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CONTENTS.

Editorials:

Notes	169
Gold Dredging	170
Equipment and Ore Reserves—V.	170
Pig Iron Production in 1904.	171
Market Conditions	172
Metallies	172
Lake Superior Mining Institute.	172
Mining in Venezuelan Guiana.	172

Discussion:

Calculating Mine Values. Blamey Stevens	173
Ore Reserves in Gold Mines. J. H. Curle	173
The Mineral Land Laws. Edward A. Belcher	173
*Circular Shafts for Mines. Emelio Cortese	175
Blast Furnaces in the Ural. J. Bicheroux	175
An Argentine Cobalt Mine. Olof S. Eriksson	176
*Hoisting Equipment at a French Colliery.	L. Saclier 177
Tin in the Federated Malay States.	179
Pyrite Smelting. A Review—X. Edward D. Peters	179
*Stotted Steel Safety Guides.	180
The Mounds of the Southern Oil-Fields—II.	Lee Hager 180
Dry Crushing on the Hauraki Gold-Field.	Percy Morgan 183
*Mining in Turkey. Leon Dominian	184
*The Buss Concentrating Table. Edward Walker	186
Graphite Mining in Ceylon. George A. Stonier	187
Recent Literature on Economic Geology—XXIV.	Western Coals. H. Foster Bain 187
Books Reviewed	188
Books Received	188

Correspondence:

Funds for Non-Union Miners. B. B. Lawrence	189
Filing Notes and Clippings. H. E. West	189
The Le Roi Mine—A Statement. S. F. Parrish	189

Abstracts of Official Reports:

Mason & Barry, Ltd.	190
Tharsis Sulphur & Copper Company.	190
Compagnie du Boleo.	190
Questions and Answers.	190
Recent Decisions	191

Patents Relating to Mining and Metallurgy:

*United States	191
Great Britain	192

*Illustrated.

DEPARTMENTS.

Assessments	205
Chemicals and Minerals:	
New York	203
Foreign	204
Coal Markets:	
United States	200
Foreign	201
Dividends	205, 208
Financial Notes:	
Gold and Silver Movement.	204
Prices of Foreign Coin.	204
Industrial Notes	196
Iron and Steel Markets:	
United States	201
Foreign	202
Metal Markets:	
Silver	204
Copper, Tin, Lead, Spelter and Minor Metals.	204, 205
Average Monthly Prices Tables.	205
Mining News:	
Summaries: Denver, Duluth, Salt Lake City,	193, 195
San Francisco, London, Monterey, Toronto,	193, 195
Sydney, Victoria.	193, 195
United States	197
Foreign	199
Mining Stocks:	
Market Reviews	199
Quotations	206, 207
Obituary	196
Schools, Technical	196
Societies	196

EDITORIAL.

A COMPARISON OF experience is always illuminating, and engineers can draw a great deal of instruction from the details of practice in other countries, whether that practice is, on the whole, superior to their own or not. The account of the hoisting system in one of the largest French collieries, which is given on another page, will, in this light, be of value to colliery engineers here.

WE HAVE HERETOFORE referred to the action of the Mountain Copper Company in arranging to build smelting works and a sulphuric acid plant near Martinez, on San Francisco bay. It will be remembered that this action was taken partly on account of the litigation in which the company was involved because of the damage done to vegetation and farming land by the fumes from its smelter at Keswick. Now that the arrangements have been made and the works are to be removed, the other side of the case begins to be apparent. The town of Keswick is a community of about 2,200 persons, all dependent upon the operations of the company. The removal of the works will oblige many of the inhabitants to leave the town, as there will be no occupation for them, and a number of them will go to the neighborhood of the new works. The Shasta county people now begin to realize the loss which will be suffered from the practical abandonment of the town, but it is too late to change the company's plans, even should all litigation be withdrawn.

A NOTE IN OUR market columns records the practical dissolution of one of the oldest and best known companies in the country. This is the Trenton Iron Company, which was organized by Peter Cooper 57 years ago, and which has been in operation ever since. The works are not to be given up by any means, but the wire mills in Trenton, N. J., have been sold to the United States Steel Corporation, and will hereafter be operated by the American Steel & Wire Company. For many years after the death of Mr. Cooper, the company was managed by the late Abram S. Hewitt. It was understood at the time that the United States Steel Corporation was or-

ganized that a very advantageous offer was made to Mr. Hewitt for the properties of his company, but he declined chiefly, it was said, on the ground that the company had many employees who had been with it for long periods, and he did not wish to run the risk of having them displaced by the closing of the works or changes in their management. Since Mr. Hewitt's death, however, his heirs have been open to offers, and have now finally accepted them. The passing of this independent concern into the control of the great combination is a notable event in the iron trade.

JULY DIVIDEND payments by 62 mining and metallurgical companies in the United States, as reported to the ENGINEERING AND MINING JOURNAL, reached a total of \$5,826,767. This showing would have been much better had not two large combinations—the Monongahela River Consolidated Coal & Coke Company, and the Allis-Chalmers—passed their regular quarterly preferred dividends, amounting together to \$697,165. However, the extra disbursements of the Alaska-Treadwell Gold Mining Company, the Kendall Mining Company, of Montana, and the Boston & Montana Copper Company, and the initial common dividend of the Federal Smelting Company, amounting in all to \$278,750, have given some encouragement. In detail the July dividends were \$2,779,580 by 33 gold, silver and lead properties; \$1,446,912 by four copper mines; \$10,300 by two Missouri zinc companies; \$199,300 by three iron and steel; \$655,788 by four coal and coke; \$125,887 by 12 oil and gas, and \$609,000 by four chemical and mineral companies.

In addition \$422,150 was paid by three Mexican mines in which Americans are interested; \$51,000 by two in Central America, and \$120,000 by a Nova Scotia coal company.

THE ARTICLE on mining in Turkey, published in another column, shows that the mineral resources of that country are much more considerable than is generally supposed, although their utilization has been hindered by local causes, and especially by bad government. The further development of the mineral industry is dependent upon the restoration and maintenance of peace in the provinces, and the introduction of foreign capital. Procuring native capital with which to open up mines is entirely out of the question.

Transportation facilities are deficient at present, but the development of the mineral resources will necessarily include the building of railroads. Part of this has been done already, especially in Europe, where a main line, with branches to the more important commercial centers, joins Constantinople to Vi-

enna. In Asia Minor foreign enterprises are also active, and would acquire greater proportions were it not for the mutual ill will and jealousy that underlie all international transactions in the Orient.

THE FIELD occupied by dredging for gold in California is to be extended considerably, a new company formed by W. P. Hammon and associates having taken up ground on the Yuba river, between Smartsville and Marysville in Yuba county. The ground has been thoroughly prospected by Keystone drills, and the projectors, W. P. Hammon and his associates, expect to obtain a large yield. It is said that the material, according to the drill samples, runs from 10 to 30 cents per cubic yard in gold, without any allowance for richer pockets, while it is believed that the cost of dredging will not exceed 7 cents. The machines intended to operate on this tract of 3,000 acres are now under construction, and will be the largest in California. They will be two in number, with a capacity of 6,000 cubic yards of gravel each daily. They will be operated by electricity, and will constitute in some respects a new departure in California dredging.

THE DIFFICULTY over the check-weighmen award made by the umpire in the anthracite coal region seems to be still unsettled, and a strike has been authorized but not finally ordered. The operators, who at first declined to accept the award, are now apparently in a more conciliatory mood. We have never believed that a general strike would come over this matter. The present outlook is that the matter will be settled, although there may be some delay over a final agreement.

GOLD DREDGING.

Although it is over twenty years since the first bucket dredge was borrowed from harbor engineering practice to dig for gold, it is only within the last five years that the use of this machine has become an important factor in mining in the United States. New Zealand led the way where the first dredge operated by steam was launched on the Clutha in 1881; soon afterward similar undertakings were started in other parts of Otago, so that by the end of 1898 there were fully fifty dredges at work on the Clutha, Shotover and Waipori rivers. At the end of 1902, no less than 270 dredges had been built, and of these 201 were in actual operation.

The success of the New Zealand dredges led to their introduction into New South Wales where the first one was launched on the Macquarie river in 1899. Since then most of the

riders draining gold-bearing country have been taken up for dredging, and a number of these machines have gone to work, especially in the Araluen district. At latest accounts eleven dredging companies were publishing weekly returns. In Victoria five dredges report weekly.

Meanwhile, the adaptation of this method of exploiting alluvial deposits was not pushed in the United States, chiefly because conditions favored the more direct practice of ground-slucing and hydraulicking, so that it was not until 1894 that the first bucket dredge was started by Harper and Revett in Grasshopper gulch, Montana. This was a Bucyrus machine, with a capacity of 2,500 cu. yd. per day. It is ten years since then, and it is safe to say that during the season of 1904 there will be fully 100 dredges at work in North America. The following list—while incomplete—gives an idea of their distribution. Our readers are invited to contribute information which will correct and complete the list.

In California: 2 on the Yuba river; 2 under construction; 2 on Bear river; 3 at Folsom; 2 under construction; 1 on the Trinity river; 1 in Shasta county; 30 on the Feather river, at Oroville; 3 under construction.

In Montana: 1 in Grasshopper gulch; 3 in Alder gulch.

In Colorado: 2 at Breckenridge; 1 under construction; 2 on Clear Creek, nearly ready.

In Idaho: 1 on Moose creek; 3 on Beaver creek; 3 in Boise basin; 10 on the Snake river.

In British Columbia: 2 on Stewart river; 3 on Fraser river; 1 at Atlin; 2 under construction.

Scattered: 1 at Elizabethtown, New Mexico; 2 in Alaska; 3 under construction; 1 in North Carolina; 2 in Georgia; 1 on the Colorado river, in Utah; 1 in Sonora, Mexico.

EQUIPMENT AND ORE RESERVES.—V.

In a recent discussion of this subject, reference was made to the diminution in working costs as a mining region gets older. Anyone inaugurating a mining enterprise may well afford to consider this factor, before planning for a lessening of expenses on the basis of a large and costly equipment. It is not always realized how great is the drop in costs, which follows upon the improved conditions consequent upon the growth of a gold-field. In 1894 the average cost of realizing upon the gold per ton of ore shipped from Cripple Creek must have been fully \$40. At that time the smelters charged \$15 per ton for treatment, the railway took \$5 per ton and these deductions, with the higher cost of supplies and machinery, made a fearful inroad into profits. Only high-grade ore could be handled, sorting was necessary, and this multiplied the original expense of mining. Within five years the smelter rate went down to \$6.50 and the railway charge to \$3, and in later years the erection of large, centrally situated chlorina-

tion and cyanide mills, competing in the ore market with the smelters, brought the total charge for both transport and treatment to a minimum, on low grade ores, of \$5 per ton.

In Western Australia, in 1897, the costs in the outlying gold-fields averaged more than the value of an ounce of gold. The scarcity of water, the dearth of timber and its transport from elsewhere by camels, the distance from distributing centers and the want of experience in the metallurgical treatment of the ores—all these factors united in rendering expenses so high as to kill the mining of medium grade ores. Within a couple of years the extension of the railways, arrangements for securing water from idle mines and the skill put into the milling methods, reduced costs by 30 to 50 per cent. This was done without any increase of equipment.

The minimum figures of recent years are, of course, the result, in large part of better equipment and a larger scale of operations, but quite aside from this factor, the general conditions existing during the earlier years of mining in Western Australia and in the Cripple Creek region changed for the better so much that, on the same tonnage and the same equipment at the same mine, the expenses went down within five years to the extent of fully 50 per cent. That is, to put it plainly, at Cripple Creek costs averaged \$40 in 1894 and \$23 in 1899; in the outlying districts of Western Australia they averaged \$22 in 1897 and \$10 in 1902. It is obvious that the increment of profit to be gained from a larger output would have been exceeded during this period by the economies due to the rapid improvement in local conditions, and that a management which deferred the enlargement of its equipment would have won a larger final profit than one which wasted its ore reserves in meeting the heavy expenses incidental to the youth of a mining district.

The subject is one to which we will return. It is well to add that the high costs at Cripple Creek were due to the fact that of the ore mined not more than one-third underwent shipment; even in rich mines one-half was sorted out, in others as much as three-quarters or even more. Thus the cost was high per ton of ore realized. This was due to the nature of the ore occurrence. Costs are now about \$14 per ton as compared to \$23 in 1899, not so much because general conditions have gone on improving, but by reason of the larger capacity of the custom mills and the bigger proportion of those low-grade ores on which treatment charges are relatively low. In Western Australia, similarly, since 1902 the beneficent results of the Coolgardie water scheme, the extension of the railways, the improvements in ore reduction and the sense of stability due to the opening up of large reserves of ore have warranted estimates of an increment of profit due to larger equipment, and to-day even an outlying mine like the Cosmopolitan

exhibits working costs so low as \$5.44 per ton, inclusive of development and taxes.

Considerations such as these prove that the solution of the problem—the ratio of equipment to ore reserves—must be determined by the local conditions of each case, and not upon general theory, however well founded. But a working theory is quite necessary in order to start with intelligent ideas upon the subject.

PIG IRON PRODUCTION IN 1904.

The production of pig iron in the United States in the first half of 1904, as reported by the American Iron & Steel Association, does not show quite as great a decrease as had been anticipated. The total for the half-year was 8,173,438 tons; which compares with 9,707,367 tons for the first half of 1903, and 8,301,885 tons for the second half. That is, while the decrease, as compared with the first half of last year was 1,533,929 tons, or 15.8 per cent, it was only 128,447 tons, or 1.5 per cent, as compared with the second half.

The number of furnaces in blast was 307 on January 1, 1903; on July 1 it was 320, but fell off to 182 on January 1, 1904. By June 30, the end of the half-year, it had increased to 216, while 209 furnaces were then idle. Among the furnaces out, however, are a number of old and small stacks, which may never resume, though still counted in the lists. This makes the statement somewhat misleading. There is not anything approaching one-half of the blast furnace capacity idle, though the figures might seem to indicate it.

The production, classified by the uses for which it is intended, was as follows, in long tons:

	1903.		1904.	
	Tons.	Per ct.	Tons.	Per ct.
Foundry and forge.....	2,912,270	30.0	2,466,386	30.1
Bessemer	5,480,619	56.5	4,530,946	55.5
Basic	1,203,803	12.4	1,061,901	13.0
Spiegel and ferro.....	110,675	1.1	114,205	1.4
Totals	9,707,367	100.0	8,173,438	100.0

The production of ferro-manganese alone in the first half of 1904 amounted to 26,541 tons, against 14,118 tons in the last half of 1903 and 21,843 tons in the first half of that year. Included in this is a small quantity of ferro-silicon, electrolytically made.

Changes from last year, in quantities and proportions, are as follows:

	Tons.	Per ct.
Foundry and forge.....	445,884	I. 0.1
Bessemer	949,673	D. 1.0
Basic	141,902	I. 0.6
Spiegel and ferro.....	3,530	I. 0.3
Total	1,533,929	.....

The smallest proportional decrease was in basic pig; which indicates that the manufacture of basic steel has shown less decrease this year than that of bessemer and acid open-hearth metal. This is probable, as many of the smaller basic open-hearth plants have been steadily in operation.

The classification of the iron made this year, according to fuels used, is as follows:

	Tons.	Per ct.
Coke and bituminous, chiefly coke.....	7,337,279	89.8
Mixed anthracite and coke.....	607,624	7.4
Anthracite alone	15,179	0.2
Charcoal	213,356	2.6
Total	8,173,438	100.0

Coke is the staple blast furnace fuel of this country; raw bituminous coal is hardly used, while 97.5 per cent of the so-called anthracite pig is made with a mixed fuel, of which coke forms a considerable proportion.

The approximate consumption of pig iron in the first half of the year was as follows, comparison being made with the first half of 1903:

	1903.	1904.	Changes.
Stocks, Jan. 1	49,951	591,538	I. 541,587
Production	9,707,367	8,173,438	D. 1,533,929
Imports	452,451	61,933	D. 390,518
Total supply	10,209,769	8,826,909	D. 1,382,860
Exports	7,357	25,009	I. 17,652
Stocks, June 30 ..	126,301	623,254	I. 496,953
Total	133,658	648,263	I. 514,605
App. consumpt'n.....	10,076,111	8,178,646	D. 1,897,465

We have here a decrease in consumption, as compared with the first half of 1903, amounting to 18.8 per cent. It is probable that the actual falling off was fully, if not a little over, 20 per cent, since the stocks reported do not include iron held by the large steel companies for their own use, and not for sale as pig.

A decrease of one-fifth is sufficiently formidable—but it is less than many estimates made; and it is less than we have seen in some previous years in the history of the trade. If, in a period when everyone is deploring the depression and predicting general ruin, we are able to use over eight million tons of iron, all is not lost. A boom cannot be expected to last forever; but it is evident that there is a substantial business still to be done, and signs of future improvement are not lacking. Much capital has been locked up in enterprises started to meet an abnormally inflated demand, and now unproductive for the time. The country generally is not poor, and it is quite possible that we may see a gradual revival of the demand for structural materials, which will put iron makers on a comfortable basis, though we cannot, of course, expect now a renewal of the boom times of 1902-1903.

One theory, which was in great favor two or three years ago, has been exploded by the present depression. We were told on all sides that the consolidation of the iron and steel trades in the hands of great combinations was going to steady and equalize the business, so that there should be no more extreme fluctuations—no more alternations of activity and depression, of high and low prices. The present situation shows the fallacy of the supposition that any combination, however great its capital, can control the laws of trade. In fact, the greatest trust of all is hit the hardest, and seems to be most at a loss to define its policy. The smaller producers have the best of the situation just now, and are making the most of their opportunities. And we hear but little now of the wonderful advantages of combina-

MARKET CONDITIONS.

Aug. 3.

The metal markets continue to show very little change, and may be called dull, with only the slight exception noted below.

In copper very little is doing for home consumption, and buyers seem to be taking little interest in the market. European demand, however, continues fair only; not all the fear of political complications having passed away, though consumption over there appears to be on a very good scale indeed.

Tin is quiet, with only moderate purchases from consumers. Lead remains unchanged, both as to prices and business. Spelter is rather dull, and shows little change. Ore prices in the Joplin district are nominally well maintained, but the margin left to the smelters is so narrow that it looks as if there must be some change soon.

Silver remains very steady, under the influence of continued buying from the East, and there seems to be no prospect of any immediate decline of importance.

The iron markets continue dull and irregular. Here and there a little increase in buying is noted, but the transactions have been mainly for immediate use. Some consumers appear to be ready to place future contracts, but makers do not seem anxious to undertake any long deliveries at current prices. In the Southern iron district there has been a curtailment of production, several furnaces having been obliged to shut down on account of the coal miners' strike.

The Western coal markets continue dull and inactive. Lake trade has fallen off a little from the first rush, and local business is very quiet. In the southern district the Alabama union miners are still out, though it is said that negotiations for a settlement will shortly be resumed.

The anthracite market is disturbed over the possibilities of a strike on account of the check-weighmen award. In fact, a strike has been ordered by the executive board, but the order has not yet been put into effect, and it looks very much as if the matter would be settled after all.

The Atlantic seaboard bituminous coal trade is quiet, showing no material change from recent conditions.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

Both in England and Germany it is found that many coals will coke better when crushed fine, damped and compressed before going into the oven.

English experience with retort coke ovens, as recently reported, shows that the quantity of coke obtained from a given amount of coal exceeds, by from 10 to 15 per cent, the yield from a beehive oven. Retort coke is made

denser than beehive coke, and a little darker perhaps, because it is quenched outside the oven on the bench.

A square foot of uncovered pipe, filled with steam at 100-lb. pressure, will radiate and dissipate in a year the heat put into 3,716 lb. of steam by the economic combustion of 398 lb. of coal. Thus, 10 square feet of bare pipe corresponds approximately to the waste of two tons of coal per annum.

The voltage of a direct current transmission system is limited to 750 volts, or less, on account of commutator troubles. Alternating current transmission at 55,000 volts is now employed at Shawanigan Falls, Quebec. Economical alternating current is limited by line losses through brush discharges and by the difficulty of maintaining insulation and preventing short circuits. For transmission underground, 10,000 volts is about the maximum pressure as moisture in mine air increases insulation troubles.

The natural resources of the earth have, in all ages and in all countries, been squandered by man with a wanton disregard of the future; and they are still being squandered wherever absolute necessity has not yet forced a more careful utilization. This is natural, as long as the exploitation of these resources is left unrestricted in private hands; for private enterprise, private interest, knows only the immediate future—has only one aim in the use of these resources, and that is, to obtain from them the greatest possible personal and technical gain.

Monazite, which has come into importance in recent years for the manufacture of incandescent gas mantles, is mined in but three places, the Carolinas, Brazil and Norway. The deposits in North and South Carolina and Brazil are found in gravels resulting from the erosion and disintegration of ancient crystalline rocks; the Norwegian monazite, on the other hand, is obtained as a by-product in feldspar mining and occurs in pegmatite dikes.

LAKE SUPERIOR MINING INSTITUTE.

The committee having in charge the arrangements for the Tenth Annual Meeting are making good progress and the following general outline can be presented at this time.

Members will meet at the Curry Hotel, Ironwood, on Tuesday morning, August 16, where the day will be spent in visiting the mines on the Gogebic Range. For this feature ample accommodations will be provided for the comfort of the visitors. In the evening a session will be held for the reading of papers and the transaction of such business as may come before the meeting. After the meeting the party will leave by special trains for Milwaukee, arriving there Wednesday forenoon, and proceeding immediately to the plants of the Allis-Chalmers Company, the Prescott pump works, and such other points as may be convenient. There will be a session held in the afternoon or evening as may be decided later, for reading papers, etc., also an excursion to some of the interesting points near the city. Headquarters will be at the Plankinton House.

On Thursday there will be an excursion to the plants of the Nordberg Manufacturing

Company, the rolling mills, Bucyrus works and other points of interest. In the evening a banquet will be tendered to members and their guests. Trains will leave at convenient hours after the banquet, one returning to Ironwood, Ashland and Duluth, and another to Iron Mountain, Ishpeming and the Copper Country.

Itinerary of the trip with railroad time cards and all necessary information will be furnished members upon their arrival at Ironwood.

Following is a partial list of papers which will be presented at the meeting:

Titanium and Titaniferous Iron Ores; by Dr. Nelson P. Hulst.

Supply System; by Walter M. Jeffery.

On the Bisbee District of Arizona; by George A. Newett.

Sinking Sand Shaft at Maas Mine, Negaunee, Mich.; by W. W. Graff.

Iron and Steel Consumption; by George H. Abeel.

A Study of Faulting at the Ashland Mine; by Lucien Eaton.

Sinking Shaft in Quicksand at Susquehanna Mine, Hibbing, Minn.; by H. B. Sturtevant.

Messrs. Graham Pope, Jas. R. Thompson, F. W. Sperr, J. Parke Channing, R. S. Rose and others have also promised to prepare something of interest to the Institute.

MINING IN VENEZUELAN GUIANA.

The mining district of Guiana is known as Las Misiones, because it was first colonized by Spanish missionaries who, at the end of the 18th century, had over thirty very prosperous establishments. These missions were destroyed during the war of independence, and the monks were massacred or expelled. After the dispersion of the monks, the country was colonized by people from the north of the Orinoco, who mixed with the Indians, so that pure Indians have now totally disappeared from the region.

Local traditions tell of fabulously rich mines that had been exploited by the monks and were walled up before their departure from the country. It was only in 1845 that the first nuggets were found in the bed of the Yuruari river and in 1850 the first work in that valley was begun. In the valley of the Mocupia large quantities of placer gold were discovered and miners commenced to flock to the district, especially from Peru and Colombia. For 15 years the quantity of gold extracted went on increasing, and in 1865 the famous quartz vein of Callao was discovered. After a very difficult and modest start the Callao mine reached a production of gold so great that it attracted, for a long time, the attention of the whole world. Not until 1871 did the production of El Callao commence to be important, the quartz then yielding over 6 oz. of gold per ton. A real gold fever invaded the district, all the surrounding lands were secured and mining claims were taken up by speculators who cared little about the existence of ore on their property. Mining companies were formed by use of the reputation of the Callao mine, as Callao Bis, New Callao, West Callao, and so forth; mills were purchased and erected before any veins were discovered, the inevitable result being the bankruptcy of the companies and severe losses to the English and French capitalists who rushed in to speculate.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of the ENGINEERING AND MINING JOURNAL.

CALCULATING MINE VALUES.

The Editor:

Sir.—The following table was computed for my own use some time ago, but it might be more generally useful, as I notice several writers in the JOURNAL are very lax in their methods of estimating values.

The table shows the value of uniform yearly dividend (per cent of capitalization) and the ratio of capitalization to total dividends (as percentage):

Interest on principal. Per cent.	Life of mine (years).				
	5.	10.	20.	30.	50.
2.....	{21	11	6.1	4.5	3.2
	{94	89	82	75	62
3.....	{22	12	6.8	5.1	3.9
	{91	85	74	65	51
4.....	{22	12	7.4	5.7	4.7
	{89	81	68	57	43
5.....	{23	13	8.1	6.5	5.4
	{86	77	62	51	37
6.....	{24	14	9.6	7.2	6.2
	{84	74	52	46	32
8.....	{25	15	10	8.8	8.3
	{80	67	49	38	24
10.....	{26	16	12	11	10
	{76	61	43	31	20

The values are calculated on the supposition that the mine pays uniform dividends from start to finish and that no surplus is left. The total dividends, of course, correspond with the value of ore after net mining and treatment charges have been deducted and the capitalization includes equipment to a dividend paying basis, so that the valuation must be modified accordingly, and also by some factor dependent on the risk, where this is not taken account of by assuming a high rate of interest on the principal.

In a mine, where the risk is almost wholly dependent on the ore-body and is incurred when the purchase is made, is it not more rational to modify the value for risk directly instead of the interest on time, as one would in a manufacturing business with a continually varying environment.

BLAMEY STEVENS.

Valdez, Alaska, July 10, 1904.

ORE RESERVES IN GOLD MINES.

The Editor:

Sir.—I have just been re-reading Mr. Hoover's articles of March 24 and May 19, and, if not too late in the field, should like to make a few remarks on points raised by him.

Mr. Hoover says that "the maximum profit from any (gold) mine can only be obtained by the most rapid exhaustion of the mine, and that most rapid exhaustion is to be secured only by the most vigorous prosecution of development and the maximum equipment that can be employed." He then goes on to show—as a result of carrying out this system—that an economic limit to a mine's ore-reserves intrudes itself as a factor, and that this economic limit works out at about three years. From the technical point of view I feel sure that Mr. Hoover's arguments are correct. They are unanswerable, and cannot but be endorsed by technical men.

Now let us look at ore-reserves from the point of view of those who buy the shares. What do they say? It is a true saying that "those who pay the piper call the tune," and as the investors in gold mines furnish the cap-

ital wherewith the industry is kept going, it is only right that their side of the argument should carry weight. I will assume that these people know as much about sound finance as Mr. Hoover does about economic mining—indeed, you will find H. C. Hoover, Esq., the capitalists among their number.

The argument of one of this investors' class would be as follows: "I have money to invest and intend to put it in gold mines. I have a sound knowledge of finance, and believe that, besides the value of any capital in the mining industry, my personality will have a sound and steadying influence on a class of securities hitherto held by many people in disrepute. But if I come in, and find money, I bring in with me my knowledge of sound finance, and I insist that the investments placed before me shall conform to a certain degree of safety which degree I, not you, shall decide. I see that from the technical point of view Mr. Hoover's claim for an ore-reserve of only three years is sound; but I, who am asked as a consequence to risk the greater part of my capital on the chance of finding ore that is not yet exposed, and knowing the risks of mining, decline to go in on such terms. As a sound financier I wish to insure my capital, and I can do so to a great extent by insisting that there shall be ore-reserves for considerably more than three years ahead. I know that this is not the most economical way of handling the mine, and that there is a loss of interest on the money locked up in these extra reserves, but I look on this loss as the price I pay for insuring my capital, and am satisfied to incur it. If my terms don't suit you, I will withdraw from gold mining, and the gamblers and charlatans who have in the past made this industry their hunting ground can return."

Under ideal conditions of investment a three years' ore-reserve, as required by Mr. Hoover, would really be enough, for the shares would only be capitalized at such a price as to yield 30 per cent to the investor, who would then, on his three years' reserves, have the respectable proportion of 90 per cent of the mine's market capitalizations in sight as net profit. But in a mine that is located in a good district, with big ore-bodies, and looking well in the bottom, such a yield as 30 per cent is now impossible to secure. If such a mine can be bought into, to yield 15 per cent, it is as much as the investor can look for; but more often the yield of interest on the price of standard gold mines is found to be no more than 12, 10 or even as low as 8 per cent. Personally, I have come to the conclusion that the best gold mine should return 15 per cent to an investor, of which he must set aside at least half for the redemption of his capital; if the mine is not looking well in depth the rate of interest received ought to be considerably more.

Mr. Hoover's second article discusses ore-reserves in their relation to mine valuation. He says, with truth, that it is rarely possible in the initial stage to find a mine with a net profit in sight equal to the price asked for it. I had said that it is rarely possible to buy shares on this basis in a producing mine, and we had both tried to answer the question, What margin of risk is it permissible to take? Mr. Hoover argues that this margin of risk ought to be determined differently for individual mines, and gives most ingenious theories for arriving at this unknown factor—theories based on locality; geologic structures; the nature of ore-shoots; width, length and value of the ore-bodies—all of which much be as-

sessed at their just value and added to the net profit then in sight. I had previously, in estimating the chances of the average sound gold mine, over and above its present net profit in sight, lumped all these possibilities together as a job lot. My formula is that a share is worth buying if the net profit in the mine—assuming developments in the bottom are normal as to width and value—is equal to two-thirds of the market price of the mine. That means that I expect enough additional ore will be exposed in depth to at least return the one-third of the capital which is unguarded, and also pay a good interest on the whole of the capital at stake. This generalization of mine strikes Mr. Hoover as somewhat crude. But let me point out that it was written for laymen. The average investor, so far as I can see, has no standard to guide him, and is liable to flounder most hopelessly when he buys mining shares. The mere putting into operation of this bit of advice, and thereby reducing mine capitalizations to one-third more than the net value of the current ore-reserves, would alter the status of mining investments out of all recognition. In other words, to produce a paradox on one of Mr. Hoover's favorite expressions—amortization would set in, and the investing body, instead of dying, would be on the high road to recovery.

J. H. CURLE.

London, July 20, 1904.

THE MINERAL LAND LAWS.

The Editor:

Sir.—Dr. Raymond's article under the above caption in the ENGINEERING AND MINING JOURNAL for June 16 will attract wide attention and be warmly welcomed. His experience has been so varied and his knowledge is so full and fine, that whatever he writes is both interesting and instructive. It is almost needless to say that the article in question is both convincing and timely.

As he points out, in no country save ours would such a system as ours for the disposition of the public mineral lands be tolerated. Even the rule of the land of *poco mañana* is infinitely better. In adding something further, under the same heading, I shall pursue the lines of Dr. Raymond's article and adopt his sub-divisions.

1. The extra-lateral right should be utterly abolished. It is a thing of evil. Within my reading no one statutory provision has been so productive of endless and costly litigation as this. No mine-owner can say, with assurance, that his title is quieted for all time; at any stage some new development may start a new suit; at any depth his vein may intersect another and be lost to him if he chances to be the junior locator; at any point his vein is liable to develop into a complex fissure and involve him in endless controversy over the doctrine of underlap and connecting veins. Death only or the petering or working out of his ledge ends the miner's troubles. With respect to the beneficence of the doctrine of the extra-lateral right, note as familiar instances the litigation in the Coeur d'Alenes and at Butte, Montana, yet in its swaddling clothes, so to speak.

For decades there has been a desire for a better mining law, and it will be good news to miners that a Federal commission has the subject in hand.

The Philippines mining act of July 1, 1902,

is the latest Congressional legislation. The Filipinos, doubtless, will never know how grateful they should be that the extra-lateral right has not been inflicted upon them. That act provides for a claim 1,000 ft. by 1,000 ft., in rectangular form, within the boundary lines of which, continued vertically downward on every side, the locator is entitled to all the minerals. Diagrams illustrate the intention of the Congress to provide for the placing of stakes in such manner as to comprehend the dip of the ledge to almost any feasible working depth within the vertical planes of the boundaries. In several respects that act can be consulted to advantage in the preparation of an amendment to our existing mining law or, better still, an entirely new mining act.

Really there can be no sound objection to vertical planes for boundaries. It is easily perceivable that if a ledge should chance to run beyond the vertical planes of the boundaries at a depth still permitting work, then, as the only discovery possible would be by the owner at the place of crossing, he could make a side location and protect himself. His would be the only valid location as being the only location founded upon discovery. In almost any contingency the owner of the original location would be in a situation to protect himself against the "jumper," because the jumper could make no discovery upon which to found a valid location of the ground lying to the side of the original location into which the ledge projects on its dip, after crossing the vertical boundary of the original location. The only possibility of any trouble accruing to the owner of the original location, where the ledge crosses his boundary and he desires to continue to work it, would be where a side location embraced an apex of its own, from which to the lode of the original location there might, at the depth of the boundary crossing, be a cross-cut. The only statutory method of providing against such a situation would be to give the owner of the original location the right to make a side location calculated to embrace the dip at any feasible depth upon his original discovery. Ordinarily, however, within the perpendicular planes of the location the vein could be worked as deep as would be desired, or as practicable. But even though that should not prove to be the fact, is there any greater reason why one locator should have the right to make two mining locations than there is why one agriculturalist should be restricted to but one homestead?

2. The rules for perfecting a mining location require radical changes; nevertheless, changes should be advisedly considered so as not to handicap too severely the "honest miner."

It is true that save in the occasional instances where patents to mines have been obtained, as compared with the vast number of mining locations in which no land office proceedings looking to patent have been taken, there is no definitive segregation of mineral lands from the agricultural, but the fault is due to the law, that is, to the system. Under the Federal law the mere location, together with the required expenditure for labor and improvement, gives permissive title for an indefinite period—a title which the United States Supreme Court has held to be "an estate vested in the occupant." The statute does not require the locator to procure a patent, it does not even require him to record his location. Only State or mining district laws require

record. As a consequence, under the Federal law, unless proceedings to obtain a patent are initiated, there is nothing to connect the mining location with the land office—the place is provided by law for the disposition of the public lands. In the absence of an application for a patent, nobody can know anything about a mining location save the locator, those whom he has informed, those who may chance to be on the ground and see the stakes and those who are constructively informed by the record of the location in the office of the recorder of the mining district, or in the office of the county recorder. The record aforesaid is supposed to give constructive notice, but its capacity in that direction is limited; confessedly it is no notice at all to the paramount proprietor—the United States. The laws of mining districts and of some of the States require record, but the reason for the rule—antedating the enactment of the Federal mining law—long since lost its force, since Federal surveys of the public lands have been widely extended, and general withdrawals of wide regions, supposedly mineral in character, set aside.

In instances known, mineral lands have been returned as such by the United States deputy agricultural surveyors in the field, and platted as of that character; but otherwise than as they are so platted from casual examination or information, and as segregated by deputy United States mineral surveyors in patent proceedings, the Government maps give no information as to what are mineral lands. Some of the best mines have been discovered upon lands surveyed, returned and platted as of agricultural character. In places, public lands returned as agricultural in character, or at least as not being mineral in character, are, in fact, covered by mining locations, duly recorded under local rules, of which the United States land offices have no knowledge. This condition of fact is not merely bad, it is shocking, and it is high time the law was changed. Yet any change that would put too severe a burden upon the hardy prospector and poor miner would fall short of attaining the object desired. The present law does not protect the "honest miner." In numberless instances where the land in which his mine is situated has been returned as agricultural, unless he has chosen to initiate patent proceedings, he is at the mercy of the agricultural claimant, the "scripper," or the purchaser from the State under a State selection to fill the quota of school lands lost from the grant in place. For the lesson they may convey I give three instances, selected out of many that have come to my notice as a mining lawyer, of mishaps to miners who assumed that location and annual labor conferred sufficient title. M. J. C. . . . had been mining upon his claim upon an even-numbered section of public land for many years and had expended upon it considerable money. Learning that his title was in question he investigated and discovered that the township had been surveyed and returned as agricultural; that subsequently the State had selected that section as a lieu selection for land lost from its grant in place; that the land department of the Government had approved the selection and certified the land to the State and that the State had sold it. The maps in the land office did not indicate that there was any mine there, and very properly so, because the mine was discovered after the survey and no patent proceedings had been initiated. He was compelled to pay the purchaser from the State his own price.

J. G. had mined upon his claim in an odd-numbered section within the limits of a railroad grant for 30 years, relying upon his location and annual labor for title. The railroad company selected the land in a list of lands subject to its grant and, the maps and land office records showing nothing adverse, the selection was approved and patented. Afterwards the railroad company sold the section containing the mine, and thereafter J. G. heard from the purchaser.

P. McC. had a good claim that he had worked for several years. His location was of record, and regularly, year by year, he recorded his affidavit of annual expenditure. He thought that gave him a good title. There was nothing in the land office to show the existence of a mine in that section, and the land, appearing to be clear and subject to such entry, was taken by scrippers.

In the instances these miners were negligent. They slept on their rights, or rather did nothing to disclose their rights; but their negligence was invited by the seeming security of the Federal statute, which, while providing for patent proceedings, nevertheless does not require that a patent be taken—which statute both by intent and interpretation confers "an estate vested in the occupant," from which "estate" the honest miner is liable in many cases to be disseized by merely placing blind confidence in the statute and taking no steps to procure a proper title.

In the estimation of the writer the Federal statute should require mining locations to be recorded in and noted upon the records of the United States land offices. Where the locations are of placers, they would conform to legal subdivisions and could be noted on the plats and tract books without much trouble; but where they are of lode claims a survey would be necessary in the first instance to establish relation to township and subdivisional lines, so that a proper segregation from contiguous lands could be properly made.

There is no other means of segregating the public mineral lands. They must be segregated so that the land office—the place provided by law for the disposal of all public lands—may have notice of what they are. The Ministry of Industry in Mexico and the Mining Commissioners of British Columbia have such rules. Nothing is left to chance as here—that is to say, an official segregation of each location is made at the outset.

The plats of the deputy mineral surveyor and of the land office would always agree and conflicting locations—now so easy to make, and so fruitful of litigation or blackmail—would not be permitted without a showing under oath, nor unless it should appear that the conflicting party had some substantial litigable interest not merely negligible.

Doubtless this procedure would reduce the number of locations recorded, but it would have a tendency to make prospecting more thorough and extensive as is the case in Canada and Mexico.

The Federal law should also be amended so as to require a locator to procure a patent within a specified period, say within five years after recording the location in the land office, under penalty of forfeiture. If a mine is worth working it is worth patenting, and there is no reason why the owner of a mine should not be required to get a title while the owner of a farm is. The period of five years is chosen by analogy to the homestead law.

3. The new Federal law should be compre-

hensive. It should provide, as suggested, for a record in the land office, and should provide, negatively, that no other record should be required. That would do away with the record of the country recorder and the record of the recorder of the mining district and the accompanying expenses and dangerous uncertainties.

The proposed legislation should, also, in exact terms, do away with that continuing source of infinite perplexity, the local rules and regulations of miners. Vol. 14 of the 'Tenth Census Report, 1880,' contains Clarence King's compilation of the local rules and regulations of miners, but it does not contain all. Many exist only in tradition, and can be proved only by parol. The collection referred to is curious;

nearly as possible air-tight. The smaller compartment is utilized for the ladders so that the men can enter the mine by the main shaft. In the larger compartment I place the cages, each of which holds two trucks, or mine-cars, having a capacity of one-half cubic meter each. Three timbers hold the guides *G G*. Steel beams might be substituted for these timbers. In the segments, *B B*, I place the steam and water pipes, connecting with the steam pumps at the bottom of the shaft.

The vertical distance between each set of timbers in the shaft is 2.50 meters, or approximately 8 ft. The ladders have the same length, being slightly inclined, and alternating in different directions. The hand rails *d d* facilitate very much the ascent and descent by the lad-

this design, some of them very deep, and have been very well satisfied with the work done in and through them.

EMILIO CORTESE.

Genova, Italy, July 18, 1904.

BLAST FURNACES IN THE URAL.*

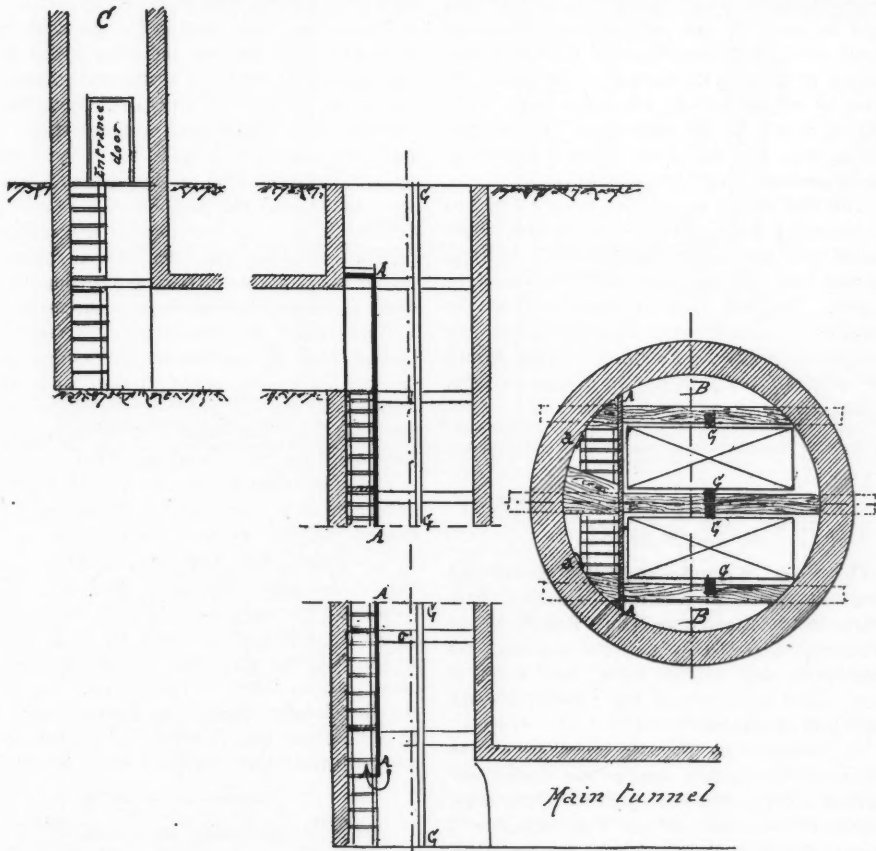
By J. BICHEROUX.

The Ural iron industry includes mines and furnaces scattered over an immense territory, one several times larger than France and Belgium together. It is particularly developed in basins of the rivers, the Viatka and the Kama at the north, the Tschusowa and the Ufa in the center and the Bielaia at the south, these streams permitting at certain times of the year the shipment of the iron toward the Russian and Asiatic centers of consumption. The object of the industry is to render profitable immense forest riches, otherwise valueless, as there are no places where they can be utilized, and no ways of getting them to centers of population.

The rivers named are usually only insignificant shallow water-courses, but the melting of the snow in the spring swells them to large volume, and permits for some days the passage of large flat boats, 100 to 160 ft. long, carrying cargoes of 150 to 400 tons. The iron works profit by this short period of navigation to send toward the Volga their total yearly output of wrought and pig iron. The works are generally situated on some branch of the principal stream, and several *versts* from it. A dam across the stream furnishes power, during a large part of the year, for water-wheels to drive the blowing engines. This same stream, dammed farther up, serves in the spring to float timber cut during the previous winter in the neighboring forests, and thrown in after the ice goes out. It is caught by the dam and piled up near the charcoal ovens, which are thus supplied during the whole year. At the outlet of the brook a large ship-yard is provided for the construction of the boats needed to carry the products toward the ports on the Volga. Establishments toward the head waters of the rivers use boats 100 to 120 ft. long, carrying 165 to 245 tons. Establishments better situated build boats 175 ft. long, carrying as much as 650 tons. Such boats require 600 fir-logs, 2 ft. in diameter, 48 to 65 ft. long, cost \$800 to \$1,000, and are resold as lumber on the Volga at one-quarter of their original value.

As a rule the smelting plants are of small size, and of primitive equipment. They comprise one or two furnaces, 40 to 56 ft. high with three tuyeres, tapering in profile with thick masonry supporting pillars, the whole covered in a tower of brick, supporting the platform of the furnace top. This is open, and an inclined plane of gentle slope leads to it, the charge being drawn up by horses, in wagons made of wood for the ore, and of wicker for the charcoal. The charging is done by shovels. The gas is used to heat the blast in contrivances that vary widely. The blast is supplied generally by a piston-blower of very small power, driven by a water-wheel in summer and in winter by a steam engine, often very large, joined to the same shaft and receiving steam from a battery of boilers that are fired with wood. The apparatus is usually

*Abstract from a paper on 'Fabrication de la Fonte au Bois dans L'Oural,' *Revue Universelle des Mines*, February, 1904.



SKETCH OF CIRCULAR SHAFT.

but the sort of thing shown there ought not to be law anywhere.

There should be a uniform and complete system for the location and sale of the public mineral lands, which system should be exclusive.

EDWARD A. BELCHER.

San Francisco, July 25, 1904.

CIRCULAR SHAFTS FOR MINES.

The Editor:

Sir.—In the *ENGINEERING AND MINING JOURNAL* of June 16, page 952, I have read an interesting article about circular shafts for coal mines. As manager of sulphur mines and of coal mines in Italy, I worked out and adopted a special type of circular shafts, in which I succeeded in concentrating the several services required in the shaft and with the least possible loss of space. The shaft section is divided into two compartments by a partition *A A*, which may be made of timbers and planks, or of iron sheets. It should be as

ders; in fact it is so easy that miners frequently go up and down without lights and are in no danger of falling.

During the sinking of the shaft the division is very useful, in order to keep up a good ventilation. A small fire kept in the entrance shaft *C*, above the door, is sufficient to create an air current. The air descends through the large compartment, ascends through the smaller one, and finds its way out from the top of the chimney or entrance *C*. The course of the air is shown by the arrow on the sketch.

When the shaft is finished and at work, the large compartment is heated by the steam pipe leading to the pump. The air from the mine is exhausted through that compartment, while the fresh pure air goes down through the small division or ladder section of the shaft. The miners going up and down, therefore, find always abundance of air fresh and not contaminated.

In the accompanying sketch the vertical section of the shaft is on a scale twice as large as the plan, or top view, is drawn.

I have sunk in all eight circular shafts of

ill-planned, and turns out a daily production of 12 to 15 tons per furnace, with an excessive amount of hand labor.

The calcined ore used is rich and pure. It is mined in open pits, at distances of 5 to 50 *versts* from the furnace, and calcined on the spot, more to render pulverulent the clay it contains than for any chemical changes produced. The calcining is done in large heaps, 10 to 12 ft. high, upon a bed of wood, 30 to 45 in. thick. It is primitive and costly, but suffices. The ore, like the charcoal, is stored at the smelter in great sheds. It is carefully sledged and broken before use.

The plants recently installed, as well as those remodeled, have stacks 51 to 55 ft. high, 11.5 to 13 ft. in diameter at the bosh, 51 to 60 in. at the crucible, and 10 ft. at the top. These furnaces have four tuyeres, 3.5 in. in diameter, and the blast has a pressure of 1 to 3 lb. in the blowers of most recent type. The blast is heated to 350 or 400° C. in a Calder, or to 600° or 700° in a Cowper stove. The top of the furnace is closed by a bell and cone. Part of the gas is carried to the stoves, and the other part is utilized for steam by means of purifiers and washers suitably installed. The charge is hoisted vertically to the platform by steam hoists in cars with iron-plate boxes.

Such furnaces smelting calcined ore, carrying 56 to 63 per cent of iron, make 25 to 40 tons of pig iron in 24 hours, with a consumption of 1,500 to 1,975 lb. of charcoal to the ton. The fuel consumption is low, and the production relatively heavy, when charcoal made from birch and pine mixed is used. Oak is not valued, as the heavy logs get lost in floating down stream. Charcoal made from aspen is soft, greatly reducing the production of iron, and increasing the consumption of fuel. The slag is a bi-silicate carrying 40 to 45 per cent of SiO₂ and CaO. The iron, according to the working of the furnace, is mottled, or gray and fine grained, and contains from 0.25 to 2 per cent of silica, 4 per cent of carbon, 0.25 to 2 per cent of manganese, traces of sulphur, and little or no phosphorus. Its quality is excellent.

The charcoal is made in ovens, and very rarely in heaps. The ovens are plain rectangles of masonry, surmounted by a cylindrical roof having a full centered arch. They have a capacity varying from 450 to 1,040 cu. yd. of wood, and are heated by a side-hearth, opening on the center of the floor into a chimney 18 to 21 in. wide. The gases of distillation escape at the four angles by passages 4 to 5 in. wide, and pass across a tar collector to a plank chimney. The filling and emptying is done in the little ovens by a side door opening into the hearth, and in the large ovens by two doors in front. A workman takes care of four ovens. To convert a charge to charcoal in a large oven takes five days, the cooling seven, and the emptying and re-filling, four days.

The charcoal is stored for use in large sheds roofed with sheet iron, divided by cross walls of fir logs, and separated from one another by open spaces. The calcined ore is stored in heaps, or in large cupola-like structures. All plants are by preference on the side of a hill, and have no mechanical appliances whatever, except a breaker to break up the ore, and separate the clay made dusty by calcining. There are numerous establishments in the Ural which cast their pig iron, make their ordinary and refractory bricks, and get from their own resources whatever is necessary, not only to

their existence, but also for all repairs and equipment, except important pieces of machinery.

With prevailing conditions, the cost of charcoal at the furnace, including the cost of wood, its transportation, manufacturing into charcoal, depreciation on ovens and general charges and transportation of the charcoal, comes to about \$5.31 per metric ton.

Most of the many iron works in the Ural get the ore from mines belonging to the owners of the land whence is taken the supply of wood. All these mines are rich, and the ore is pure. There are so many scattered openings that it is difficult to estimate the contents of the veins more nearly than in hundreds of millions of tons. It follows that the exploitation of these deposits for a long time will be more or less rudimentary, taking out what can be broken easily, and leaving in that which is difficult to extract. The mines are paid by weight for the ore taken out. After paying royalty to the land owner, and the cost of hauling, the ore costs at the furnaces at the maximum, \$1.79 per metric ton.

The cost of pig iron under these conditions is, including taxes and general expenses, about \$11.58 per ton. The transportation charges, storage and sale at Nijni Novgorod must be added. The sale takes six months from the period of manufacture; the interest on the cost, combined with all other charges brings the price of the iron on the Volga to from \$16.60 to \$17.40 per metric ton.

AN ARGENTINE COBALT MINE.

By OLOF S. ERIKSSON.

The Reina Alejandra deposit of cobalt and gold ore at Valla Hermoso, Vinchina, Provincia de la Rioja, Argentine Republic, was discovered less than two years ago and has since then been worked by a small force of men, under direction of the owners, Messrs. Gare and Eriksson.

It is situated on the western slope of the Cerro de Famatina, a spur of the Andes, extending south and almost parallel to the main Cordillera from Lat. 28° S. This mountain is famous for minerals, specially its eastern slope, which boasts such well-known districts as the Mejicana, to which just now the greatest aerial tramway in the world is being built by the national government.

The site of the Reina Alejandra is about Lat. 28° 20' S. and Long. 70° 25'.

The ore deposit occurs in a big patch of talcose schist covering several square miles, and principally near the contact with an acid igneous rock of which the main body of the range consists. A large number of veins appears at the surface. These show outcrops of rich cobalt ore in several places, but so far only one of them has been seriously exploited. This vein, which is about N. 60° W. and a northerly dip, has, on account of its favorable situation on the hillside, been worked by three adits; the upper two follow the vein and the lowest started as a crosscut but tapped the vein in rich ore at 18 m. from daylight.

Since entering into this ore-body, the various faces have never failed to show rich ore everywhere, of a width varying from 90 cm. to 1.30 m., with an average of about 1.10 m. From the whole of the workings more than 300 tons of ore have already been produced, of which 150 tons have been sorted, so

as to pay the enormous expenses of export to Europe. What cannot be brought up to that grade by hand-picking is thrown over the dump.

The ore consists of cobalt glance, mixed with arsenical pyrite in a gangue of quartz. First and second classes of ore are sorted, thus:

FIRST CLASS.	
Cobalt	.....from 6 to 7 per cent.
Nickel	....." 0.5 " 2.5 per cent.
Gold	....." 25 " 30 grams per metric ton
Silver	....." 150 " 300 grams per metric ton
SECOND CLASS.	
Cobalt	.....from 3 to 4.5 per cent.
Nickel	....." 0.10 " 0.80 per cent.
Gold	....." 10 " 20 grams per metric ton
Silver	....." 90 " 180 grams per metric ton

Of course, the bulk of the ore sorted consists of the second class; only a few tons of first class having been produced so far.

The second class, sold in Europe, will fetch from £12 to £17 per ton, but even at that price the margin of profit is small, on account of the enormous cost of transport. In order to remedy this, mechanical concentration has been considered and tests have been made by a responsible firm in Europe with excellent results, and the erection of a small concentrating plant at the mine is now contemplated. Smelting the ore into a speiss or matte has also been tried, but owing to its silicious nature this has been unsuccessful.

With regard to concentration, it has been proved easy to concentrate the entire mine product up to the grade of first class, thus utilizing all the low grade ore, which at present goes over the dump and of which some 200 tons have already accumulated.

The chief difficulty in the way of vigorous development is the cost of transport. The nearest railway station is Nonozasta, on the F. C. A. del Norte line, at a distance of 120 miles. Between this point and the mine, though a cart-road could easily be made, practically all transport is made by pack mules, which is costly and even difficult in case of heavy articles, like machinery, etc. At present the freight charges to Europe come to £8 and £9 per ton, to which, of course, commissions and other expenses must be added.

Coke dust, or breeze, as it is called, is of very little value commercially. Efforts to make it into briquettes have failed, as they will not hold together like coal briquettes, but break up in the fire. The only use so far found is to mix with sand in mortar and concrete. The quantity of breeze is much less with retort ovens than with the beehive type.

ASPHALT IN VENEZUELA.—According to the United States consul at Maracaibo, a contract has been granted by the government of Venezuela to Andres Espina to exploit four asphalt mines, three in the district of Perija and one in Maracaibo. The government is to receive 25 per cent of the net proceeds. The contract is to run for 25 years from the day that a certain railroad is built, but nothing about the railroad contract has been published. The mining code does not mention any special percentage to be paid to the government, and it must be presumed that the railroad contract gives enough special benefit to enable the contractors to give the 25 per cent of the net proceeds demanded. As there are plenty of asphalt mines here which have no such extra burden as this 25 per cent, it is hardly clear how these will ever become remunerative.

HOISTING EQUIPMENT OF A FRENCH COLLIERY.*

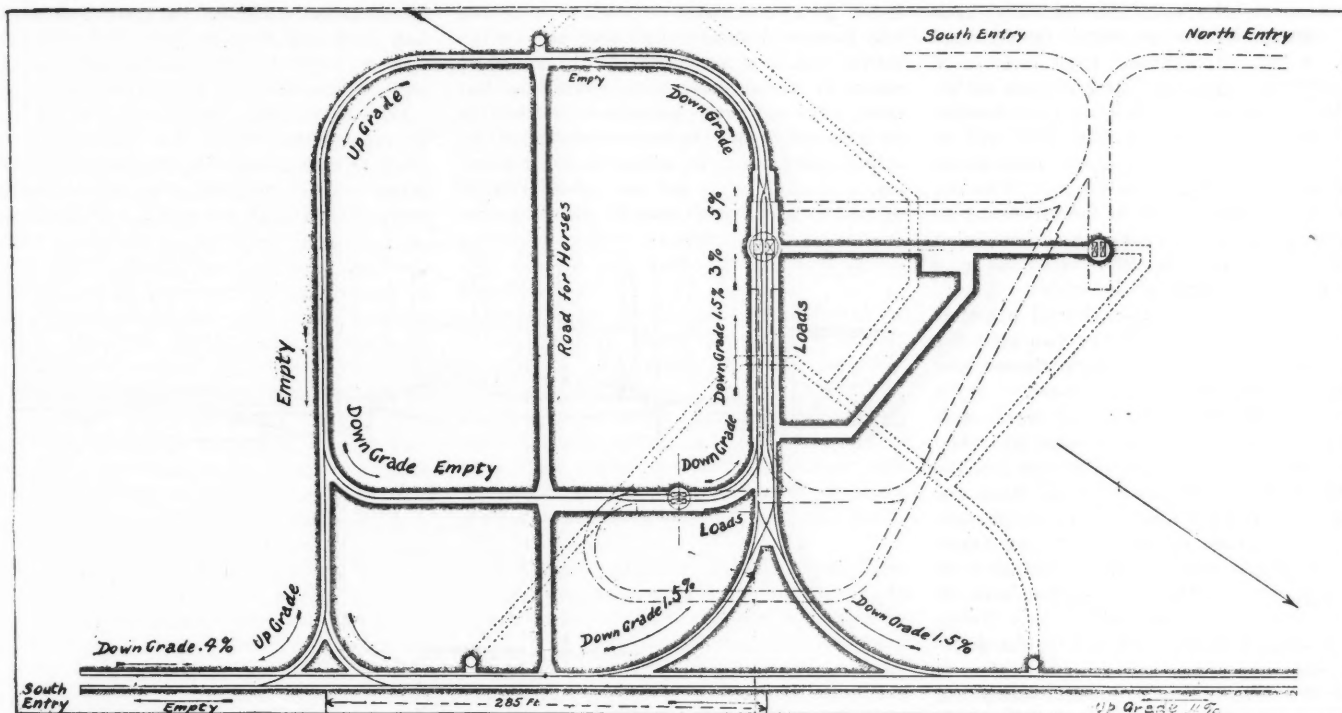
By L. SACLIER.

The Arenberg mine is to open two series of coal seams, one with eight beds and a total of 6 m. (19.5 ft.) of coal, averaging 10 per cent

are lined with iron to a depth of 99 m. (325 feet).

Two beds are being opened, the first at 220 m. (722 ft.) and the second at 334 m. (1,108 ft.). They are being exploited simultaneously with a view of producing 1,500 metric tons of coal a day; but the lower workings are kept

ed on the same axle. The deep groove on the shieve is partly filled by a rope; round steel wire cable is used, and the friction of the cable on the rope prevents slipping and lengthens the life of the cable. The brake is an iron band with wood shoes and an iron counterweight. The speed regulators are two cen-

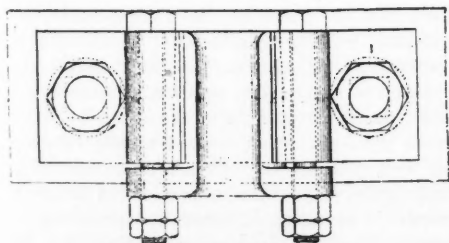
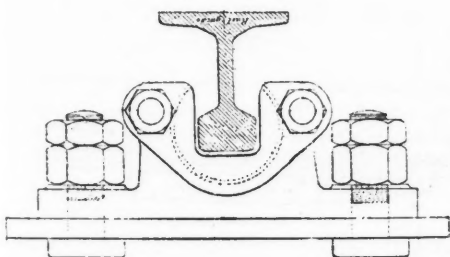


PLANS OF SHAFT BOTTOM.
Full lines, 334 m. opening; broken lines, 220 m.

of volatile matter, and the other with 1.2 to 1.5 m. (3.9 to 4.9 ft.) of exploitable coal showing 12 per cent of volatile matter. The general inclination of the strata is 30°. Two circular shafts, one 5 m. (16.4 ft.) in diameter

1,000 ft. in advance of the upper to assure the proper location for haulage roads. In one or the other there is worked by the advancing stall system (*taillies chassantes*) with gravity planes, a total square surface of 1,225 hectares (3,027 acres).

trifugal pumps which check acceleration beyond a certain speed, by having to lift a cer-



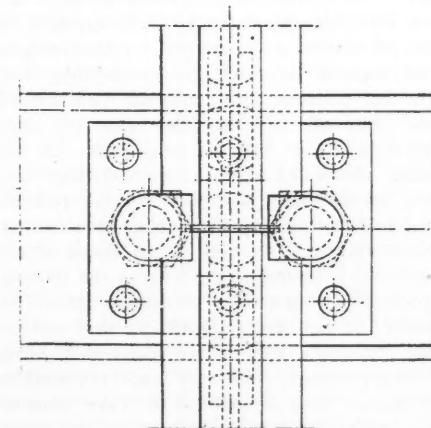
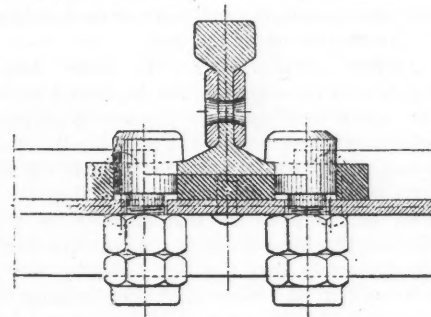
DETAILS OF GUIDE-SHOE.

for a main working shaft, the other 3.8 m. (12.5 ft.) in diameter for various purposes, were sunk by drop tubing through 135 ft. of Tertiary sands, and then in the usual way to the coal-beds in the Cretaceous. The shafts

The full mine cars from the 220-m. workings descend by an inside shaft in a balance gravity hoist to the 334-m. level whence all the mine output is hoisted, but in case of accident to the gravity hoist the trips on the 220-m. workings can go directly to the main shaft, while the hoist is being repaired. A single loading station considerably increases the capacity of a shaft, and does away with the chance of serious accidents which is inherent with several loading stations, but also calls for a more powerful hoisting engine.

Loading Station.—The cut shows the course of the mine cars at the 220-m. and 334-m. stations. It will be seen that, as the roadways for the full and the empty trips are separated, thousands of loaded cars can arrive at the main shaft without congestion; also that the roads have such grades that gravity suffices for moving the loaded trips to the point where the cars are run on the cage, for caging, and for running the empties to the points where they are made into trips. These arrangements secure least loss of time and the greatest economy.

Gravity Hoist.—The gravity hoist from the 334-m. to the 220-m. workings carries two cars on a single deck; the caging of the loaded cars, and the running off of the empties are done automatically by gravity. One man sees to the caging. The guides are of the Briart type with 40-lb. rails. The steel shieve, the brake pulley and the two speed regulators are mount-



DETAILS OF RAIL GUIDE JOINT.

tain volume of water which is used over and over.

Guides and Guide Shoes.—In the main shaft high speed without fear of derailment has

*Abstract from 'Note Sur les Installations de la Fosse d'Arenberg de la Société d'Anzin,' *Revue Universelle des Mines*, February, 1904.

been sought, that the cage might be used for lowering men. Everything is very strong, steel rails 11.994 m. (40.4 ft.) long, weighing 45 kg. to the meter (82 lb. per yd.), of the North of France type, are used as guides; and steel I-beams, weighing 55 kg. to the meter, (111 lb. per yd.) as buntons. Steel chairs hold the rails to the buntons (at 10 ft. intervals) by means of bolts with blind jam-nuts; each rail rests on its bottom buntion by a riveted heel, so that all expansion from increase of temperature is upward. The rail shoes are fitted by the chairs into steel sheets riveted on the webs of the buntions, so that each rail is held for 8 in., thus preventing any lateral movement and all weakening of the rail. The rail ends are also held in line by fish-plates fastened with rivets of annealed copper, there being a space of 6 mm. (0.24 in.) between the ends. The details are shown in the cut.

On the cages are riveted steel pedestals into which fit and are held by two bolts the east-iron shoes. The diagram shows how quickly a worn shoe may be replaced.

Cages.—The cages have three decks, each taking four mine cars having a capacity of 600 kg. (1,320 lb.), say, 6 tons of coal at a hoist; a cage and 12 empty cars weigh 8,000 kg. (17,600 lb.) and the weight of the loaded cars and cage is 15,200 kg. (about 15 long tons). For a maximum output from an installation of this sort, the time taken for running cars off and on must be as short as possible. Owing to the bad ground large openings at the shaft-foot were impossible, and as it was desired to use the same systems at top and bottom the choice was restricted. The cages are received at the bottom and at surface on hydraulic chairs which stop successively the three decks before the cars can be run on or off. The chairs support the cage by the upper framing, thus the stresses on the vertical members of the cage are tensile, and there is no tendency to deformation under the load.

Surface Arrangements.—The three decks which hold the mine cars are horizontal when the cage is hanging in the pit, but tip slightly when the cage rests on the chairs. When the cage comes to surface it is hoisted a little higher than the arms of the chairs; it is then lowered, and a point of support rests on the chairs. The three decks of the cage are tilted simultaneously, but the cars, held by stops, can not run off. When the upper framing of the bottom division of the cage rests upon the chairs the movement of cars on the deck below proceeds automatically. The car-stop on the off side of the cage has a counterweight, and engages at catch on the landing (Fig. 1), the car-stop falls and the two loaded cars run off. When they run off they move a little lever which pulls in the catch mentioned (Fig. 2), and the car-stop on the cage takes its normal position and holds two empty cars which have run on. These are put in motion by the frame of the cage which, coming to the level of the landing, operates an upwardly projecting catch by which the cars are released; as they run on they depress a stop in the cage; this, being counterweighted, rises and holds the empties in place. Thus as soon as the cage rests on the hydraulic chairs four cars on the lower deck run off and four empties run on. The cager then opens the tap of the hydraulic chairs, the cage falls (Fig. 3) and releases the catch which operates the further stops on the empty tracks, counterweights throw all catches

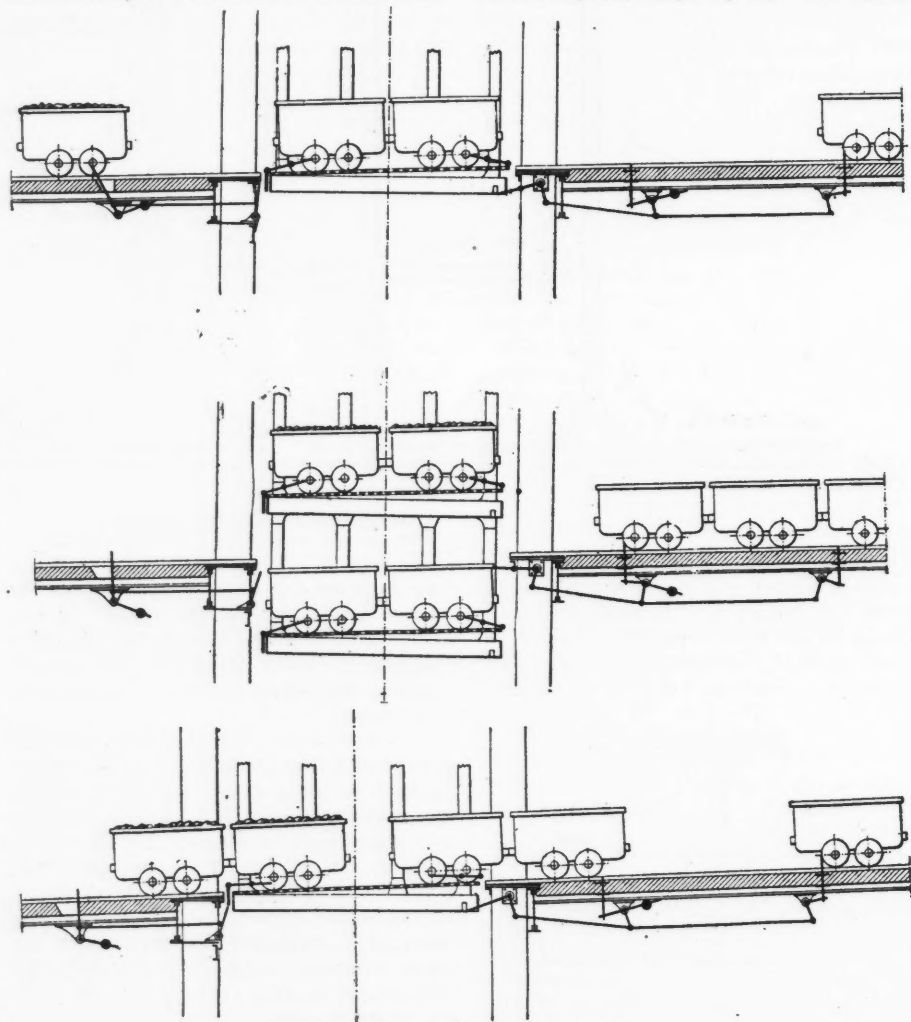
to their original position and on each of the two empty roads two more cars are caught between the stops. The second deck of the cage reaches the landing level, and the operations above noted are repeated. With this system one man can quickly run off 12 cars and run on 12 others.

During the hoist the cager, assisted by a laborer, gets 12 empties in position while the two footmen distribute the loaded cars on the tracks leading to the breaker. The hydraulic chairs at surface have some interesting features. The necessary pressure is obtained by an accumulator and any loss is compensated by a little hand-pump. In winter, to avoid freezing, a solution of 25 per cent of chloride of calcium is used. The arms of the chairs are

For hoisting men, each deck of the cage is closed by a steel-plate gate, easily removed. Seventy men can descend at a time on each cage. The safety catch used has side grips which act directly on the steel-rail guides.

Cables.—The cages are hung from tapered flat cables of aloë fiber having 10 strands; the cables are 500 m. (1,640 ft.) long, 0.06 m. (2.36 in.) thick and 0.460 m. (18.14 in.) wide at the large end, and 0.045 m. (1.77 in.) thick and 0.350 m. (13.78 in.) wide at the small end. A cable weighs 9,600 kg. (21,164 pounds).

Hoisting Engine.—To reduce to a minimum the consumption of fuel, it is advisable to use steam at high pressure with a condenser. The boiler pressure for this plant was therefore made 10 kg. (142 lb. per sq. in.). It is econom-



BOTTOM LOADING STATIONS.

kept in a horizontal position by a regulating valve, the port of which is closed till the three decks of the cage are unloaded. Then the tap of the hydraulic chair is opened a third time, the cage descends a little, the tappet of the regulating valve moves, the catches fall back, the three decks gently come to the horizontal and the cage once more hangs free on the cable. The results of this arrangement are important economies in steam and in time and great safety.

Loading at the Bottom.—Arrangements at the bottom station are almost identical with those at surface. The empty cars are moved from the cage in the same way as are loaded cars at surface, but the landing stops, holding the loaded cars, are not moved by the cage; the cars are released by hand that they may not go on fast enough to make trouble.

ical to use high pressure steam by two cylinders, but, as is well known, a compound two-cylinder hoisting engine has certain disadvantages; it is without flexibility, and if the cables are not exactly adjusted its operation lacks precision, and the brake must be used; when the work is not divided equally between the two cylinders the cables whip in the shaft, and, lastly, unless the equilibrium of the moments is perfectly adjusted by special apparatus, cylinders of considerable size must be used. To preserve the flexibility of a simple two-cylinder engine, and obtain the economy of double expansion, a tandem compound engine with four cylinders is used.

The steam from the boilers is first passed through a separator and receiver; a reducing valve permits the dry steam to pass to the small cylinders or cuts it off altogether. From

the high-pressure cylinders the steam goes to a receiver and from that, after passing a second reducing valve, connected with the first and opening or closing at the same time, goes to the low-pressure cylinder and then to a central condenser, of the Balke horizontal type. As it is sometimes necessary to be able to admit steam in the low-pressure as well as the high-pressure cylinders for nearly the whole length of stroke, the valve gear is designed for cut-offs up to 90 per cent. Of course, under normal conditions, the cut-off is automatic. The cut-off valves are within the admission valves; by a governor they regulate the supply of steam according to the speed. During three or four strokes of each trip the cut-off valves permit the admission of steam up to 90 per cent. When the normal speed is reached the valve gear reduces the cut-off of the four cylinders to 35 per cent; toward the end of the trip, the engineer closes the reducing valves, the speed slackens, and the engine is ready to work with a 90 per cent cut-off for stopping. The two characteristics of the engine are the double reducing valves and the simultaneous change of cut-off for the four cylinders. The reducing valves are worked by steam on account of their size, as is also the reverse. The engines have a stroke of 1.8 m. (70.86 in.), and the cylinders are 1.165 (45.77 in.) and 0.690 m. (27.17 in.) in diameter.

To provide large steam ports, and also reduce waste space and the work of operating the valves, the main valves are of the vertical piston type with cast-iron segments, as lips, placed at either end of the steam cylinders. The main valves of the high and low pressure cylinders are controlled by a Gooch link; they are operated in unison by the same lifting shafts. The cut-off valves are also of the piston type. The shifting of these valves is done by changing the lead of the eccentric.

TIN IN THE FEDERATED MALAY STATES.

The annual report of the British Resident-General for the Federated Malay States, for the year 1903, gives the following statement showing the output of tin in those States. The figures are in pikuls, the total being also given in long tons:

	1902.	1903.	Changes.
Perak	405,878	430,370	I. 30,492
Selangor	278,368	292,665	I. 14,297
Negri-Sembilan	73,511	85,497	I. 11,986
Pahang	23,114	25,275	I. 2,161
Total pikuls.....	780,871	839,807	I. 58,936
Total tons.....	46,480	49,989	I. 3,509

Of the total exports reported last year, 494,319 pikuls were exported as ore, against 445,268 pikuls in 1902. In giving the tin contained in the ore the average is taken at 68 per cent metal; the so-called ore exported being really concentrates.

The report says that of the output of the State of Perak, about one-eighth was the product of two rich mines, Tambun and Tronoh, but prospecting carried on in the neighborhood of those mines has so far given no indications that the deposits extend beyond the areas now worked. Of the total tin output reported last year only 700 tons were obtained from lodes, the balance coming entirely from alluvial workings. The only two lode mines in operation last year were the French Mining Company's property, at Lahat in Perak, and the Pahang Company's concession in Kuantan.

PYRITE SMELTING.—A REVIEW.—X.

By EDWARD D. PETERS.

THE RELATIVE CAPACITY AND ECONOMY OF THE PYRITE FURNACE.

This phase of the subject has already been partially considered in article No. 2, which treats of the types of ores suited to the process.

The replies to the question involving the economy of pyrite smelting are all highly favorable. This is quite natural, as these replies, without exception, come from men who are pyrite smelters, and who would not be practicing this method if they did not find it advantageous.

This closing article, therefore, is primarily addressed to those members of the profession who are not practically familiar with pyrite smelting.

There is no metallurgist in the world so situated that he would not gladly save fuel in smelting. The great majority of smelters would thankfully avoid a preliminary roasting of their ores, with its expensive plant, and its attendant cost, delay, and loss. The ability to produce a slag containing 5 to 12 per cent more silica than is practicable by the ordinary method would be a great boon to nine smelters out of ten.

When, however, a method of gaining these several important advantages simultaneously is offered to a metallurgist, and he is assured that he can enjoy them all without making any important alterations in his works, and by merely shutting down his roasting plant and feeding less coke into his blast furnace, he feels, very naturally, a strong suspicion that, to obtain such manifold and striking benefits, without attendant drawbacks, is too much to hope for. Sudden and radical alterations of either principles or practice are disliked by the experienced smelter.

I know, from my private correspondence, that many able men are startled by the results obtained, for instance, by Beardsley and Sticht in smelting the pyritic ores of Mt. Lyell with 0.5 per cent of coke and a cold blast, and making concentration of seven into one; or by Bretherton's running on a silicious charge of raw zinc, lead, antimony, and arsenic-bearing ores, and concentrating fifteen into one with less than 5 per cent of bad coke, and an almost complete elimination of the impurities just mentioned.

It must be borne in mind that such results as these are the fruit of years of experience, experiment, and expense, and cannot be immediately duplicated in a new enterprise, and especially not by metallurgists who lack a long apprenticeship before the pyrite furnace.

There is, however, a wide and fruitful territory lying between the two extremes of blast furnace practice—that is to say, between the common roasting and reduction smelting of copper ores on the one hand, and the most advanced type of pyrite smelting on the other; and it is quite practicable for the conservative metallurgist to feel his way cautiously along the newer line of practice without materially altering his plant, and without losing touch with the old method which he thoroughly understands.

No metallurgist would feel that he was taking any serious risks in making the three following slight modifications in his blast furnace practice:

1. Using some rather poorly roasted ore.
2. Lowering the ore column in the furnace.

3. Increasing the silica contents of the charge by a few per cent.

Under proper conditions, he would then find that he was producing a matte of about the same grade as by his ordinary method, and that, consequently, he was burning off more of the sulphur in the blast furnace and oxidizing more of the iron than usual; and that his furnace was smelting rather more slowly than before, in consequence of the more silicious slag.

This is the beginning of pyrite smelting, and I obtained my first clear ideas of it many years ago from Bartlett's work at his small smelter in Portland, Maine.

Very little financial advantage is obtained by this method of running a furnace. There is a saving in roasting, as poorly roasted ore can be used in the blast furnace; there is, also, usually a decided advantage in being able to employ a more silicious charge. There is, generally, no saving in coke, owing to the more refractory slag and the low ore column, which offset the heat derived from the decomposition of the sulphides in the charge.

As the furnace men become familiar with the new method of working, further changes can be made. The ore column is gradually restored to its full height, and the necessary strong oxidizing effect is maintained by increasing the blast. The coke is gradually diminished and the proportion of raw sulphide ores increased, the ratio of concentration being regulated mainly by the silica contents of the charge.

It cannot be too often repeated that there will be little oxidizing effect and little concentration until the silica of the charge is provided as follows:

- a. Sufficient silica to form a bisilicate with the lime and magnesia.
- b. Sufficient silica to form a singulo-silicate with any oxidized iron or manganese that the charge may contain.
- c. Sufficient silica to combine as a singulo-silicate with the ferrous oxide that will be produced by the oxidation of sufficient of the pyrite present to leave only enough sulphides to produce a matte of the desired grade.

The total silica, therefore, that must be present in the charge will be $a+b+c$, $a+b$ representing the silica that is already neutralized by the oxidized bases present in the original charge, while c represents the excess of free silica that is unprovided for, and that lies waiting unfused, and delays the smelting operation until sufficient pyrite is decomposed by the blast to furnish the ferrous oxide that is required to satisfy this silica to the degree of singulo-silicate.

It is this delaying and holding back of the operation by the excess of free silica that makes pyrite smelting, other conditions being equal, a decidedly slower process than the simple fusion of an already oxidized charge. If there were no free silica present, the sulphides would simply melt down with great ease and rapidity into a low-grade matte, as so frequently occurred in the early days of raw smelting of heavy sulphide ores with too basic a slag. It follows, consequently, that this excess of free silica is an essential portion of the pyrite charge, and the delay that it caused by holding up the process until sufficient pyrite had been oxidized to furnish it with FeO has been obviated by heightening the ore column and greatly increasing the pressure and volume of the blast. The decomposition of the pyrite that, with the light blast,

progressed slowly and reduced the capacity of the furnace much below the normal duty of a furnace of similar hearth area running on roasted ore and coke, now, with a heavy blast, proceeds with rapidity.

The economy of a smelting process stands, to some considerable extent, in relation to the capacity of the furnace employing that process. Owing to Beardsley's valuable communications to the JOURNAL,¹ we have some quite exact information as to the capacity of furnaces at the Mt. Lyell smelter, which employs genuine pyrite smelting, and makes a concentration on heavy pyrite ore of about seven to one on the first fusion.

A furnace 210 in. by 42 in., with a cold-blast pressure of 20 to 30 oz. per square inch, averaged 271.43 tons of charge per 24 hours, which is 4.42 tons per square foot of hearth area. The same furnace, with a blast pressure of 40 to 45 oz., averaged 530.76 tons of charge per 24 hours, which is 8.65 tons per square foot of hearth area. Thus the capacity of the furnace was nearly doubled by an increase in blast pressure of some 20 oz. per square inch, and its duty per square foot of hearth area was brought up close to the highest average record of any of the large blast furnaces running on roasted ore.

The interesting results obtained by W. H. Freeland on the Ducktown, Tennessee, pyrrhotite ores demonstrate with equal conclusiveness that, in using this method on heavy sulphide ores, a cold blast gives entirely satisfactory results, providing there is enough of it, and that the capacity of the furnace depends largely upon the volume and pressure of this blast. The pyrite furnace demands a much larger blowing plant than does a furnace of equal capacity running on roasted ore.

There is one more decided disadvantage with which the raw smelting method must be debited. It is a very much more difficult process to conduct than the ordinary smelting of roasted copper ores with coke. The chemical and physical phenomena that accompany the production of heat from the oxidation of carbon are simpler and more manageable than those that are involved in the production of heat from the oxidation of metallic sulphides, and the great amount of solid residues from the combustion of the latter substances also has to be cared for. In plain language, it is easier to burn coke in a blast furnace than it is to burn pyrite.

Consequently, in pyrite smelting the entire operation is very much more delicate and precarious than when using carbonaceous fuel. A shutdown of an hour may affect the behavior of the furnace for the succeeding one or two shifts; great skill and watchfulness are necessary on the part of both metallurgist and furnacemen, and campaigns are seldom very long.

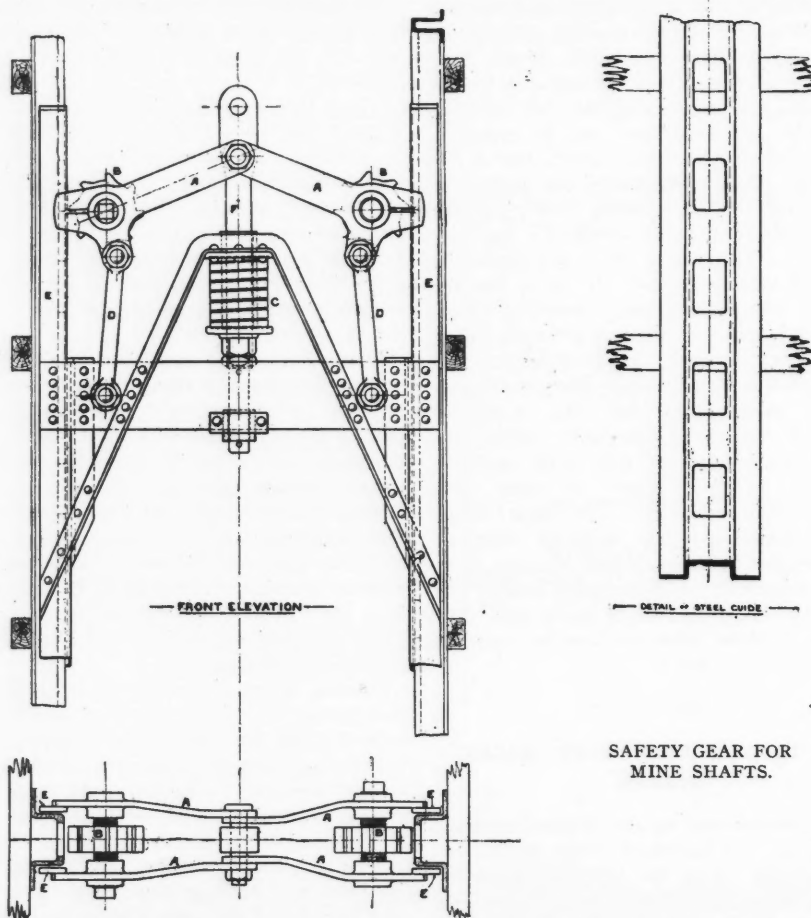
RAPID HANDLING OF IRON ORE.—

All records for unloading ore were broken at Conneaut, O., July 25, when the cargo of 9,945 gross tons of the steamer *Augustus B. Wolvin* was unloaded in just four hours and a half. The work was done by four Hulett clamshells and four Brown electrically operated buckets. The four Hulett worked out 25 of the hatches, while the Browns worked out the remaining eight.

¹ENGINEERING AND MINING JOURNAL, February 11 and June 30, 1904.

SLOTTED STEEL SAFETY GUIDES.

At a recent meeting of the Mechanical Engineers' Association of the Witwatersrand, Mr. W. H. Wood presented a sketch of a device for slotted steel safety guides for use in vertical shafts. This sketch is reproduced herewith. Mr. Wood explained that the arrangement is operated by means of toggle levers, marked *A*, connected to a main draw-bar *F*, by means of a bolt, and the method of operation is as follows: In the event of the rope or other suspending gear breaking, the spring *C* will be released, thus causing the center of the toggles to be brought downward and force the outer ends outward, which will cause the toothed wheels *B* to engage in the face of the



guides. The wheels *B* are mounted on a spindle, with a right and left hand thread, the spindle being screwed into the bosses on the toggle levers, and it will be evident that the toothed wheel gearing on the recesses of the guides will cause the wheel to rotate and screw up the toggle levers, thereby causing them to press against and bring together the portions of the skip shoes *E*. These shoes, bearing on the sides of the guide itself, will retard the falling skip until the friction between the shoes and the guides is sufficient to prevent the further descent of the skip. The wheels *B* will also assist to bring the skip to rest, owing to the fact that when they are screwed up as tightly as possible their teeth will be engaged in the face of the guides. This device has been tried only in model form, when it was found to work well. It can be easily adapted to any form of skip.

Iridium, the hardest metal known, used to point gold pens, for which purpose America consumes annually about 30 oz., is nearly 20 per cent heavier than gold, and 45 per cent more expensive.

THE MOUNDS OF THE SOUTHERN OIL-FIELDS.—II.

By LEE HAGER.

(Continued from page 139.)

Various theories have been advanced in explanation of the facts observed in the oil-fields of Texas and Louisiana. Basing their opinions almost wholly upon the grounds that the salines of north Louisiana are associated with outcrops of undoubted Cretaceous material, Messrs. Harris and Veatch are inclined to refer to the same age the salt of the Five Islands, the dolomite of Damon's Mound, the sulphur at Sulphur Mines and the reservoir rock at Beaumont. Reviewing the evidence, they reach the conclusion that: "The extreme

similarity of the geological structure of these different localities is evident, and we feel that the evidence thus far collected points very strongly to a common geological age and that we are justified in referring them all to the Cretaceous." They conclude, further, that the movement which resulted in the formation of these quaquaversals had its beginning in the Cretaceous and has continued intermittently to the present time. The salt deposits they regard as indigenous to the Cretaceous rocks in which they occur; having their genesis in precipitation from sea water, but whether in the land-locked remnants of the retreating Gulf of Mexico, or in the shallow lagoons and estuaries of a subsiding coast area, they do not explicitly state.

Such an hypothesis would seem to involve the assumption of conditions at variance with facts. In the first place, the salt and gypsum deposits at certain localities are at least 2,000 ft. thick. At Jefferson's Island well No. 1 was in salt from 334 to 2,090 ft.; a well at High Island 2,600 ft. in depth failed to pene-

¹Louisiana Geological Survey Report, 1902, p. 99.

trate it. In fact, so far as recorded, no well in the coastal region of Louisiana and Texas has ever reached the bottom of one of these salt and gypsum masses. For all that is known to the contrary, they may be 5,000 ft. or more in thickness. Now, to produce the 2,000 ft. of salt at Jefferson Island more than twenty-five times this depth of sea water would be required. That such a process of deposition should have taken place in land-locked lagoons, or in remnants cut off from a retreating sea, involves the assumption, on the one hand, of a subsiding coast with a land barrier to seaward renewed at a constant rate through an entire grand division of the Cretaceous, to prevent the access of less saline water from the sea; or the assumption, on the other, of a rising coast with a rate of evaporation in the land-locked sea remnant in excess of the fresh water additions from the land side. The theory implies that the process of precipitation was contemporaneous with the deposition of the beds enclosing the salt. For such a process, vast stretches of shallow water evaporated almost to dryness, would be required. Now, in every case the Cretaceous beds exposed at the various salines are not shallow water deposits, but everywhere present an off-shore deep-water facies, limestones and glauconitic marls predominating.

As developed in central Texas and Arkansas, the Cretaceous formations which make their appearance at the salines in the Tertiary region afford an unbroken series of marls, limestones and sands. Granting, then, that the salt deposits at these various localities might have their genesis in a process of precipitation from sea-water co-eval with the deposition of the rocks in which they occur, why, in the elevation of the Cretaceous beds exposed at the mounds and salines were only those small areas uplifted, which were associated with salt deposits and similar phenomena?

At Blue Ridge, Fort Bend county, Texas—to mention one instance—occurs a bed of coarse sand and heavy gravel, more than 300 ft. thick, cemented together by gypsum and dolomite, with occasional seams and pockets of salt. Under the theory advanced by Messrs. Veatch and Harris, it is difficult to conceive of conditions which would admit the deposition of such heavy gravel beds at one and the same time with the precipitation of salt and gypsum from saturated solutions of sea-water.

Finally, however adequate such a theory may be to explain the genesis of the salt, the gypsum, and even the dolomite, it wholly fails to throw light upon the origin of their attendant phenomena—the immense sulphur deposits and the metallic sulphides.

In a recent bulletin² Messrs. Kennedy and Hayes have discussed at length the association of petroleum with the mound and salines of the Gulf Coastal region. Concerning the causes which have resulted in the quaquaversal structure at these localities, or concerning their genesis, they reach no definite conclusions. Certain lines are projected, "which may be considered as coinciding with the main structural axes of the region, which are actual or potential lines of dislocation, either by folding or by fractures. The date of initial movement on these axes cannot be fixed exactly, but it must be as far back as the Miocene, since the thickness of the Miocene formation is affected by the doming which has taken place at various points. The movement has

continued through the late Tertiary and into the present. The character of the movement cannot be determined with certainty, and it doubtless includes both flexing and faulting. Its most striking characteristic appears to be the concentration of differential effect at certain points which form the mounds of uplift, of which Spindle Top may be regarded as a type."

In view of the considerations already advanced, it may be urged that these conclusions, indefinite as they are, lay too much stress upon the probable influence horizontal compression has exerted in the uplifting of these domes. Horizontal compression cannot satisfactorily explain the great dislocation of strata confined to small areas, nor the undisturbed condition of the beds in the vicinity. Could such structural conditions be due to flexing of the usual type, there is scant evidence that the Coastal Plain, since Cretaceous times at least, has been subjected to the horizontal compression necessary. It may well be questioned whether lateral pressure alone, under any conditions, could give rise to the mounds of the coastal region in a great series of formations composed almost wholly of yielding clays and quicksands.

Mr. Robert T. Hill has advanced another hypothesis to explain the domes and their phenomena—a hypothesis so suggestive that I take the liberty of quoting it at some length:

"There is some evidence," Mr. Hill³ concludes, "that the Coast Prairie overlaps conceal a line of serious deformation, which may be a sharp fold with a sharp dip coastward, or a zone of faulting. . . . The hypothesis is as follows: The oil and salt pockets of the Texas Coastal Plain are probably not indigenous to the strata in which they are found, but are resultant products of columns of hot saline waters which have ascended under hydrostatic pressure, along lines of structural weakness. . . . If a drill hole could be continued to a depth of 10,000 ft. below Beaumont, it should encounter: First, the Nacogdoches oil stratum; next, the bituminous shales of the Eocene; next, the oil shales of the Corsicana field; next, the Eagle Ford bituminous shales; then the bituminous shales which furnish the asphaltum of St. Jo and Burnet, and, finally, the oil shales of the Carboniferous."

The formations dipping beneath the Coast Prairie, he points out, contain many artesian water strata. "This water increases in temperature with depth and in its capacity for taking in solution the solvent salts and for upward flotation of the oil gathered in particles from the various strata through which it passes. . . . At Marlin this water comes from a depth of 3,200 ft., has a temperature of nearly 140° F. and is excessively saline and sulphurous. Should the rate continue from Marlin to Galveston (near Beaumont) this stratum would be at the latter place nearly 10,000 ft. below the surface and intensely heated and saline. If these deeply embedded water-bearing strata under tremendous hydrostatic pressure exist beneath the coast prairie, their waters would pass through any natural channels, such as fissures, through all of the known sheet oil horizons of Texas, except those of the Carboniferous formation. Such hot water would gather from the rocks, which are known to contain them, oil, salt, lime, sulphur and gypsum, and the oil gathered from

these strata would be floated upon the ascending saline waters.

"If ascending columns of oil and water of this character should meet resistance near the surface, we could well conceive of the formation of such a pool as that beneath Spindle Top Hill. To produce such a formation, which would be practically like the end of a mushroom bullet, there must be resistance, and this resistance would naturally come from an impervious formation."

The resistance necessary Mr. Hill finds in a series of late Tertiary deposits overlaying the oil rock at Beaumont, which he designates as the "X beds." He concludes: "Furthermore, the reaction which would take place in the column of water below the oil could theoretically account for all of the after-phenomena of the Coast Prairie, such as the salt islands of Louisiana and Damon's and the dolomite of Big Hill."

Attractive and illuminating though Hill's hypothesis may be, it offers serious difficulties in face of the conditions existing. That superheated waters, finding vent from great depth through fault fissures, carrying in solution, salt, sulphur and other minerals, might well produce the phenomena present in the mounds and salines of the Gulf Coastal region seems probable enough; but that the impact of water-columns under hydrostatic pressure could in any manner give rise to the dome-like structural conditions there existing is hardly conceivable. Mr. Hill finds the resistance requisite to his hypothesis in the impervious clays of the Neocene X beds mantling certain assumed fault-lines in the older formations. Now, at many of the mounds of the Coastal region—Damon's, Grand Cote, Jefferson's Island, among others—the impervious X beds are not found above the salt and gypsum deposits, nor is there any evidence that their absence is due to denudation. At Grand Cote the central salt mass is reached by shaft at 90 ft. The overlying material is wholly quicksand and gravel.

Furthermore, the rocks underlying the X beds are likewise involved in the dome-like folding. The same quaquaversal conditions of structure are present at the salines of northern Louisiana and Texas, localities geologically older than the X beds, to which he refers. Here the deformation extends to the Cretaceous rocks, which are domed and tilted at high angles. Objections might be multiplied to show the inadequacy of the hypothesis to explain the structural conditions present at the mounds and salines.

Reviewing the data thus far collected, the weight of evidence would seem to establish the following conclusions:

1. The Cretaceous salines in northern Louisiana and Texas, the Eocene salines of the Sabine river and other localities, the upper Tertiary salines near Navasota, Jasper and elsewhere, the Quaternary salines and mounds near the Gulf—all present the same conditions of geological structure, and are probably due to the operation of the same natural causes.

2. All of these localities represent areas of uplift, with considerable but varying degree of faulting, plication and displacement. The area affected in every case is limited. The surrounding country rocks show no considerable deformation.

3. Horizontal compression alone is inadequate to produce such conditions of structure; the thrust must have been mainly from below.

³Beaumont Oil Field. *Journal of the Franklin Institute*, Aug. to Oct., 1902.

²United States Geological Survey Bulletin No. 212.

4. All of the mounds and salines thus far prospected have shown the existence, singly or in combination, of certain phenomena peculiar to these localities—salt, gypsum, sulphur, dolomite, petroleum, sulphureted hydrogen, sulphur dioxide, hydrocarbon gases, hot sulphurous and saline waters and metallic sulphides.

With these conditions in view, it remains to call attention to certain considerations which may have a bearing upon the discussion.

Perhaps the most remarkable structural feature in the geology of central Texas is the great Balcones fault traversing the entire State from northeast to southwest. This fault results in a down-throw to the east, the displacement observable averaging about 500 ft. At several points along the down-throw side of the fault the structure is intimately connected with intrusions of igneous rock, basalts and phonolite for the most part. In the Austin and Uvalde quadrangles these intrusives have been closely studied and mapped by Messrs. Hill and Vaughn.⁴ Surface flows are wanting; the intrusives take the form of bosses, necks and laccoliths. While the enclosing strata, as a whole, exhibit no extensive disturbance beyond accelerated dip coastward, in places blocks of lower Cretaceous rocks have been faulted or floated up beyond the later Cretaceous formations. In several instances the vertical displacement thus resulting cannot be less than 600 ft. The area involved in the fault-blocks is generally limited.

A constant feature of the areas disturbed by these intrusives is the dome-like structure resulting in the country rocks of the immediate vicinity. In those localities where the molten rock, failing to find an exit to the surface, has forced its way into the lower beds in mushroom-shaped laccoliths, thrusting up the superincumbent strata into dome-like folds, the similarity of structure to that of the quaquaversal mounds and salines in the Coastal region is strikingly marked.

As to the geological age of the Balcones fault, opinions are at variance. Hill and Vaughn attribute it to the loading of Eocene sediments on the Gulf floor. The intrusive basalts, in part at least, they are inclined, however, to regard as of Cretaceous age.⁵ Vaughn, on the other hand, says of the Uvalde region:⁶ "It seems most probable that the igneous activity took place in Eocene times." The Balcones fault traverses the Eocene beds of southwest Texas. Many considerations point to the conclusion that the intrusion of the basalts accompanied, rather than preceded, the faulting. Further investigation may establish the amygdaloidal nature of certain material, interbedded with Cretaceous rocks, which has hitherto been regarded as of volcanic origin. Heavy beds of Pliocene gravel, capping the highest hills, occur only on the down-throw side of the fault. A great increase in the rate of denudation on the upper side probably followed the faulting movement, with a corresponding decrease of gradient in the river valleys, on the down-throw side, resulting in their congestion and in the accumulation of vast gravel beds. The gravel deposits being Pliocene, such an explanation of their origin would point to a late Tertiary age, for the fault itself.

Be that as it may, the conditions observed

⁴Austin and Uvalde Folios' United States Geological Survey, R. T. Hill and T. Wayland Vaughn.

⁵Austin Folio, United States Geological Survey, 1902, p. 6.

⁶Uvalde Folio, United States Geological Survey, 1900, p. 5.

afford the basis for a hypothesis offering some light upon the mound phenomena of the Coastal region. In the nature of things, it can be no more than an hypothesis, and is here advanced rather in the hope that it may lead to fuller discussion of the problems presented than from any belief in its finality. The hypothesis is as follows:

The movement which resulted in the great Balcones fault, or a similar movement in late Tertiary times, extended to the rock-sheets below the present Coastal Plain, accompanied by igneous activity as in the vicinity of the fault itself. Fault-blocks resulted, thrust up by intrusive masses of igneous material in the form of laccoliths at great depth. Owing to the nature of the Tertiary deposits, yielding clays, marls and quicksands, the faulting proper was confined to the deep-lying indurated lower Cretaceous and Carboniferous rocks. In the unconsolidated materials of the overlying Tertiary and upper Cretaceous a dome-like structure resulted, due to the vertical thrust of the fault blocks pushed up by the intrusive masses in the form of laccoliths.

By contact with the molten intrusives, vast quantities of gas were generated from the reduction of metallic sulphides and the distillation of lignites and organic substances. These gases, accompanied by steam under tremendous pressure, forced their way to the surface through the unconsolidated sands and clays of the overlying Tertiary material, perhaps, giving rise to mud volcanoes, such as occur in many of the world's great oil-fields at the present day. Heated waters from great depths found vent along the same channels, carrying in solution carbonates of lime and magnesium, gypsum and salt. By ebullition and evaporation these solutions became concentrated until, saturation resulting, precipitation commenced, forming the neck-like masses of salt, gypsum and dolomite now encountered. With the cooling of the intrusive masses and the choking of the vents, the process practically ceased. A period of subsidence followed, during which the Coastal Quaternary beds, which at present cap the mounds, were laid down, followed by a secondary movement along the old lines of weakness, resulting in the present elevation of the mounds above the surrounding prairie.

The function of these quaquaversal areas of uplift in determining the accumulation of petroleum into productive pools is an open question. It is possible that the fault lines may have furnished vent for the ascent of petroleum from the deep-lying oil horizons of the Cretaceous and Carboniferous. It is possible that the presence of intrusives may have assisted in the process by the distillation of organic material. It seems more probable, however, that the oil is indigenous to the Tertiary deposits, to some degree petroliferous in all horizons, and that the mounds but furnish the dome-like structural conditions requisite for the accumulation and storage of the oil.

Such, in bald outline, is the hypothesis suggested. Its weakness, apparently, lies in the assumption of intrusives concerning the existence of which we have no evidence whatever. Given the hypothetical conditions, there is strong probability that the results would follow in some such sequence as that outlined. The constant association of petroleum with mud volcanoes is one of the commonplaces of economic geology. In the opinion of Prof. Mendeleef, the productivity of the great Baku fields bears a direct relation to the mud volcanoes in the vicinity. Mud volcanoes he re-

gards as the "natural satellites of petroleum." They occur in close connection with all the important petroleum deposits of Persia, the Crimea and the Apsheron peninsula. At many of these localities the structural conditions are much disturbed by the intrusion of igneous rocks. Mud volcanoes are of frequent occurrence in the oil regions of India—at Ramri, in Burmah; at Cheduba, in the Irrawadi valley; at Minbu, in the upper Burmah. All eject mud, steam, gas, saline waters and petroleum. Those at Ramri are subject to fiery paroxysms. In the oil-fields of Java, Borneo and Sumatra the oil-bearing formation is of Tertiary age, much dislocated by intrusives. In all of them mud volcanoes, salses and other phenomena of a similar nature are of frequent occurrence. The mud volcanoes of Java have been well described by Mr. A. Bosch in a recent article. He says:⁷ "The heat is intense. Here and there, within this enclosure, the earth suddenly rises up to a height of 15 or 20 ft. and then bursts with a muffled report, throwing mud and earth in all directions. Clouds of steam issue from the vents, and the odor of petroleum is very noticeable." The petroleum deposits of New Zealand are in a region of geysers, solfataras and mud volcanoes. The rocks are much disturbed by intrusives. The mud volcanoes of Trinidad have been repeatedly described in connection with the vast bituminous deposits. They are known to exist in the petroliferous districts of Venezuela and Columbia. They occur in the Peruvian fields, on the plains of La Garita and Reventazon. As for the mound phenomena of the Gulf Coastal region—the salt, gypsum, sulphur and dolomite, the sulphurous gases, metallic sulphides and thermal waters—these are associates of vulcanism in some form the world over. That they occur in nearly all of the great oil-fields of the world is not without significance. The mud volcanoes near Baku deposit salt, gypsum and sulphur. The salt deposits of this district have been famous for centuries. Here, as in Texas, the sands are frequently cemented by the infiltration of calcareous and dolomitic material. In the Kouban district the dolomite occurs in masses reaching a thickness of 400 ft. In the Loristan district of Persia the oil-bearing formation is intimately connected with deposits of salt and native sulphur. Enormous deposits of rock salt, with gypsum in the form of anhydrite, occur throughout the oil districts of Galicia and Roumania. Geikie assigns to the famous Wieliczka deposits an aggregate thickness of 4,600 ft. At Starunia, in Galicia, ozokerite occurs with native sulphur, gypsum, iron pyrites and sphalerite. At Truskawiec, near Boryslaw, occurs a deposit of native sulphur and sulphides mixed with gypsum, ozokerite and petroleum. At various localities in Egypt and Algeria prospecting for oil has been prosecuted. Without exception, development has shown the existence of gypsum or salt, together with sulphur, with the petroleum. The oil districts of India have yielded salt for centuries. In Java the natives mine salt in the vicinity of the mud volcanoes. Similar occurrences might be cited in the oil-fields of Borneo, Sumatra and Japan, in Venezuela, Peru and other regions of South America. With such evidence at hand, the conclusion can hardly be questioned, that whatever their origin, the mound phenomena of the Gulf Coastal plain are those of other oil-fields, and just as certainly there is nothing fortuitous

⁷Scientific American, October 10, 1903.

in this identity. In all the other great oil-fields of the world occurring in rocks later than the Cretaceous, the presence of intrusives, or of vulcanism in some form, has exerted undoubted influence. Other evidence apart, then, does not this world-wide association in itself tend to establish a presumption that in the Gulf Coastal region these occurrences are due to the operation of the same natural forces; that the mounds of Texas and Louisiana mark the position of deep-seated igneous activity, that their phenomena, the salt, the gypsum, the dolomite, the thermal waters and the sulphides, have a common origin with like phenomena elsewhere?

DRY CRUSHING ON THE HAURAKI GOLD-FIELD.*

By PERCY MORGAN.

In the early days of the Hauraki gold-field (1866 to 1889) the ore was treated by wet crushing followed by amalgamation on copper plates. A further extraction was obtained from the tailings by pan amalgamation. This system answered fairly well for the bulk of the gold-bearing quartz of the Thames and Coromandel districts, where the gold occurs chiefly in the form of visible particles, and there is not much silver. It failed, however, with most of the ore found in the Upper Thames, or Ohinemuri district, especially at Karangahake and Waihi. This was before the days of the cyanide process, and the last resort of the metallurgist was smelting. At Karangahake many attempts were made to discover a payable method of treatment for the so-called 'refractory' ore, but with very little success; at Waihi the Martha stamp battery treated, by wet-crushing and copper-plate amalgamation, 18,000 tons, worth at least \$20 per ton, but the average return was considerably less than \$5, a sum which barely paid working expenses, and consequently the shareholders were glad to part with a property containing millions, for what they considered the excellent price of \$15,000. The art of fire assaying was apparently quite unknown to the staff of the Martha Company, and a curious light is thrown on the usual mining methods of those days, when one reads that the manager estimated the 'stone' to contain from 4 to 6 dwt. per ton only, while at the battery "they were losing very little, and they looked on their gold-saving appliances as being as good as any in the district."

About 1887, the year in which McArthur and Forrest patented their cyanide process, the now famous Waihi Company was organized, principally by aid of British capital, in order to take over the Union and Rosemont claims adjoining the Martha ground. It is necessary to dwell somewhat upon the history of the Waihi Company, for it was undoubtedly the great success of this corporation, especially after the introduction of the cyanide process, that led to the universal adoption of dry crushing in the Ohinemuri district. Profiting, it would seem, by the experience of the Martha, the Waihi decided to adopt dry crushing followed by pan amalgamation. Thirty stamps, together with drying kilns, rock breakers, ore feeders, combination pans, settlers, etc., were accordingly installed. In 1889 this plant, the first of its kind in New Zealand, was in full

operation. In many respects it was a great improvement on any battery previously built on the Hauraki gold-field, but it is doubtful whether it would have paid its way had not the Waihi Company, through the shrewdness of Mr. T. H. Russell, then superintendent, acquired the ground held by the Martha Company for a sum equal to about one hundredth part of the present annual profit therefrom.

At this time the Waihi Company was by no means in a satisfactory financial position; but during the next few years, thanks to the abundant supply of good ore obtained from the Martha lode and the up-to-date methods of ore treatment, the company found itself on a better footing. The average extraction resulting from the pan amalgamation system was much better than that obtained by the Martha Company in their wet-crushing and copper-plate amalgamation battery, but was still moderate, being from 60 to 70 per cent of the gold and 45 per cent of the silver. One great drawback to the dry crushing was the clouds of dust generated thereby, but this was partially remedied by housing in the stamps as closely as possible. About 1892, 38 additional stamps were erected, and with these wet crushing was given a trial, but apparently without success, as dry crushing was soon resumed throughout the entire mill.

We now come to the introduction into New Zealand of the cyanide process, which was destined to play an important part in the development of dry crushing. About 1889, the Crown Company erected at Karangahake a small dry-crushing plant, consisting of a rock-breaker, a step or shelf kiln, and two Lamberton mills. In connection with this mill, one of the first, if not the very first, working cyanide plants in the world was built under the auspices of the Cassel Company. Though the crushing plant was anything but a success, the excellent results obtained by the cyanide process led to the construction of a 20-stamp dry-crushing battery, together with a complete cyanide plant. The Waihi Company, which now had 90 stamps at work, adopted the new process early in 1894. The striking success which immediately ensued gave a great impetus to the mining industry all over the Hauraki gold-field. In the Ohinemuri district in particular, Waihi practice was naturally followed as much as possible, and thus dry crushing, succeeded by cyanidation, became the leading process of ore treatment in this part of the Hauraki field. Existing wet-crushing batteries were converted into dry-crushing plants, while a number of new batteries were specially designed and built for the process. During 1896 and 1897 dry crushing was at its zenith; every battery in the Ohinemuri district, including the new 100-stamp mill built at Waikino by the Waihi Company, dry-crushed its ore. The undisputed reign of the process, however, was short. During 1897, Mr. F. Daw, superintendent of the Crown mine, introduced a wet-crushing system which proved successful. The new departure was speedily followed by the Komata, Waitekauri, Waihi-Silverton, Woodstock and other companies. After making numerous experiments, the Waihi Company also began to come into line, and built a 100-stamp mill at Waikino specially for wet crushing. At the beginning of 1902, the older plant at this place was changed to wet crushing, and finally, at the beginning of this year, the adaptation of the Waihi battery to the system in use at the Waikino mill brought the reign of dry crushing on the Hauraki gold-field to a close.

The chief advantages of the dry-crushing system as practised on the Hauraki field were as follows:

1. There was no loss of ore during treatment, except that due to dust. The losses caused by sliming and float gold in the old wet-crushing process were entirely eliminated.
2. The product was in such a condition that it could be leached by cyanide solution, in one stage, without separation into sand and slime. It was, therefore, well adapted as a preliminary to the cyaniding of the clean quartzose ores of the upper levels.
3. Even with ores containing much clay or hydrated oxide of iron, the bricking of these substances during the kiln calcination protected them to some extent from being pounded into unleachable slimes.
4. The method lent itself to fine crushing, which was absolutely necessary for obtaining a good extraction by pan amalgamation or by cyanidation.

The chief disadvantages were:

1. Cost of kiln or furnace drying.
2. Loss of ore in form of dust.
3. Low stamp-duty, as compared with wet crushing.
4. Injury to machinery from dust.
5. Injury to health of workmen, necessitating a higher scale of wages than that customary in wet-crushing batteries.
6. Lowered efficiency of labor, caused by unpleasant conditions under which employees worked.
7. The depth of ore which could be satisfactorily leached in a vat, even with the use of vacuum pumps, was limited to from 20 to 30 in. Very rarely did it reach 36 inches.
8. The great difficulty of concentrating the ore, or of separating it into sand and slime. It is true that pneumatic separators and concentrators have been invented, but it is by no means certain that any of these contrivances would have suited the ore of the Upper Thames field. It follows, therefore, that the dry-crushing process does not lend itself to a complex system of ore treatment, and hence was not suitable for the sulphide ores which appeared in the lower levels.

The last of these disadvantages was the one that had most influence in causing the abandonment of dry crushing in New Zealand; but there is no doubt that it was well adapted as a preliminary to the cyanidation of the clean quartzose ore found in the upper levels of the Waihi and other Ohinemuri mines. It was, and perhaps still is, the best commercial method of dealing with such material. Yet, had the metallurgical knowledge and experience of to-day been available ten or twelve years ago, one can hardly doubt that the class of ore referred to could, and would, have been successfully treated by some modification of the wet-crushing process now in use in the same district for ore, much of which is not materially different from that crushed dry in the past.

In the Simon-Carves coke oven, in use in the north of England, the gases are drawn off to the residual plant, where the coal tar, ammonia and benzole are washed out of the gas, and it is then returned to the bottom flue of the oven and burned there to supply the necessary heat. There is usually about 35 per cent of the gas which is not required for this purpose, and which can be used under boilers for raising steam, or directly to produce power in the gas engine.

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MINING IN TURKEY.

BY LEON DOMINIAN.

Mining in the regions now constituting the Turkish Empire, is of high antiquity. The traveler in eastern Europe and in Asia Minor often encounters old mine-workings. As a rule they are indicative of valuable ore-bodies, the surface of which has barely been scratched. It may also be said that the prospecting of these old mines turns out generally to be more profitable than the examination of new fields; this fact is well known to the few mining men of Constantinople and Smyrna, who act accordingly.

To prospect on Turkish soil is usually a hazardous undertaking, because of the lack of orderly government; the geologist is hin-

privately during a long residence in the country.

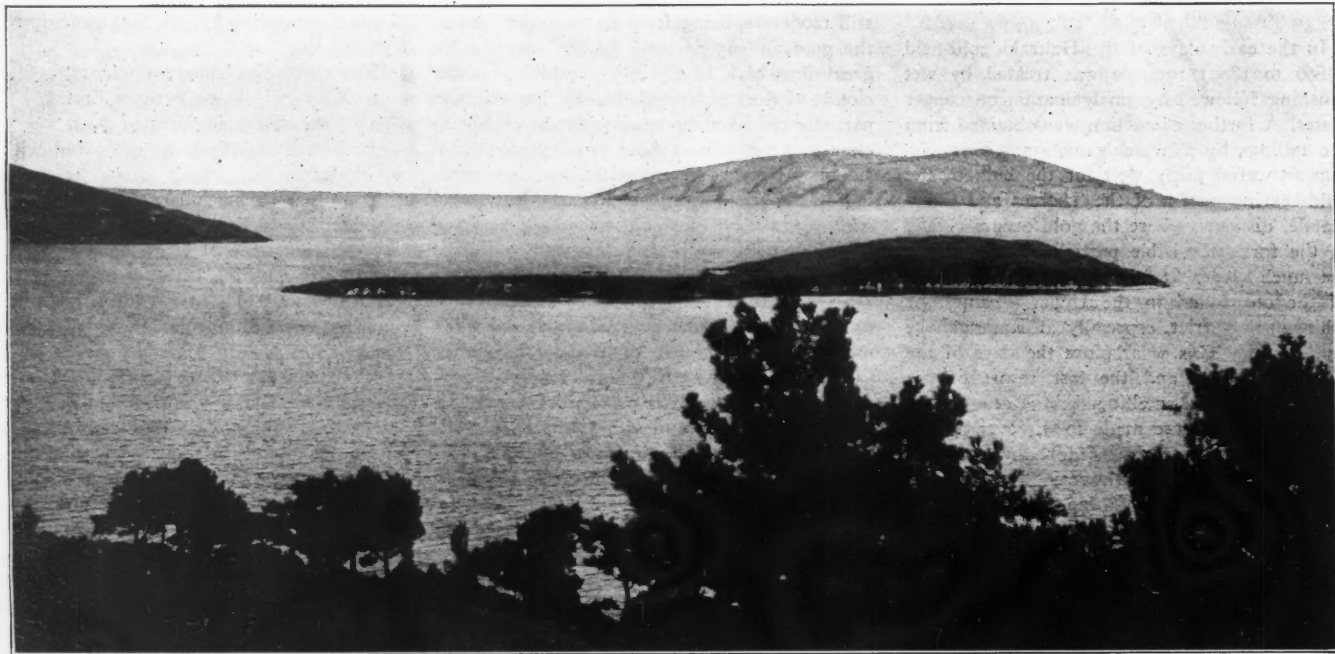
Iron.—Important deposits are situated in the northeastern portion of the province of Adrianople, within easy reach of the Black Sea. Although these have been recently granted to private parties, no work has yet been done. Other deposits have been reported from the province of Adana in southwestern Asia Minor. Nothing definite is known about them.

Coal.—Coal is known to occur in every one of the provinces of the Empire. The most important coal district lies near the town of Heraclea, in the province of Zoungouldak, on the Asiatic coast of the Black Sea. The coal-beds are of Carboniferous age, as evidenced by the fossil flora. The entire region

ul-Aziz also contain this same coal. None of this coal has yet been mined.

A great number of lignite beds are known in the different parts of Turkey. No work has been done on them beyond the production of a small output for local requirements. The most important deposits are situated in the region of the Lebanon and near Lampsacus, in the province of the Dardanelles.

Gold.—Gold is mined in small amount. The mining department of Turkey controls most of the production. The chief producers are the mines at Bulgar Daghi in Asia Minor. Some placer deposits are worked after rain-falls in the Karadagh of Macedonia, not far from Salonica. A small return is considered satisfactory, for 40c. is considered ample compensation for a day's panning. A gold mine



PRINCE'S ISLANDS, NEAR HALKI, SEA OF MARMORA.

dered in his field-work; general knowledge of the geology of Turkey is therefore fragmentary. No attempts have been made to establish an active geological survey. A mining department was created in Turkey 25 years ago, and a code of mining laws was compiled after the system then in vogue in France. These laws, on the whole, were liberal, and were worded entirely in the interests of Ottoman citizens. A corps of mining engineers was formed, the members of which were detailed to the various provinces with instructions to do their best to promote mining activity. The results, however, have been disappointing. At the present day the only business transacted within the departmental offices is the collection of taxes and royalties.

Through the pressure exerted by their respective embassies, foreigners have occasionally traveled through the provinces under the safeguard of a military escort; it is due to them that we know something regarding the geological features of the region. The country itself has been impoverished to such an extent as to be utterly unable to finance any commercial undertaking whatever. Hardly a dozen mining concerns, and these are the oldest in the land, have been able to stand against the general industrial depression.

The following summary of the mineral production is based largely upon data collected

has been considerably disturbed; profound faulting has occurred repeatedly during geological time, and this is a constant source of worry to resident engineers. The coal is bituminous and valuable for many purposes. Some native steamship companies use it in preference to Cardiff coal. The entire deposit has been conceded to the Imperial admiralty, by which it has been divided into leases. A French company—Société Minière d'Héraclée—is the most prominent worker; the early history of this company involves a long period of expenditure of capital and barren results. Recently the mines have been put on a paying basis, and the daily output is estimated at over 1,000 tons.

The coal is picked by hand and conveyed by means of an aerial tramway to the town of Zoungouldak on the coast, where it is loaded direct into steamers. The introduction of Kurdish miners at 35c. per day has been a favorable innovation, the Montenegrin miners, hitherto employed, refusing to work at less than \$1 per day. A further use for this coal is in the manufacture of illuminating gas. Excellent coke is produced on the spot, at present, at the rate of 150 tons per day.

The coal-beds near the town of Palou in the province of Diarbekir are known to be an excellent quality of anthracite. The adjoining provinces of Van, Erzeroum and Memouret-

in the vicinity of the Dardanelles was sold two years ago to an English syndicate, but no work on the property has been reported.

Silver.—Silver is found near the town of Balia, in the province of Hudavendighar. It occurs associated with lead in a quartz gangue in eruptive rocks. The mines are owned by a native company, and are under the management of French engineers. The Imperial Mint derives its supply of silver mostly from the mines worked in the various provinces. Some silver is also produced at the gold mines of Bulghar Daghi, mentioned above, and a little work is done in the province of Trebizond.

Copper.—This metal is widely spread in Turkey. The provinces of Trebizond and Diarbekir are specially noteworthy. The former contains the important Espie bay deposits, situated a few hours' ride from the seaport of Kerassund, on the Black Sea. They are controlled by an Anglo-native company. Some of the oldest mines in the country are situated here. The ore-bodies were worked superficially 800 to 900 years ago. Within the last 15 years, French and English syndicates have done considerable development work on these properties.

Prince's Islands, lying in the Sea of Marmora, a few miles distant from Constantinople, contain bodies of iron and copper sulphide ores, the last metal accounting for the name

Halki (a corruption of *chalkos*, Greek for copper) by which one of the islands is known. Numerous workings, now caved in, show that extensive work has been carried on.

The Arghanah copper mines, owned exclusively by the mining department of Turkey, are well known on account of their high tenor, assays averaging 12 per cent copper. They have been operated without any interruption for nearly three centuries. Exploitation is carried on in a primitive manner. The ore is reached by means of adits, and is smelted on the spot to matte carrying 50 to 60 per cent copper. It is then shipped on camel-back to the coast or to the town of Tokat, where a certain amount is used in making copper wares. Of late years the production has decreased owing to a rise in the price of the wood used in the first treatment of the ore. No railroads have yet been built in the region, and present rates of transportation prohibit the profitable working of the mines. At Arghanah it is a fact that the miners do not get their wages in cash, but in food supplies and tobacco.

A deposit of copper, chiefly in the form of chalcopyrite, is found on the European coast of the Bosphorus at Sari-Yari, close to the Black Sea. The ore-bodies occur at the contact of sedimentaries with the eruptives. They were conceded in 1860 to an English company. Owing to the proximity of the workings to fortifications built some years after, the government withdrew the act of concession. A long litigation ensued, which was finally brought to an end by the payment of a heavy indemnity by the government.

Lead.—Lead is found abundantly throughout the Empire in association with silver, for the extraction of which it is chiefly worked. Mines of argentiferous galena exist in the provinces of Trebizond, Diarbekir, Hudavendighar, Macedonia, Adana and Erzeroum. The mines at Balia,¹ mentioned above, have been worked with success for a number of years.

Zinc.—A deposit of calamine is now being worked by a French company at Karason, close to the Zakharia river, in the province of Ismid. It is now two years since the property began to produce, and it is likely that the output will increase steadily. Other known deposits of zinc ores, in the provinces of Salonica and Adana, have not yet been developed.

Manganese.—About 5,000 tons of manganese are produced annually in Turkey. The mines at Kassandra, in the province of Salonica, furnish slightly over one-fifth of this amount, chiefly in the form of pyrolusite, which is shipped to European seaports. An equal quantity of higher grade ore is derived from the workings in the Phlinika district in Asia Minor. The ore here assays 52 per cent manganese. A smaller amount comes from the Zenghan mines with average assays showing 83 per cent manganese dioxide. About 1,000 tons are shipped to France every year from the province of Trebizond. Some deposits of manganese occur in the province of Aidin, in western Asia Minor.

Antimony.—Deposits of stibnite are found in the provinces of Monastir, Edirne and at other Macedonian localities. Near Rozdan the ore occurs in a clay gangue at the contact of the schists with the dolomite, and is often associated with arsenic. Considerable work has been done on this property. The ore is concentrated on the spot to about 55 per cent anti-

mony, and is then forwarded to Europe. Other points at which stibnite occurs are the islands of Mytelene and Chios in the archipelago. Some development work has been done in the former, but no attempt has ever been made to establish a steady production.

In Asia Minor most of the deposits are found in the province of Aidin, whence shipment is made chiefly to England by way of Smyrna. The two important centers of production in this province are at Endemish and Djinli Kaya, in both of which high-grade ore is found, often as much as 65 per cent antimony. The yearly output of the Endemish mines is about 2,400 tons. At Djinli Kaya the high grade of the ore was not maintained, besides which the presence of impurities in the form of pyrite render profitable extraction a doubtful problem.

Arsenic.—The Turkish mines yield 2,000 tons of orpiment annually; this mineral is usually found associated with antimony. The mines at Elkhur, near Rozdan, put forth 500 tons per annum. The mineral is found in the same vein that carries the stibnite, but in pockets free from the presence of this mineral. Most of the ore is shipped via Salonica to France, a small proportion being reserved for domestic consumption. The mines near Yenikeuy are important. They are noted for the excellent quality of their ore, which runs as high as 42 per cent in arsenic. A large percentage of gold is present. About 900 tons of this ore is shipped every year to Europe.

Arsenical pyrite is also found in the Endemish deposits, and is reported to be of high grade. The development work that has been done on these ore-bodies justifies further expenditure, but the present adverse conditions forbid the undertaking of operations on a large scale.

Chrome Ore.—Turkey contributes largely to the world's supply of chrome ore. The Turkish ores are soft, rich in chromic oxide, have a low silica content and are free from objectionable impurities. Many localities in which chromite is found are known in the Empire, but only a few mines are now being exploited. The ore is all exported.

In European Turkey some mines are worked near Salonica, the percentage of the ore varying between 48 and 52 per cent chromic oxide. In Asia Minor, the region around Broussa is especially important; there the ore occurs in pockets and masses in serpentine, the assays averaging 52 per cent chrome oxide. The ore is transported to the seaport of Makri, whence it is shipped to European ports. Important deposits in the province of Aidin have not yet been worked.

Asphalt.—Important occurrences are known both in European and Asiatic Turkey. In the former, asphalt is mined only near Avlona, in Albania, by the Imperial Ottoman Bank, and the output is shipped to Trieste. In Palestine, the region around the Dead Sea has long been known for the occurrences of the various hydrocarbons. This portion of the Empire is, on the whole, under the "sphere of German influence," and it is probable that work will be started shortly. An excellent quality of asphalt is mined in small amounts in the vicinity of Hesbeya, in Syria, whence it is also exported to Trieste. It is probable that many provinces in Armenia and Kurdistan contain deposits.

Petroleum.—Reports of oil discoveries in Turkey have been made. In European Tur-

key, the European Petroleum Company has acquired oil-lands, close to the sea of Marmora. The results of careful investigations made on this property were published, and from these it may be gathered that although the indications of oil have been rare, the company was hopeful of success in the southeastern districts of the Marmora basin, and especially in the Lake Isnik district.

Borax.—This substance is mined in the form of pandermite, which is thought to represent a massive and not entirely pure variety of colemanite, the calcium borate, usually found elsewhere. This mineral occurs in nodules varying greatly in size. The deposit is overlaid by a thick layer of gypsum. It is found near Sultan-Tchair, in the province of Hudavendighar in Asia Minor, from which place it is shipped to Panderma, a seaport on the Marmora. The international borax combination is believed to control these deposits. Since the levy of a royalty of 16 per cent on the gross products, work has not been carried on as extensively as heretofore. The annual output ranges between 13,000 and 6,000 metric tons.

Lithographic Stone.—This is found in abundance near Panderma. The output was controlled for some years by an English syndicate. A good deal of money was spent without result. The failure of the enterprise was attributed to the ignorance of Turkish customs and methods of dealing on the part of the management.

Emery.—The production of this substance is confined to western Asia Minor, the most important deposits being found in the province of Aidin, and in some of the islands of the Ægean Sea. The noteworthy localities are all in the vicinity of Smyrna at Bahtchedjik, Cosbounar, and Kuluk. All the output, amounting to about 20,000 tons per annum, is shipped abroad via Smyrna.

Meerschaum.—The plains near Eski-Shehir, in Asia Minor, constitute one of the best known localities for this hydrous silicate of magnesium. The Turkish sepiolite is often given the preference on account of its ready adaptation for certain uses in jewelry. It is said to occur in masses in stratified earthy or alluvial deposits, where it has been formed from the decomposition of magnesium carbonate, which is embedded in serpentine, in the surrounding mountains. It is richer in silica than that found in Utah and in North Carolina. Almost all the meerschaum mined in Turkey is controlled by Austrian dealers, and the exploitation is carried on in the best possible manner, considering the numerous drawbacks.

The mining regulations accord to any individual the right to obtain a concession, one year after his report to the mining department of his discovery of any mineral on that land, provided that he is ready to pay the purchase price of the concession, which amounts to £200, Turkish, or about \$900. The taxes levied consist of a fixed land-tax amounting to 10 piasters, or 50c. per acre, also an annual royalty varying from 1 to 5 per cent of the gross value of the ore. It is surprising that even after these provisions have been complied with, there should still be any reluctance on the part of the government officials to grant mining concessions, and yet it is only those who have tried to obtain them within the last six or seven years, who are cognizant of the difficulties to be faced.

¹The Lead Mines of Balia, Turkey, by Georges Ralli. ENGINEERING AND MINING JOURNAL, February 18, 1904.

THE BUSS CONCENTRATING TABLE.

By EDWARD WALKER.

The chief feature of the new concentrating table invented by Dr. J. Buss, of London, and made by the Luhrig Coal & Ore-Dressing Ap-

pliances, Ltd., is that its motion imitates the action of the Cornish vanning shovel. That is to say, the table gives an upward oblique throw and has a regular reciprocating movement. In this way it differs from tables that have bumps or jerks in the plane of the surface

the side *AB*. The pulp is fed in at *E* through a distributor which is fixed to the table. The pulp gradually shakes along and down the table, the heavier particles keeping to the top while the gangue passes more quickly down.

J to *D*, and the calcite from *K* to *D*. The separation is very good and the amount of middlings from *I* to *J* and at *D* is less than 10 per cent of the ore.

The table is supported on a number of rows of ash strips about a foot in length, held in an inclined position and clamped at the top and bottom to the table and to the foundation frame. A few of these are marked *M* in the illustrations. The motion is transmitted to the table by means of a rod *N*, which is pivoted at one end to the under side of the table at *O* and is connected at the other end to the excentric *P*. The motion of any point on the table is along a small segment of a curve. The vertical and horizontal components of this curve—that is to say, the vertical throw and the horizontal stroke of the table—can be altered at will by increasing or decreasing the length of rod *N*, and by altering the excentric *P*, respectively. The number of oscillations given to the table varies from 250 to 290, according to the class of ore dealt with.

The table may be either plain or rifled, preferably the latter. In practice it is found best to have the riffles arranged as in the diagram. One set of riffles *F* runs the greater length of the table, slightly converging toward the end.

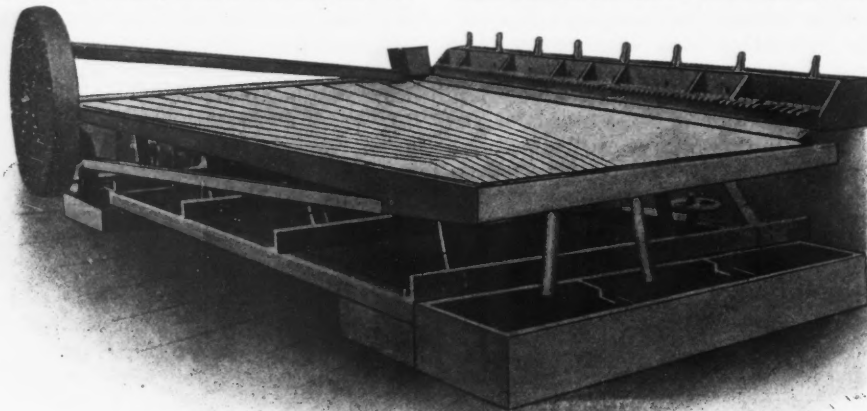


FIG. 1.—BUSS TABLE, FRONT END.

The clean ore eventually escapes over the side from *H* to *D* and the gangue from *K* to *D*. If there is more than one metal in the ore, the

various minerals range themselves along from *H* to *D* according to specific gravity, so that the mineral constituents of the ore are separat-

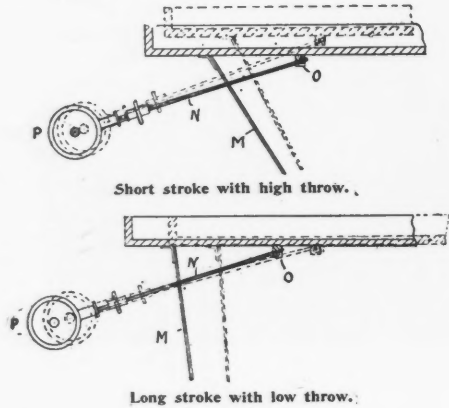


FIG. 4.

of the table. There is no doubt of the efficiency of the Cornish vanning shovel, and any table that seeks to imitate its motion is worthy of notice.

As will be seen from the illustrations, the

various minerals range themselves along from *H* to *D* according to specific gravity, so that the mineral constituents of the ore are separat-

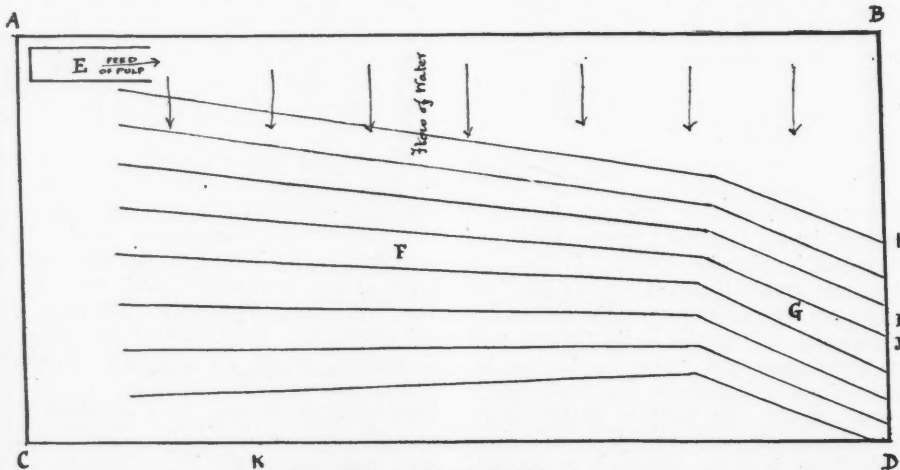


FIG. 3.—PLAN OF TABLE.

table is arranged with its sides *AB* and *CD* horizontal, and its sides *AC* and *BD* inclined. The vibrating movement is longitudinal and the flow of water transverse, coming on along

ed from each other as well as from the gangue. When the table is treating an ore containing galena and blende in a gangue of calcite, the galena comes off from *H* to *I*, the blende from

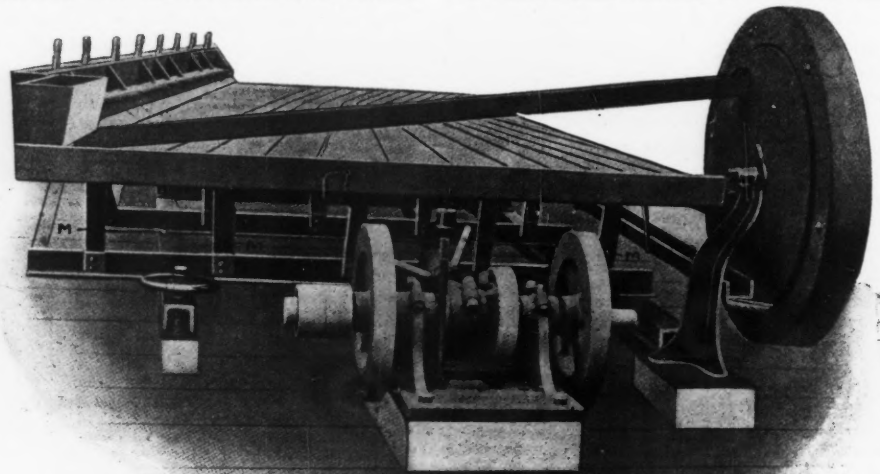


FIG. 2.—BUSS TABLE, GEAR END.

The rest of the table is occupied by riffles *G*, inclined downward and made of small copper ridges. These are found specially useful in keeping the minerals of complex ores apart and so preventing middlings. In the photographic views there is shown a middlings elevator which automatically returns the middlings to the feed *E*. As a matter of fact, however, the machine will separate so cleanly that the middlings are not the result of imperfect separation, and they, therefore, need not be sent over the same table again, but may be sent instead for regrinding, or sent for re-treatment on another table.

Owing to the combination of the upward throw and forward movement, the mineral particles are rapidly and most effectively separated into layers according to their specific gravities. The lighter particles come to the top and are washed down by the water and the heavier remain next to the surface of the table. The nature of the motion also tends to prevent caking so that the rate of travel of the mineral is more rapid than on tables with only a horizontal movement.

The whole machine is extremely simple in construction. It works noiselessly, an unusual

feature in a concentrating plant. The motive power required is very small and there are no parts to wear out, so that the cost of operation and maintenance is low.

Altogether the machine is well worth the attention of mining engineers and metallurgists.

GRAPHITE MINING IN CEYLON.*

By GEORGE A. STONIER.

The graphite deposits of Ceylon are found chiefly in the western and southern provinces and in Sabaragamuwa. The mineral area is 95 miles long in a north and south direction, with a width ranging from 35 to 43 miles. One well-defined zone of deposits is 18 miles from the coast, and 5 miles wide at the northern end, and touches the coast at the southern extremity, where it is 20 miles wide. A second zone is 40 miles long and 4 miles in maximum width.

The graphite occurs in veins which traverse a garnetiferous granite. As a rule the veins have a slight dip; the hanging is well-defined, and shows the effects of differential movement in its polished and striated surface. In the southern provinces the strike is usually meridional, but it changes frequently in the northern part of the field to east and west. No evidence for main lode or even a series of connected lodes has been discovered, and their horizontal extent is limited. The veins vary from a thin *flucan* to 8 ft. in width. One vein has been followed to a depth of 720 ft., yet such continuity is exceptional. A vein 4 in. wide is considered payable.

It seems clear that the graphite and quartz were deposited in pre-existing fissures. The quartz may have been derived from silicious solutions, while the graphite was probably deposited by sublimation of hydrocarbons.

In all there are 300 mines and quarries at work, which give employment to 10,000 people, mostly natives. Attempts have been made to work the deposits according to modern methods, but they have generally failed. Graphite mining, like mica and gem mining, is uncertain, and the native operator can easily modify his work to suit the changing natural conditions as well as the fluctuations in the market. According to the native method, the mineral shoot is followed in depth as far as underground water permits. In a few cases, a shaft is sunk to the water-level and the vein worked upward to the surface. In soft ground, a vertical pit of rectangular section is sunk for about 60 ft., and then the lode is followed by a series of winzes. Hoisting is done in barrels, attached to each end of a rope, which is passed around a wooden jack-roll worked by six or seven men. Small fans are frequently used to ventilate the workings. Men earn from 16c. to 24c., and women from 6c. to 12c. per day.

The mineral is conveyed in bags to a dressing shed, where it is roughly picked and then packed in barrels for transit to Colombo or Galle for dressing. On arrival at Colombo the graphite is first sorted on a brick or asphalt floor, the large lumps being placed to one side. The fine material is thrown onto a series of stationary screens with 3/8 in., 3/16 in., 1/4 in. and 3-16 in. holes, and set at an angle of 35° from the horizontal. The screened material is taken to sheds, where it is chopped and sorted from the quartz. It is then placed on sacking or

boards and rubbed by hand, while the final polishing is done on a screen placed flat on the ground. The poor material is crushed by wooden mallets or cylindrical beaters, and hand-picked. At some establishments further concentration is effected by washing in a pit. Before marketing, the graphite is classified into five sizes as follows: Lump, ordinary, chips, dust and flying dust.

The graphite industry of Ceylon first assumed importance in the early part of the last century, although mention is made of it in the Dutch government records of 1675. The exports in 1834 were 129 tons; in 1869 they reached 11,306 tons, and in 1899, the maximum of 31,761 tons was recorded. In 1902 the exports were 25,189 tons, or \$3,505,455 in value.

THE HEAVIEST STEEL RAILS.—The Pennsylvania Railroad Company has just laid down, on the curves of the Delaware avenue freight line in Philadelphia, a number of rails weighing 142 lb. to the yard. These are the heaviest steel rails ever made, the largest heretofore rolled having been 125 lb. These rails were made by the Pennsylvania Steel Company.

GEOLOGICAL SURVEY WORK IN NEW ENGLAND.—During the present season the division of geology and palaeontology of United States Geological Survey will conduct the following work in New England: Dr. George Otis Smith will, with the assistance of Messrs. E. S. Bastin and C. W. Brown, continue the survey of the Penobscot bay quadrangle in Maine. Dr. Smith will also exercise general supervision over geologic work in New England and the crystalline belt of New York and New Jersey. Areal and economic surveys will be made in western Vermont by Professor T. Nelson Dale. Professor B. K. Emerson will continue his investigation of the areal and structural geology of central Massachusetts.

SICILIAN SULPHUR TRADE.—Orders from the United States were somewhat less in the fiscal year ending June 30, but the depreciation has been fully met by heavier exports to France. During this period the exports to all countries totaled 505,629 long tons, which is 20,779 tons more than the previous year. In detail these exports were:

	1903.	1904.	Changes.
Australia	2,876	3,880	I. 1,004
Austria	19,897	20,338	I. 441
Belgium	14,949	15,728	I. 779
France	73,451	97,452	I. 24,001
Germany	31,131	31,745	I. 614
Greece and Turkey.....	21,758	25,702	I. 3,944
Holland	5,796	7,669	I. 1,873
Italy	43,590	70,950	I. 27,360
Portugal	13,846	8,600	D. 5,246
Russia	16,291	15,009	D. 1,282
Spain	5,236	4,365	D. 871
Sweden, Norway & Denmark	27,105	25,076	D. 2,029
United Kingdom.....	21,648	18,998	D. 2,650
United States.....	165,242	141,365	D. 23,877
Other countries.....	22,034	17,852	D. 4,182
Total	484,850	505,629	I. 20,779

An encouraging feature of the trade is the gradual reduction in stocks at Sicilian ports, from 370,589 tons on February 29, this year, to 278,025 tons on June 30. Prices are well maintained, and for refined qualities show an advance. At present best unmixed seconds are selling, f. o. b. at 81s. 9d. per ton, in bulk; best thirds, 79s. 6d.; current thirds, 77s. 9d.; refined block, 90s. 6d.@93s.; refined roll, 96s. 3d.@101s. 9d., and in sticks, 105s. 6d.@108s.; sublimed flowers, 94c. 9d.@108s. 3d., according to quality; ground best seconds, 90s. per ton.

RECENT LITERATURE ON ECONOMIC GEOLOGY—XXIV. WESTERN COALS.

By H. FOSTER BAIN.

The Deer Creek Coal-field, Arizona. By M. R. Campbell. 'Bulletin 225,' United States Geological Survey, pp. 240-258.

A summary account of a reconnaissance trip. The Deer Creek field is an isolated basin in the extreme eastern end of Pinal county. It occupies an irregular syncline between the Mescal range and an unnamed ridge on the south. Recently the south line of the White Mountain Indian reservation has been changed to exclude it, and development work is now under way. While the data are somewhat indefinite, the coal is probably of Cretaceous age. There are two beds ranging in thickness from 24 to 30 in. throughout the larger part of an area 3 by 10 miles. About 50 per cent of this coal is probably workable. It is fairly well disposed for mining though locally disturbed and cut by dikes. There are two grades present, a hard block coal fairly well adapted to transportation and coke manufacture, and a soft, badly crushed coal which can only be utilized under special conditions.

Coal Fields of Crow's Nest Pass, British Columbia. By E. Jacobs. *Engineering Magazine*, April, 1904, pp. 36-57.

The geology, mining methods and equipment in this important field are summarized, and its relations to smelting centers and transportation lines are discussed. In 1903, 661,118 tons of coal and 167,739 tons of coke were shipped.

Coal Deposits between Silver Peak and Candelaria, Esmeralda County, Nevada. By J. E. Spurr, 'Bulletin 225,' United States Geological Survey, pp. 289-292.

Coal-beds of probably Tertiary age of a maximum thickness of 6 and 8 ft. occur at the north end of the Silver Peak range. Similar seams are said to have been found in the Monte Cristo mountains. The coal sampled was a light bituminous, somewhat lower in grade than Colorado coals. It is high in ash, but does not slack on exposure, and in the absence of better fuel may prove to have considerable value.

Coal Fields of the White Mountain Region, New Mexico. By C. A. Fisher. 'Bulletin 225,' United States Geological Survey, pp. 293-294.

At least two seams about 2.5 ft. thick, of medium quality and high in ash, occur. The conditions for development are unpromising.

Coal of the Bighorn Basin, in Northwestern Wyoming. By C. A. Fisher. 'Bulletin 225,' United States Geological Survey, pp. 345-361.

The coal of the Bighorn basin is confined mainly to the Laramie formation, but also occurs in the basal sandstone of the Dakota. The beds of workable character are found mainly in the basal sandy portion of the Laramie. They are widely distributed, but the greatest development is along the principal streams. In the Cody district, on Shoshone river; in the Meeteetse on the Gray Bull river; in the Thermopolis on Bighorn river; in the Basin area near the mouth of No Wood creek, and in the newly opened Garland district, there is more or less mining. The principal bed ranges from 3 to 8 ft. in thickness, 5 to 6 ft. being frequently observed and a greater thickness being mined at a few points. The coal is hard and black with bright luster and uneven fracture. It does not break down much on exposure, and affords satisfaction as a domestic fuel. The amount available is evidently very large, though the present mines are small.

*Abstract of a paper read before the Institution of Mining Engineers, London meeting, 1904.

BOOKS REVIEWED.

Pitfalls of Mining Finance. By Harry J. Newton. Denver, Colo.; *The Daily Mining Record.* Pages, 170. Price, 50 cents.

This book is written, as the author states in his introduction, not from the standpoint of a mining engineer or financier, but for the benefit of the investing public. Mr. Newton is a newspaper man, of long experience in a mining community, and he has seen much of the ways of promoters and all their allies; and he speaks with a certain authority. His object is to warn the public against worthless mining schemes and the ways in which they are made to seem attractive to the investor. He has done this in a breezy, off-hand way, which is readable and entertaining. One lesson impressed upon buyers is that they should investigate, and never invest on the strength of advertisements or high-flown prospectuses—which is surely common sense.

Report on the Pan-American Railway. By Charles M. Pepper. Washington; Government Printing Office. Pages, 76; with map.

This is a report made to the Secretary of State on the present condition of the project of the Pan-American Railway, to connect the United States with the countries of Central and South America. It sums up the conditions in those States and the work which has been already done on railroads which may hereafter be utilized as sections of the Pan-American line. Mr. Pepper sums up his observations in the following closing paragraphs:

"The conclusion formed by your commissioner, as a result of the inquiries which he has been occupied a year in making, can be briefly stated. He desires to put it as strongly as can be expressed in words. It is the opportunity for the United States to extend its commerce by encouraging railway building in the republics which are its neighbors and friends, and which look to it for guidance. The benefits of this extended commerce will be enjoyed by all the nations of the three Americas.

"The attitude of the respective governments, and their earnest desire for the increase of United States investments, has been declared with frankness and sincerity. They cannot be expected to bar themselves completely from European capital, yet their preference for North American investments and enterprises is significant. Their policy, as the result of experience, is to treat with reputable and legitimate companies or individuals. For capital of this character there is every encouragement, not only in the growing stability of the governments, but also in their ability to carry out their guaranties and in their disposition to enact legislation which will meet reasonable requirements."

Proceedings of the Lake Superior Mining Institute. Ninth Annual Meeting, 1903. Edited by A. J. Yungbluth, Secretary. Ishpeming, Mich.; published by the Institute. Pages, 166; illustrated.

The ninth yearly meeting of this active and flourishing society was held on the Marquette iron range in August, 1903. The present volume records the proceedings of the meeting, and gives also in full the papers then presented. These include 'No. 9 Shaft, Ashland Mine,' by H. F. Ellard; 'High Explosives,' by J. H. Karkett; 'Mine Accounting,' by W. M.

Jeffrey; 'Charcoal Iron Industry of the Upper Peninsula,' by W. G. Mather; 'Iron Ores of Arctic Lapland,' by Chase S. Osborne; 'Card System for Mine Supply Accounts,' by F. W. Denton; 'New Changing House at Cliffs Shaft Mine,' by J. S. Mennie; 'Champion Mill Intake Tunnel,' by F. W. O'Neil. There are also descriptions of the Greenway ore-unloader and of Pioneer Furnace, at Marquette; while the secretary adds some pages of useful statistics of the Lake Superior mining region, and a brief sketch of the condition of that region in 1856, written by a traveler who visited it at that early stage of its development, 47 years ago. This report shows that the Institute is doing excellent work, and occupying a useful position among the many mining men of the Lake country.

The Oil-fields of Russia and the Russian Petroleum Industry. By A. Beeby Thompson. New York; the D. Van Nostrand Company. London; Crosby Lockwood & Son. Pages, 524; with maps and illustrations. Price, \$15, net.

Considering the great importance and large production of the Russian oil-fields, it is somewhat singular that no book upon them had heretofore been published in Russian, English or German. Such literature as existed was in the form of scattered papers and articles. Mr. Thompson, who has spent much time in the Baku field, has undertaken to supply this deficiency, and he has done so with as near an approach to completeness as could be expected. He has divided his subject into 16 chapters, the first of which is partly historical and partly a discussion of the commercial side of oil production and distribution. The other chapters treat in succession of the features of the oil deposits and their distribution; the origin of petroleum in the Caucasus; the more important oil-fields; boring for oil; casing of wells; exclusion of water from wells; methods of raising oil; the air-lift system; bailing wells; fountains, or spouting wells—'gushers'; the generation of steam; theory and practice of liquid fuel; fires in the oil-fields; administration of oil properties; the treatment of belts and wire ropes. There are also three appendices, chiefly taken up by statistical matter in relation to the oil industry.

This shows a pretty wide range of topics, and indicates the thoroughness with which the author has treated his subject. There are few points in connection with the Baku oil district, on which information cannot be obtained in this book.

The chapters on boring wells, on the methods of raising oil by pumping, etc., and the management of oil properties are especially valuable. The author freely acknowledges the authorities from which he has obtained information. Many of his facts, however, were obtained by him directly, and are the result of careful study and long experience in the oil fields.

The book is profusely illustrated. There are views of wells and of machinery; and many illustrations showing special features of the field. The mechanical work is good, and the large volume deserves recognition, both for the facts which it presents—many before unknown—and the excellent way in which the publishers present the book.

Sterling silver employed in the manufacture of jewelry, etc., consist of 92.5 parts fine silver, and 7.5 of the best shot copper.

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sakes and for that of book buyers, give the retail price. These notices do not supersede review in a subsequent issue of this JOURNAL.

The North Laramie Peak Copper District. By Henry C. Beeler, State Geologist. Cheyenne, Wyoming; Public Printer. Pamphlet, 16 pages.

Etude sur la Réforme de la Legislation Minière en Nouvelle-Calédonie. By M. B. Noumea, New Caledonia; Imprimerie Caledonienne. Pages, 44.

The Simmance-Abady Photometer. London, England; reprinted from the *Proceedings of the Physical Society.* Pamphlet, 12 pages; illustrated.

Nouveau System pour Combattre les Incendies dans les Mines. By J. Krzyzanowski and S. Wysocki. Paris, France; Vve Ch. Dunod. Pages, 44; illustrated.

The Statistical Year-book of Canada for 1903. Nineteenth Year. Compiled by George Johnson, Statistician to the Department of Agriculture. Ottawa, Canada; Public Printer. Pages, 774.

Iowa Engineering Society. Proceedings of the Sixteenth Annual Meeting, 1904. Edited by Arthur J. Coxe, Secretary. Iowa City, Iowa; published by the Society. Pages, 188; illustrated. Price, 50 cents.

Results of a Census of New South Wales Taken March 31, 1901. Part VIII. Occupations of the People. Prepared by T. A. Coghlan, Government Statistician. Sydney, N. S. W.; Government Printer. Pages, 192.

Die Elektrochemische Reduktion der Nitro-derivate Organischer Verbindungen, in Experimenteller und Theoretischer Beziehung. By John Möller. Halle-a.-S., Germany. Wilhelm Knapp. Pages, 116. Price (in New York), \$1.40.

New South Wales. Statistical Register for 1903. Part V. Manufactories and Works. Part VI. Education, Science and Art. Prepared by T. A. Coghlan, Government Statistician. Sydney, N. S. W.; Government Printer. Pages, 36 and 44.

Geological Survey of Western Australia. No. 11. Notes on the Country Between Edjudina and Yundaminern. By A. Gibb Maitland. Pages, 64; illustrated. No. 12. *Geological Features and Mineral Resources of Mulline, Ularring, Mulwarrie and Davyhurst.* By C. G. Gibson. Pages, 32; with map. Perth, W. A.; Government Printer.

DEMAND FOR IRON PYRITE IN GERMANY.—In consequence of the diminishing supply of supply of sulphur-bearing minerals in Spain and Portugal, German manufacturers of sulphuric acid are soliciting cheap raw material from other sources. According to the American Consul-General at Berlin, comparatively little is known in Germany as regards the large iron pyrite deposits in America. Consequently producers here are requested to send data to the Consul-General concerning their output, analyses, prices, etc. It may be added that the leading pyrite mines here are situated in Virginia and Massachusetts, and that the United States produced in 1903 a total of 199,387 tons, containing approximately 87,730 tons sulphur, which satisfied a large part of the demand of sulphuric acid makers.

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

Funds for Non-Union Miners.

Sir.—I notice frequent appeals for moral and financial support addressed by labor unions throughout the country to the people on behalf of the union strikers in the State of Colorado. I have seen no subscription list started in the East for the benefit of the families of the non-union workmen who were killed by the explosion at Independence, Cripple Creek, Colorado, June, 1904, or for those injured as the result of this explosion. There are two men lying in the hospital at Cripple Creek, Colorado, who have lost their legs as a result of this horror. I enclose herewith my check for \$100 for the purpose of starting a subscription list among your readers for the benefit of those injured and for the families of those who were killed.

Will you kindly publish this letter, and will you inform the readers of the JOURNAL that there is a committee of the citizens of Cripple Creek who are authorized to receive these subscriptions which is known as the "Committee for the relief of those injured by the explosion at Independence, Cripple Creek, Colorado." This committee will acknowledge all subscriptions which you send them.

BENJ. B. LAWRENCE.

New York, July 21, 1904.

Filing Notes and Clippings.

Sir.—Some months since I believe you had in your JOURNAL one or two articles on approved methods of filing cuttings from periodicals, etc. These I read with much interest, and realize their great utility. There must, however, be a large number of engineers who find themselves very similarly situated to myself, who have at short notice to leave for distant parts, totally unknown to them, and where possibly any unusual amount of baggage would be a matter of considerable cost and annoyance. To this class, then, it seems to me that any system of classification otherwise than an easily portable one is of little practical use. In the hope, therefore, of assistance to engineers, especially those starting their foreign careers, I would advise what I have found for several years of great service; that is, a scrap book, consisting of pages containing three or four pockets apiece, made by the folding over of the paper. A printed alphabet is sold with each, also numbers for the several pages, all of which can be placed where so desired. I use an alphabetical classification, and have usually little trouble in finding what I require, since it is grouped under its particular letter and special classified pocket. The articles so filed are, of course, readily detachable.

There is, of course, one serious objection to all filings of cuttings, which applies to this system also, and that refers to articles that are on either side of the page. I presume it is a very unpractical suggestion, but it seems to me that it might just be possible to print all the reading matter on the front of the page and the advertisements on the reverse. This would mean difficulties with the publishers, doubt-

less, as I presume the advertisements are printed in advance of the letter press, and would also prove disadvantageous to those binding the volumes. The only way now, it seems to me, is to purchase two copies of each periodical, so as to avoid the necessity for references to articles contained on the reverse side.

I think I might also add, without fear of being thought to interestedly further a free advertisement, that the Perfect Scrap Book Company, 395 Broadway, N. Y., publishes a 'College Edition Scrap Book,' costing \$2, which I think will be found quite satisfactory for the purpose advocated.

H. E. WEST.

Matagalpa, Nicaragua, July 7, 1904.

The Le Roi Mine—A Statement.

Sir.—In view of the fact that numerous articles have appeared in the American papers as well as in the English press concerning the Le Roi Mine at Rossland, in British Columbia, it is but right that some facts concerning this property be placed before those interested in mining as they are of importance. With this end in view I am glad to avail myself of the courtesy of the JOURNAL.

When I took charge of the mine and the smelter at Northport as general manager in February, 1903, I was informed by my predecessor that the mine was about worked out, and its life would continue not to exceed six months or into the summer of that year. The necessity of immediately inaugurating a plan of prospecting and putting it into operation was apparent, and it was done. Diamond drill holes and cross-cuts were made to the south of the old workings, in entirely new territory, with satisfactory results in many instances. On the bottom or 1,350-ft. level, 1,200 ft. vertically from the surface, the result of this work was very valuable, disclosing, as it did, in places bodies of merchantable ore; valuable not only to the Le Roi Mine, but to Rossland camp in general, as the discovery demonstrated for the first time the existence of ore at great depth on Red mountain. In addition to finding this solid ore, a highly mineralized zone extending the entire length of the claim was found, opening a large field for warranted prospecting.

So successful was this work, that upon my retiring from the general management of the affairs of the company on June 1, 1904, there was as much, if not more, ore in sight in the mine than at any period in its history.

The method adopted some years ago of sampling the output of the mine at the mine has only recently been really proven to be faulty, although both the late Mr. Oscar Szontagh, manager of the Northport smelter, and Mr. E. J. Wilson, the present incumbent maintained that the ore did not carry the values represented by the mine sampling. The attention of the company was drawn to this fact several years ago, but no action was taken in the matter until I decided that, in the interest of all concerned, a method of accurate sampling must be adopted, not only for the protection of the mine itself, but to establish a reputation for the smelter as being beyond doubt accurate in its sampling, in its endeavor to build up a custom business. With this end in view I purchased, in October, 1903, a Vezin sampler, which was to have been delivered at the smelter in 90 days. Owing to unavoidable delays it was not installed until April, 1904. Upon its

installation the first accurate sampling of Le Roi Company's ore in quantity was made possible, and the inaccuracy of the mine sampling proven. The absence of accurate facilities for this work created annually, as can be understood, a great difference between the values as represented by the mine sampling and the value of the smelter products.

A pernicious custom was instituted by the home office of the company of mailing to the shareholders monthly an estimated value of the product, which has led, as can be readily seen, to disastrous results to those who, on the strength of such information, speculated in the company's shares. During the months of January, February and March last, the mine output was increased and the sampling at the mine showed much higher values than the ore contained and losses to individuals speculating in the company's shares became a serious matter.

The intimation that anybody connected with the mine profited by the faulty sampling, and the erroneous statements of estimated values is absolutely without foundation in fact.

The recent sampling of the mine, the result of which was to give \$8.15 per ton as the value of the ore in the mine, I do not consider as fair; stope and drift faces vary in value and character from day to day, the values being very unevenly distributed through the ore; the face of pay-ore to-day may in a few days be difficult to handle economically.

The conditions under which I assumed the management of the mine were such that it was either a question of abandoning it or spending a large sum of money in search of more ore. I took the latter alternative, and the mine is still shipping ore and, I am informed, contemplates installing a concentrating plant.

S. F. PARRISH.

San Francisco, July 23, 1904.

WHEN PARTY WORKING IN MILL HAS LIEN ON ORE AND MINING PROPERTY.—A person who performs labor in a quartz mine, under employment by the owners as an amalgamator, keeping the machinery in running order, looking after the concentrates, cleaning amalgam, generally looking after the entire machinery, is entitled to a lien on the mine under a statute granting a lien to every person performing labor or furnishing material used in the construction, alteration or repair of any mining property, or performing labor in any mine or claim. Where the ore extracted from the mine is milled at the mine, and in a mill belonging to the mine, such labor comes within the intent and meaning of the lien laws, and should be allowed. By the laws of Idaho (1887, sec. 3445) a party placed in charge of mining property, consisting of personal and real, has a lien for his services on the personal property while in possession of same.—Thompson v. Wise Boy Mining & Milling Company (74 *Pacific Reporter*, 958); Supreme Court of Idaho.

Russia's cement industry, handicapped by expensive transportation to consuming markets, and aggressive competition as a result of over-production, has invited the suggestion that factories be erected hereafter in the center of the consuming territory. In 1901 10 companies in the Black Sea district produced 2,950,000 bbl. of portland cement—1,400,000 bbl. more than was consumed. Since then the low prices have compelled several works to shut down indefinitely.

ABSTRACTS OF OFFICIAL REPORTS.

Mason & Barry Ltd.

This English company operates the San Domingos mine, in Portugal, which is a large deposit of copper-bearing iron pyrite. The report for the year 1903 shows that the profit realized for the year's working was £85,056, to which is to be added £4,832, brought forward from the previous year, making a total of £89,888. From this balance £1,000 was written off the value of shares owned by the company, £1,000 appropriated to the pension fund, and a dividend paid of 7s. per share, or 35 per cent on the stock, this payment leaving a balance of £23,078 forward to the current year. The estimated value of stocks of ore and metal at the close of the year was £96,099.

The total quantity of ore broken and raised at the mine during the year was 217,207 tons, an increase of 39,644 tons over the previous year. The shipments, including ore from the cementation works, were 349,380 tons, a decrease of 55,731 tons. The quantity of ore sold and invoiced for its sulphur value alone was 341,631 tons for the year.

Tharsis Sulphur & Copper Company.

This company owns a group of mines in Spain, the ore generally being a copper-bearing iron pyrite. The report for the year 1903 shows that the net profits amounted to £218,960. This profit was left after writing off £26,000 for depreciation of plant and equipment and for depreciation of mines. The balance from the previous year was £25,889, making a total of £244,749. From this the company has paid a dividend of 7s. per share, or 17.5 per cent on the capital stock, amounting to £218,750, and leaving a surplus balance of £25,999.

The total quantity of mineral raised during the year was 348,413 tons, an increase of 5,721 tons. This does not include cupreous sterile raised and shipped. The rainfall for the year was deficient, somewhat restricting operations.

In the Tharsis mine 65,701 cu. m. of overburden were removed, and toward the close of the year the extraction of mineral was commenced. The heaps laid down in the previous year continue to give a satisfactory yield of copper. At the Calanas mine 402,189 cu. m. of overburden were removed. This mine furnished most of the mineral produced during the year. The development work at this mine was satisfactory, opening up large quantities of ore, low in copper but high in sulphur. At the Lagunazo mine no mineral was extracted, but copper still continues to be obtained from the old heaps.

The railroad and piers are in good condition. Shipments from Corrales were 421,226 tons of pyrites and 4,548 tons of copper precipitate.

The metal works were run steadily during the year, and some repairs were made and charged to revenue. The quantity of refined copper produced during the year was 6,319 tons.

The work done for the year was exclusively at the company's mines in Spain. The property in Norway, purchased some time ago, has proved disappointing. Investigation has shown that there was not sufficient ore to warrant the equipment of the mine with plant and machinery, and it was finally decided to accept an offer made by a Norwegian syndicate. During the year the engineers of the company inspected several properties in different coun-

tries, but without finding anything which the company desired to buy. It may be mentioned that the mines in Spain are gradually approaching exhaustion, and in anticipation of this the company has been considering investment in similar properties elsewhere.

Compagnie du Boleo.

This company owns and operates the important copper mines of Boleo, in the Santa Rosalia district, in Lower California. The company is French, having its headquarters in Paris. The capital stock issued is 12,000,000 francs. The present report covers the year 1903.

The production of copper, for the year, was 10,480 metric tons. This was a decrease of 473 tons from 1902, chiefly due to the difficulty in obtaining labor. The ore mined was 230,490 tons, a decrease of 19,405 tons. Development work done was somewhat less than in the preceding year, but the quantity of ore in sight was increased.

Some economies were realized in the smelting works. The average recovery from all the ore treated during the year was 4.56 per cent copper, an improvement of 0.18 per cent over 1902.

The company's railroad carried 376,763 tons of freight, a decrease of 25,191 tons. There was, nevertheless, a decrease in expenses and in the cost per ton carried.

The financial statement is as follows:

	Francs.
Net profits	5,829,449
Amortization, etc.....	441,646
Reduction of profit and loss.....	1,913,463
Reserve funds	467,578
Founders' shares	460,002
Council of administration	46,812
Dividends on stock	2,500,008
Total charges	5,829,449

The dividends paid were 104.167 fr. per share. The reserve funds at the close of the year amounted to 4,902,049 fr. The stocks of ore at the close of the year were valued at 22,907 fr.; the stocks of matte and black copper at 3,332,235 fr. The net earnings showed an increase of 1,723,379 fr. over 1902, which was chiefly due to the improvement in the copper market.

Improvements made during the year amounted to 662,678 fr. in cost. The larger part of this was spent in betterments at the shipping piers and in other means of transportation. The sailing vessel formerly used to carry freight to Guaymas was sold, as shipments are now made in a different direction.

The new aqueduct, built to carry water from Santa Agueda to Santa Rosalia, was completed. It is 16,074 m. in length. The work, including a branch 550 m. long, cost 171,402 fr. in all.

The number of workmen employed was 1,485 in January, but fell to 1,314 in August. However, it increased to 1,606 in December. An unfavorable influence on the working force was exercised by new mining developments elsewhere, many men having left on account of rumors of higher wages paid at Nacozari and Cananea; while it was difficult to fill their places.

The Inguaran Company has decided that developments at its mines warrant their extended exploitation, and has therefore decided to increase its capital stock from 4,550,000 fr. to 12,000,000. The Boleo Company has taken a share of the new stock corresponding to its

original share in the Inguaran Company. The new stock taken is 660,000 fr., on which an installment of 165,000 fr., or one-quarter, has been paid.

QUESTIONS AND ANSWERS.

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

Whetstones.—Can you tell me anything of the origin of the whetstones commonly sold?

—C. M.

Answer.—The best whetstones are those made from novaculite. Merrill—'Non-metallic Minerals,' p. 393—says: "The name novaculite is applied to a very fine-grained and compact rock consisting almost wholly of chalcedonic silica, and which, owing to the fineness of its grit, is used only in the finer kinds of work, as in sharpening razors, knives and the tools of engravers, carpenters and other artisans. The true novaculites are at present quarried in America only in Montgomery, Saline, Hot Springs and Garland counties, in Arkansas, and are known commercially as the Washita (or Ouachita, as the name is properly spelled) and Arkansas stones. Both varieties are nearly pure silica, the Ouachita being often of a yellowish or rusty red tint, and the Arkansas of a pure snow whiteness, the latter variety being also the hardest, most compact and highest priced. According to Griswold, stone suitable for the manufacture of whetstone occurs in quantity in two distinct horizons in the Arkansas novaculite series of rocks, both of which are now being worked. The principal quarries are in the massive white beds of the Hot Springs region, the material being mainly of the fine, compact white Arkansas type. Within a limited region, northeast of Hot Springs, the stone becomes more porous, owing in part to the existence of the larger number of the rhomboidal cavities, and passes over to the Ouachita type."

Arsenic Minerals.—Can you tell me anything of the arsenic minerals found in natural state? I do not mean the mispickel or arsenopyrite.

—K. L.

Answer.—The principal arsenic minerals found are those known as realgar and orpiment. Of these minerals, Merrill—'Non-metallic Minerals,' pages 22-24—says: "Realgar is a monosulphide of arsenic, AsS = arsenic, 70.1 per cent; sulphur, 29.9 per cent. Hardness, 1.5 to 2; brittle; specific gravity, 3.55; color, aurora-red to orange-yellow; luster, resinous; streak the color of the mineral. Orpiment, or auripigment as it is also called, is a trisulphide of arsenic of the formula As₂S₃—arsenic, 61 per cent; sulphur, 39 per cent. Hardness and specific gravity essentially the same as realgar, with which it is commonly associated.

"Realgar and orpiment are very beautiful, though not abundant, minerals which occur associated with ores of silver and lead in various European mining regions and also those of Japan, Hungary, Bohemia, Transylvania and Saxony. They have been reported in the

United States in beds of sandy clay beneath lava in Iron county, Utah, and form the so-called arsenical gold ore of the Golden Gate mine, Mercur, Tooele county, this same State, also in San Bernardino county, Cal.; Douglas county, Oregon, and in minute quantities in the geyser waters of the Yellowstone National Park.

"Realgar is used mainly in pyrotechny, yielding a very brilliant white light when mixed with saltpeter and ignited. It is now artificially prepared by fusing together sulphur and arsenious acid. Orpiment is used in dyeing and in preparation of a paste for removing hair from skins. As with realgar, the mineral is now largely prepared artificially."

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

DUTY ON COMPOSITE METAL SHEETS.—Metal in sheets, composed of an iron sheet with a nickel sheet on one side and a copper sheet on the other, all rolled and squeezed together so as to form one mass, are dutiable as articles of metal under paragraph 193, act of July 24, 1897, and not as "sheets of iron or steel . . . galvanized or coated," under paragraphs 131 and 132 of said act.—Appeal of Boker & Co. from Collector of Customs at New York; Board of General Appraisers.

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 the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the *JOURNAL* in which notice of the patent appeared.

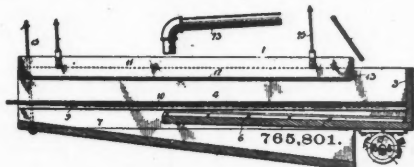
Week Ending July 26, 1904.

- 765,659. **ROPE-DRUM ENGINE.**—Harry N. Covell, New York, N. Y., assignor to Lidgerwood Manufacturing Company. In combination with a hoisting-engine, a swinger-drum shaft located in front of said engine, a swinger-drum thereon, a clutch-shaft located between said engine and said swinger-drum shaft and clutch mechanism on said clutch-shaft whereby said swinger-drum is controlled.
- 765,673. **MANUFACTURE OF TUBES OR HOLLOW BODIES.**—Balfour F. McTear, Rainhill, England. In machinery for manufacturing tubes or hollow bodies by internal and external rolling, an internal roller, an external roller, main adjusting or moving bearings mounted and working in the frames of the machine at either end of same, and normally upwardly pressed bearings outside said frames by which the operation of the internal roller between the main adjusting-bearing is normally bent toward the external roller.
- 765,706. **PROCESS OF CASE-HARDENING.**—Carlo Lamargese, Rome, Italy. A step in the art of case-hardening iron and steel which consists in first mixing together wood-charcoal and lampblack; in then placing the article in a mass consisting alone of this mixture with its metallic surfaces in intimate contact with the latter, and in then heating the article and the surrounding mixture.
- 765,724. **TREATING SCRAP-STEEL AND RE-CARBURIZING SAME.**—Herbert B. Atha, East Orange, N. J.—A process for preparing scrap-steel for remelting in an open-hearth furnace, which consists in intimately mixing with the scrap-steel finely divided carbon.
- 765,728. **MUFFLE.**—James C. Fox, Battersea, London, England, assignor to the Morgan Crucible Company, Ltd., London, England. A muffle consisting of a horizontally disposed chamber provided

with means for closing its ends to exclude the products of combustion from the interior of the muffle, said muffle having a discharge-aperture and being provided laterally with a series of air-inlets extending from one end to the other, to supply the contents of the muffle with oxygen substantially equally throughout its length whereby the entire contents of the muffle will be acted upon simultaneously and in a substantially uniform manner.

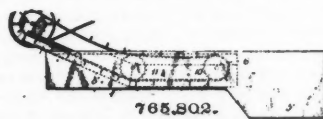
765,789. **PROCESS OF CONVERTING FURNACE-FLUE DUST INTO BLOCKS.**—Samuel V. Poppel, Columbus, Ohio. A process of converting flue-dust of a furnace or finely divided ore into blocks, consisting of mixing a quantity of flue-dust or fine ore with water and lime substantially in the proportions stated, adding to such mixture a desirable quantity of ammonium chloride, pressing the mixture into blocks and subjecting said blocks to a hardening process.

765,801. **ORE-WASHER AND SEPARATOR.**—Samuel B. Wise, White Oaks, New Mexico. An ore washer and separator comprising a longitudinally inclined box or casing provided with a screen



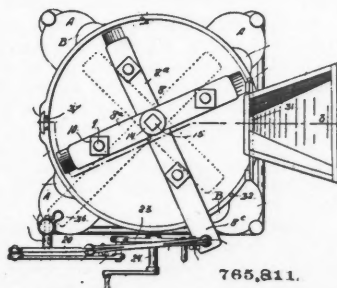
above a rifled bottom, said screen and bottom discharging at their upper ends, adjustable hangers supporting the box at the upper end, means at the lower end supporting and imparting vertical and horizontal movement to the box, whereby material under treatment is tossed toward the upper end thereof, in combination with a water-distributing pan supported above and adjustable independently of the box or casing.

765,802. **WATER-RECOVERING APPLIANCE FOR PLACER-MINING MACHINES.**—Samuel B. Wise, White Oaks, N. Mex. An apparatus for recovering, clarifying and storing water used in wet-process ore-separators, comprising a settling-tank,



which receives water and suspended matter discharged from a separator, having side and end walls and a bottom sloping downward from the side walls to a central channel having an inclined part extending over the rear wall of the tank, an endless blade conveyor movable in the channel of the tank throughout its length to remove precipitated matter therefrom, and a main tank inclosing the settling-tank and having its end and side walls extended above those of said settling-tank.

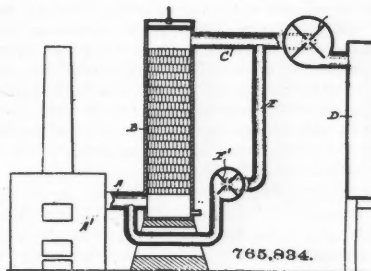
765,811. **DRY-PLACER MACHINE.**—John J. Calahan, Pueblo, Colo. The combination with a suitable support, of a tank mounted to rotate thereon and having a central post, a cruciform frame



mounted on the post and provided with agitators, one arm of said frame projecting beyond the periphery of the tank, and means connected with the projecting arm and acting on the tank for simultaneously actuating the tank and agitators.

765,832. **LOADING-MACHINE.**—William E. Hamilton, Zanesville, Ohio. A loading-machine comprising a platform, a gathering mechanism and a crane independently mounted on said platform, means to cause said crane to describe a sector of a circle, and means to impart the motion of said crane to said gathering mechanism.

765,834. **APPARATUS FOR MAKING SULPHURIC ACID.**—Herman Hegeler and Nicholas L. Heinz, LaSalle, Ill. In an apparatus of the class described, the combination with a main flue provided with a



filled section and free open sections before and after the filled section, of a fan in the free section after the filled section and a secondary flue communicating with the main flue before and after the filled section and provided with a fan.

765,836. **SEPARATOR AND CLEANER.**—Carl F. Hettinger, Boston, Mass.—A separator and cleaner comprising a cylindrical vessel, a conical bottom attached thereto, a balanced valve in said bottom and within the top of the vessel, a conical screen having a vertical perforated flange pendant from the lower edge of said screen and forming an annular passage between the vessel and said flange.

765,838. **PROCESS OF SMELTING COMPOUNDS AND PRODUCING CARBIDES.**—William S. Horry, Niagara Falls, N. Y. The process of melting electrolyzable compounds, which consists in heating the charge by passing through it an alternating electric current having a frequency sufficiently high to substantially eliminate losses due to electrolytic decomposition.

765,842. **BRIQUETTING-MACHINE.**—Joshua J. Jones, Pittsburg, Pa. A briquetting machine having a mold-chain with mold-cavities on the inner side thereof, radially-movable plungers mounted on a rotary carrier independently of, but within, the chain, means for carrying the chain along the plungers, and means for forcing the plungers against the mold-cavities.

765,876. **STAMP SHOE OR DIE.**—Walter Brinton, High Bridge, N. J. A stamp shoe or die of manganese steel comprising a heat-treated body portion having corrugated inner walls, and a metal plug cast into said opening and conforming to said walls.

765,881. **DRILLING-MACHINE.**—Edward Christman, Massillon, Ohio. In a drilling-machine, a derrick with a crown-pulley thereon at the forward end, a shaft with an idle pulley thereon at the rear end, and a shaft with a crank thereon intermediate the ends, in combination with a spudding mechanism comprising a rocker-arm on the pulley-shaft, a connecting-bar pivotally joined to the free ends of the arm and the crank and having one end extended above the arm, a shieve on the extended end of the bar and a cable attached to the machine and passed over the pulleys and under the shieve and having a drill on its free end.

765,902. **APPARATUS FOR HANDLING MINE-CARS.**—William J. Patterson, Pittsburg, Pa. In apparatus for handling mine-cars, the combination with an elevated structure and a shaft therein, of an elevator in said shaft, a track in proper position with reference to said elevator, a carriage adapted to travel to and from said elevator, a yielding pusher on said carriage in the path of said car, a mechanism for moving said carriage.

765,923. **AIR-COMPRESSOR.**—John S. Herriot, Liverpool, England. An air-pump comprising a cylinder, a bucket of dished form, with an annular wall with aperture therein, adapted at the end of the stroke to pass the end of the cylinder and an end on said cylinder projecting into the same and having an annular space round it.

765,929. **STEAM-HEAD FOR AIR-PUMPS.**—John C. Lyons, McComb, Miss., assignee of one-half to T. M. Flynn, McComb, Miss. In a reversing-valve, a reversing-piston operatively connected to shift said valve, a main power-piston controlled by said reversing-valve, a connection between the power-piston and the reversing-piston, and means carried by said valve to control simultaneously the reversing and power pistons.

765,932. **MANUFACTURE OF CAST-STEEL.**—Maurice Meslans, Paris, France. A process for removing oxygen, nitrogen and hydrogen from steel in the process of casting, consisting in incorporating

with the molten steel an alloy of aluminum and calcium.

765,953. MACHINE FOR SHEARING METAL.—August A. Berghof, Newark, N. J., assignor to George A. Ohl & Co. In a machine for cutting sheet metal, the combination, with a bed or table and standards comprising guide members, of a shearing-head and cutter and supporting-lugs extending from said shearing-head, mechanism for causing a reciprocatory motion of said shearing-head and cutter, a clamping-leaf, and lugs on said clamping-leaf, said supporting-lugs on said shearing-head being in separable and lifting engagement with the lugs of said clamping-leaf.

765,969. CENTRIFUGAL PUMP.—Nils K. F. Hanson, Utansjö, Veda, Sweden. A centrifugal pump, comprising a casing composed of two side plates and an intermediate annular plate, said plates being connected at the perimeters of the side plates so as to form a central water channel or chamber, said channel or chamber being of greater diameter in one direction than in the other, and a turbine-wheel mounted in said chamber or channel eccentrically thereof, and said chamber or channel being provided with a tangential outlet at one end thereof and with a central inlet formed in one of the side plates thereof, the turbine-wheel being also provided with a shaft which passes through the opposite side plate, and the annular plate being changeable so as to vary the depth of said chamber or channel.

765,986. CONICAL ROLLS FOR PIERCING, EXPANDING OR CROSS-ROLLING METAL BILLETS OR TUBULAR BLANKS.—John H. Nicholson, Pittsburg, Pa., assignor, by mesne assignments, to National Tube Company. The combination of two conoidal rolls forming a converging and then diverging pass between them, the convergence or taper of the two rolls throughout their entire rolling surfaces being in opposite directions in respect to the length of the pass, and the rolls being skewed, the smaller ends of both rolls being inclined in the same direction and the smaller diameters of one roll being opposed to the larger diameters of the other.

765,990. CONVEYER-CHAIN.—David E. Phillips, Mahanoy City, Pa. A conveyer-chain link comprising a U-shaped bar having laterally-reinforced ends.

765,994. PUMPING APPARATUS.—Augustus C. E. Rateau, Paris, France. In a pumping apparatus of the character described, a steam-turbine and its shaft, and a main centrifugal pump located on and operated by the turbine-shaft, in combination with an obturator interposed in the steam-inlet of the turbine, and means controlled by the discharge from the main pump for governing said obturator.

765,997. ORE-ROASTING FURNACE.—George H. Shellabarger, Dekalb, Ill., assignor to Apex Manufacturing Company, Kansas City, Mo., a corporation of Arizona. In an ore-roasting furnace, a furnace-body comprising a longitudinally-extending primary ore-chamber, a communicating return or secondary ore-chamber, said chamber being sealed against the admission of the products of combustion thereto, and an interposed air-flue.

765,998. ORE-ROASTING FURNACE.—George H. Shellabarger, Dekalb, Ill., assignor to Apex Manufacturing Company, Kansas City, Mo. In a roasting-furnace, the combination with a movable roasting-furnace body, of a longitudinally-extending air-trunk an air-flue affording communication between said air-trunk and the roasting-chamber of said furnace-body, and a valve member movably mounted within said air-trunk and moving upon the outlet therefrom to control the admission of air to said air-flue.

766,017. COMPRESSOR.—Ivan Carlier, Denver, Colo. In a compressor, the combination of a motor and a fluid-chamber, a plunger moving in said chamber adapted to be reciprocated by the motor, a tube for the admission of air to the fluid-chamber, a second tube for the escape of air compressed in said chamber by the fluid, valves in said tubes, a coil arranged in the fluid-chamber and adapted to have a liquid circulating therethrough for cooling the fluid in the chamber, a supplemental fluid-receiving tank arranged adjacent to the chamber, pipes connecting the said supplemental tank with the air-discharge tube and with the fluid-chamber, valves in said pipe, and means, including a rod, movable vertically at predetermined times for controlling said valves.

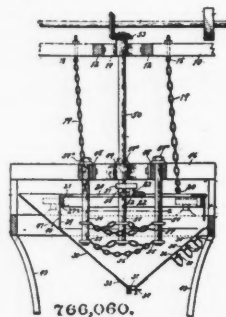
766,025. SLIME-FILTERING APPARATUS.—George S. Duncan, Melbourne, Victoria, Australia. Improved slime-filtering apparatus comprising a large number of hollow flat vertical filters parallel to each other and worked under vacuum suspended within a vat containing the material to be treated, each of said filters consisting of a skeleton framing covered with

filter-cloth and arranged comparatively close together with scrapers between.

766,040. BELT CONVEYER APPARATUS.—James B. Humphreys, New York, N. Y., assignor to Robbins Conveying Belt Company. In combination in a conveying apparatus, a movable conveying-belt framework, means for movably supporting said framework, a conveying-belt mounted and actuated upon said framework, and means adjustable lengthwise of said belt for discharging material therefrom.

766,058. METHOD OF PUTTING INTO OPERATION GAS-PRODUCERS WORKING INTERNAL-COMBUSTION MOTORS.—Hans Neumann, Cologne, Germany. A method of starting gas-producers working internal-combustion engines, which consists in causing a draft of air upon the partially-cooled contents of the producer, carbureting the resultant incombustible gases, and utilizing such carbureted gases to drive the engine until the normal working of the producer is set up.

766,060. ORE-PULP WASHER AND CONCENTRATOR.—Francis E. Parker, Kansas City, Mo. The combination with the receptacle for the concentration of metals from ore-pulp having valved discharge-openings for the waste material, of sus-



766,060.

pensory device for said receptacle, means for communicating an oscillatory movement to said receptacle and a series of stud-shafts located at the limit of oscillation of said receptacle in pairs, horizontal guide-rollers on said shafts, arms extending radially from the side of said receptacle and guide-pins on said arms contacting with said rollers, and controlling the curvilinear movement of said arms, and stationary pulp-agitating devices located above the receptacle and extending downwardly within the same and adapted to loosen the material at the discharge-openings in the receptacle.

766,062. MINING SQUIB.—John R. Powell, Plymouth, Pa. A mining squib having a fuse or match and a separate exposed tube-closure that may be untwisted to permit examination of the contents of the tube without untwisting the fuse or match.

766,074. BRICK-MAKING MACHINE.—Edgar R. Sutcliffe, Leigh, England, assignor to Sutcliffe Speakman & Company, Ltd., Leigh, England. The combination in a brick-making machine, of a pug-mill and means for driving same, with a reciprocating mold-box, a drum-and-lever mechanism for reciprocating same, a plunger working in said mold-box, and a cam-and-lever mechanism for effecting the rise and fall of the plunger in the mold so that the mold is filled with material under pressure.

766,085. ALLOY AND METHOD OF ITS MANUFACTURE.—Richard B. Wheatley, Barnsbury, London, England. An alloy consisting of about 98.5 per cent of copper and zinc, which are present approximately in the proportions of 60 and 40 per cent respectively and about 1.5 per cent of other metals, consisting of manganese, iron, tungsten, aluminum, tin and strontium about one-third of which consists of tungsten and strontium in equal quantities.

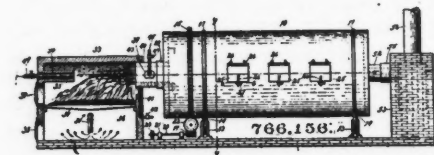
766,110. CAR-DUMP.—Edward Moran, Charleston, W. Va. The combination, with a dump and converging and crossing main and return tracks, both having a down grade, but in opposite directions from the dump, a latch or section of the main track, which is adapted to open and close at the intersection of the adjacent rails of the two tracks, means connecting such latch or rail section with the dump for opening the former when the dump is operated to discharge a carload.

766,131. TREATING SCRAP-STEEL AND RECARBURIZING SAME.—Herbert B. Atha, East Orange, N. J. A process for preparing scrap-steel for remelting or recarburizing in an open-hearth furnace, which consists in applying to the surface of the scrap, a carbon-bearing liquid.

766,132. SAFETY-SHAFT FOR QUICKSAND OR OTHER DANGEROUS GROUND.—Ralph Baggageley, Pittsburg, Pa. Means for sinking shafts, comprising a casing composed of sections adapted to be successively attached, supporting-cables, and a wall which is built within the casing as it is lowered.

766,133. TREATING THE RESIDUE RESULTING FROM MANUFACTURE OF WHITE LEAD.—John W. Bailey, Frank T. Bailey and Mark Bailey, Jersey City, N. J., assignors, by mesne assignments, to United Lead Company. A process of treating the waste products of lead such as are formed in the manufacture of white lead by the corroding process, said waste products being composed mainly of carbonate of lead, oxide of lead and metallic lead, which consists in alternately moistening the said products with acetic acid and exposing them to suitable corroding-gases and at the same time causing the particles of which the products are composed to move upon themselves, whereby the metallic lead in the waste products is converted almost entirely into a solution of acetate of lead, then separating the acetate solution from the carbonate.

766,156. ORE ROASTING AND OXIDIZING APPARATUS.—Lyman H. Allen, Kansas City, Mo., assignor, by direct and mesne assignments, of four-fifths to Ora A. Johnson, Charles E. Bye and William O. Bye, Kansas City, Mo., and Mary Elizabeth Stewart, Sonora, Cal. An apparatus for reducing ores comprising a rotary ore-retaining cylinder hav-



ing a flame-conducting opening at its forward end, a reducing-furnace, a flame-conducting cylinder leading from the furnace within the opening in said cylinder, means for drawing off the gases from the cylinder and an open water-receptacle concentric with the inner side of the cylinder and located at its forward end adapted for the storage of the liquid to be vaporized and a water-pipe leading within the flame-conducting opening of the cylinder and discharging downwardly within the open water-receptacle.

GREAT BRITAIN.

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

Week Ending July 9.

12,653 of 1903. PEAT BRIQUETTES.—R. A. Kellond and J. C. Morrison, Chicago, Ill., U. S. A. Improvements in machinery for making blocks of fuel from peat, specially for covering the blocks with tar or other waterproof material.

13,182 of 1903. PREPARING ALUMINUM.—F. W. Croucher, Southampton. An improved method of preparing aluminum surfaces to make them receptive of electrolytic metallic deposits.

16,317 of 1903. WIRE ROPE GUIDE.—H. Jones and J. Rees, Ystradafog. Improved method of suspending wire guide ropes in shafts so as to reduce the wear.

17,981 of 1903. SULPHATE OF MANGANESE MAKING.—Badische Anilin & Soda Fabrik, Frankfurt, Germany. The manufacture of a sulphate of manganese dioxide, by oxidizing electrolytically a permanganate in presence of sulphuric acid.

23,909 of 1903. CRUCIBLE FURNACE.—M. Harvey, Walsall. A crucible furnace mounted in steel frames, containing the fuel and blast inlets, and mounted portably on trunnions.

24,658 of 1903. COLLECTING COAL DUST.—J. Hogg, Glasgow. Method of catching and utilizing dust, caused by coal when passing into the loading apparatus.

27,769 of 1903. COAL MINE HAULAGE.—J. H. Craven, Wakefield. Improved rope grips for haulage in collieries and mines.

2,520 of 1904. MINE CAR COUPLING.—W. H. Jones, Liverpool. Improved means of connecting colliery tubs to prevent accidental unfastening.

SPECIAL CORRESPONDENCE.

San Francisco. July 27.

(From Our Special Correspondent.)

The Turlock irrigation district in Stanislaus county has had a great deal of trouble with a high flume in Snake ravine. The directors of the district, in advertising for bids for the purchase of the balance of their 5 per cent bonds, found that the owners of the La Grange Ditch & Hydraulic Mining Co. would take part of the bonds, and in part payment for the purchase would agree to fill in this Snake ravine. The idea of the La Grange Co. is to work the ground in the close vicinity of the flume by hydraulic process, getting what gold they can from the ground, and confining the tailings by brush dams, thus building an embankment across the gulch so that water may be carried across on solid ground instead of by means of the flume. The work is to be tested before payment is made and is to begin next month. This is a case of a mining scheme very markedly helping an agricultural community.

At a meeting last week of the Anti-Debris Association the manager reported that men were out in the field examining "the territory under jurisdiction of the association" and would soon report. The phrase is quoted as showing that this association assumes a certain jurisdiction, although it has no legal rights whatever, is not endorsed by the State and has no legal authority to supervise hydraulic mining. The "men in the field" are those the miners term "Anti-Debris spies," as they seek to learn the doings of the miners and bring in information on which is based injunction suits against those who are supposed to be guilty of infractions of the laws. At the same meeting the attorneys reported that they had commenced suits against several persons mining by hydraulic process, showing that the association continues to persecute the hydraulic miners. They also discussed dredge mining again and appointed a committee, to make an examination in detail along the Feather river, near Oroville, to see what damage was being done by this class of mining.

This committee consists of E. J. White, of Yuba City; T. B. Hull and L. P. Farmer, of Tudor, and the county surveyor of Sutter county. As Farmer is manager of the Anti-Debris Association and the others are from districts unfriendly to mining, the result of their report may be very readily predicted. It will doubtless be adverse to the dredger industry and all the blame of overflows caused by the flood waters of last winter will be laid to the operations of dredges. The Oroville field is a fresh one for the association to operate in and dredging is a new industry. Moreover it has grown so rapidly that it exceeds in annual product the hydraulic mining interest; and while the latter is to some extent waning the dredge men are increasing their operations. The Government has for some time appointed skilled engineers to supervise hydraulic mining and the preservation of the navigable streams and given them full power to permit or stop any mine of that class. But the Anti-Debris men are not satisfied with this and insist on doing the supervising themselves, although clothed with no authority, being merely a private organization.

In making an upraise from the 2,500-ft. level to the 2,400-ft. level in the Kennedy mine at Jackson, Amador county, the other day, the miners found a very rich pocket, and outside of this a ledge of fair milling quality. The main shaft will be sunk deeper, to the 2,800-ft. level. This is deep mining and the result is very encouraging to all miners on the Mother Lode. The Gwin in Calaveras county, the Keystone in Amador county and other mines which have "gone to the deep" are taking out rich ore and are prospering. But it has taken capital and grit to do what they have done and proved their mines at great depth. The Kennedy is a very old mine, which once laid abandoned for some 15 or 20 years, but after being properly developed at lower depths has paid dividends a number of years. It is now one of the best equipped mines in the State, and finding such rich ore so deep argues well for further profit.

The strike at the Jumper mine at Stent, Tuolumne county, ended after the order was rescinded that the men must strip going from one room to another on coming off shift. However,

the company has declared "open shop" to be the rule henceforth, hiring men whether union or non-union. Development work only is being done at present in the mine, and some of the old employees were refused work when they applied. Several agitators, who were frequently making trouble, were thus got rid of. The mill is now running 40 stamps and the former wage scale is in force.

Non-union miners have taken the place of the strikers at the Fremont Consolidated mines at Drytown, Amador county, Arthur Goodall, manager. The mine has been closed for 10 weeks. The strike came on for a foolish sort of reason. One of the miners, a union man, did not pay his dues to the union, and after the other miners tried to force him to do so, they appealed to the company to discharge him. This the company refused to do, as collection of dues to a union was none of its business. About 100 men walked out in consequence of this refusal of the company to collect the dues for the union. Then, on May 3, the men came back and offered to work again and were told to come back on May 9. When they did return, they had a string of demands regarding hours, wages, rules, etc., which the company refused to consider. So they did not go to work. The president and manager declare that while they would take union men if they could get them, they are now compelled to hire non-union men in order to run the mine.

The old mining town of Big Oak Flat, Tuolumne county, was almost wiped out by fire on Sunday last, but no damage to any mining works occurred.

The fire in the Bellevue tunnel of the Bellevue Mining Co., near Alleghany, Sierra county, caused a damage of some \$10,000 to buildings and mine timbers, but none to the tunnel. This company has been rather unlucky though it has rich ground. The mine used to be called the "Thistle Shaft" and the Scotch company operating it did its work through a shaft instead of a tunnel, which was rather an innovation in large drift mining operations in this State. It was worked this way for several years and much gold taken out. But after a time heavy floods of water stopped work entirely, and it was decided to run a tunnel as other drift mines did. The tunnel is now about 7,000 ft. in length and is designed to tap the gravel channel about midway of its width and also to furnish a means of draining the whole channel. When completed it was found to be several feet higher than bedrock, and the work of cutting it down has since been in progress. Some months since a drill hole which had been bored was run into, and when the water broke into the tunnel it was filled with sand for a thousand feet or more. Now comes a fire which will cause a temporary shut down and some money loss. The gravel channel has, however, been proved to be rich, and notwithstanding the mishaps the tunnel will be completed.

The marble deposits on the Grant ranch, near Columbia, are to be opened by a new company which is negotiating for the property. The Tuolumne county marble is of good quality.

The old Bloss & McClary hydraulic mine, near Trinity Center, Trinity county, is under bond, with certain surrounding lands, to some of the Oroville, Butte county, dredger men. Keystone prospecting drills are being used to test the ground, and if results are satisfactory, dredges will be built and put at work. Not all hydraulic mining ground, however, can be dredged. If it could, the mining debris question would be definitely settled in this State, and there would be no need for any Caminetti law in the drainage basins of the Sacramento and San Joaquin rivers. There is already one dredge operating north of Trinity Center.

In this connection it may be stated that land along the course of the Yuba river, which could have been bought three years ago for \$2.50 per acre, can now be readily sold for \$150 to \$300 an acre, although covered with debris. In fact it is worth considerable more than before it was covered by mining debris, on account of the fact that the gold in the soil can be recovered at a profit by the use of dredging machines. It is not poor man's mining ground and considerable capital must be invested before any profit may be made.

Shasta county has a new power plant, which was started up last week. It belongs to the Northern California Power Co. and is on Cow

Creek, 30 miles from Redding. With a fall of 1,200 ft, the pressure in the pipe is 550 lb. to the inch. The plant generates 22,000 volts. There is a duplicate of this plant owned by the same company at Shingletown, and 250 miles of wire have now been stretched. The two plants can be combined at will and furnish power and light to Shasta, Tehama and Glen counties.

About 5,000 inches of Bucks creek and 3,000 inches of Grizzly creek, Plumas county, have been located by Oroville dredger men. The combined waters of the two streams are to be conveyed to the cañon of the North fork and used in the development of electric power. A fall of about 2,000 ft. can be secured for the water in the cañon of the North fork.

Some of the miners in the richer mines in Tuolumne county have been detected in striking ore, and at the Rawhide and Jumper stringent rules were put in force which have caused some strike trouble at those mines. At the Jumper they made a rule that the men should strip at the change-room, and the men struck. After a few days the strike was declared off.

At the Fremont Consolidated mine, in Amador county, where the men have been on strike a few months, work has started up again with 50 non-union miners.

There has been litigation between the oil men and owners of riparian beach rights on the shore line of Santa Barbara county. A petroleum and mining company erected, with permission of the Secretary of War, some wharves just off the shore of Santa Barbara, fronting some property of the San Francisco Savings Union. When the oil men started to make an approach from their wharves to the shore the Savings Union protested, on the ground that it was a trespass, and in derogation of the rights of riparian owners. The matter was taken to the courts, and the Superior Court decided that while the wharves were lawfully erected, any extension of them toward the shore that would rest on ground above the level of low tide-water would be illegal. The oil company went to the Supreme Court, and that body has confirmed the decision of the trial court. This decision protects the riparian owners in such fields as Summerland, where oil wells are operated from wharves built far out into the ocean from the beach.

A telephone company is about to connect by wire the various isolated mining camps in the desert region of Southern California. The present means of communication is by railroad telegraph line, but many of the camps are distant from the tracks, and this new move will be of great advantage to them.

Denver. July 30.

(From Our Special Correspondent.)

At last, after nearly a year of martial law in one or another part of Colorado, the troops have all returned home, and it is earnestly to be hoped that for a long time to come the civil authorities will be able to maintain peace and quiet in their respective districts. Whether this will be the case, at least for a while, in the Cripple Creek district, remains to be seen. In that community there appeared to be a strong sentiment against the withdrawing of the militia, although it is said that Sheriff Bell informed the governor that he could now handle the situation. The announcement yesterday that a number of the deported men, who have been in this city for some time, would return caused considerable excitement in the district. The number of buttons worn inscribed "They can't come back" has increased very largely, and it will not be safe for any of them to return. An armed force watched the incoming trains all day yesterday. President Moyer, who refuses to call off the strike, which to all intents and purposes is virtually over, is said to be in favor of having the governor send troops into the district again, in order to protect the union miners, and if a large number of the deported men should attempt to return there is sure to be serious trouble.

Co-operative stores will be opened again next week at Cripple Creek and Victor by the Western Federation. Judge Cunningham, in the district court at Cripple Creek, allowed bail to be given for all the suspects charged with complicity in the Victor riot and the Independence horror to whom this had been refused, and re-

duced the other amounts to a considerable extent, making the total for the 46 men \$103,500.

At Telluride, Clarence J. Moorhouse, organizer for the Colorado Liberty League, was deported and is in Silverton at present.

The Minnequa steel works of the Colorado Fuel & Iron Co. at Pueblo are turning out over 1,000 tons of pig iron daily, and they are far behind with their orders for steel rails. The details of the reorganization and of the expansion of this company's business have lately been arranged, and it is understood that about \$10,000,000 will be expended in improvements. Among these will be blast furnaces and a large amount of other machinery. The annual meeting of the company will be held in October, when it is expected these improvements will be authorized; those of the several subsidiary companies will be held next month. President Frank J. Hearne had a very large experience in the steel business before coming to Colorado.

The question of the establishment of permanent headquarters for the American Mining Congress, which is to be considered at the meeting of that body to be held at Portland on August 22, is an important one, and Salt Lake City seems to be Denver's only rival.

President J. H. Waters, of the Midland Terminal and the Florence & Cripple Creek Railroads, has issued the order for the removal of the general offices from this city to Cripple Creek.

During next week two of our prominent mines will pay dividends. They are the Camp Bird, which will pay 18c., making \$1,607,300 paid since May 1, 1902, and the Iron Silver, 10c., or \$50,000.

On the subject of production during the first half of the current year, it may be stated that notwithstanding the great strikes in our leading gold-fields, the total amount of tonnage is about 332,000 tons, valued at \$10,522,000.

One of the best moves ever made by a railroad company was the acquisition by the Colorado & Southern Railroad of the Gilpin county tramway, to which brief reference was made last week, as it will give that company almost entire control of the freight business of the ores of Gilpin and Clear Creek counties when the contemplated extensions of the tramway have been constructed. About 15 miles of new track will be laid and practically every producing mine connected with the Southern system. The surveying parties will probably be in the field next week.

The removal of such parts of the old mint plant as will be used in the new building, which is about completed, will commence next month, although it is not expected that the coinage plant will be in operation until about a year from now. The machinery, which will be installed for that purpose, is at present on exhibition at St. Louis. The old plant, which was built by the Government about 1860, during the earliest days of this city, is located in the center of the wholesale district and will probably be sold.

It is reported that the Highland Mary mine, near Silverton, has been sold to the Guggenheim Exploration Co.

An important meeting was held a few days ago by the governing committee of the Colorado Springs Mining Stock Exchange, at which the president was authorized to appoint a committee to make the necessary arrangements for advertising the resources of the Cripple Creek district, which of late has acquired such an undesirable notoriety in the East.

In connection with this, I would like to mention that a few days ago, in the Shurtloff mine on Bull Hill, in the tenth level, a very fine body of ore was struck, which will run nearly \$500 per ton; this is the best find for several months.

A syndicate of Denver men have formed the Independent Smelting & Refining Co. with the object of purchasing the Carpenter smelter at Golden. The new company expects to place a lot of new machinery in the plant where needed and to commence the treatment of ores as soon as possible. Considering the low rates of transportation prevailing at present on the Colorado & Southern, they expect to get a good share of the Clear Creek and Gilpin county ores.

Duluth. July 29.

Reference has frequently been made to the mine interests in northern Minnesota owned by

the State, but the importance of these is scarcely realized. It will not be far out of the way to estimate the amount of ore now shown on State lands at 100,000,000 tons, all of which is under lease to large operating interests. Mining on State lands has never been especially rapid, chiefly on account of the fact that the State's leases are easier in the matter of minimum outputs than those of any private owners, and it is easy to hold these lands in reserve. But at this time about 2,000 tons a day are coming off these lands on the Mesabi range.

State leases are on the basis of 25c. a ton royalty, in which they differ little from the average of private leases on the Mesabi range, but instead of a minimum output of from 50,000 to 100,000 tons for each 160 acres, or fraction thereof, contained in a single lease, there is a requirement of only 5,000 tons at the maximum, and no payment other than \$100 a year for the first five years of lease, and until a railroad is within a mile of the property. If no road is within a mile of the land when the contract is made, then five years can elapse after such road is built before more than 1,000 tons need be mined or paid for. The State maintains an inspector who looks after shipments and examines the various leases and contracts outstanding.

At this time only Pool mine of the Oliver Iron Mining Co. (United States Steel Corporation), and Grant, of the Interstate Mining Co. (Jones & Laughlin), are operating on State land. But there are opened Minnewas and Oliver of the Oliver Iron Mining Co.; Elizabeth, of the Scranton Mining Co. (Pickands, Mather, & Lackawanna Steel Co.), and Yates and Frantz of the Consumers' Ore Co. (M. A. Hanna & Co.). The last three are new mines. Oliver will probably make a small shipment this year. Minnewas has been idle a long time. Other properties have been explored and tested, and will in time be opened.

The State owns probably productive mining lands all the way from the Mississippi river, in T 55 R 25, to T 59 R 14, a distance of 75 miles; but only in scattering locations. Most of its ore is in township 58-19, and in the Hibbing district. Close to Hibbing it owns Pool, in 36-58-21; Flynn, in 6-57-20; Carson Lake, in 10-57-21, and others in 2 and 12-57-21. In 58-19 it owns Wanless, and Woodbridge in 16, Wabigon in 17, Frantz in 21, Yates in 11 and Grant in 20. It owns several properties in the vicinity of Mountain Iron and Virginia. At the extreme western end of the Mesabi it owns Buckeye, in 36-56-25, whose value is problematic; Mesabi Chief, in 23-57-22, an ore-deposit leased by the Cleveland Cliffs Mining Co. in 10-56-23, and several ore-bodies tested by the Great Northern road. Many of these tracts are not thoroughly explored, some scarcely at all, and the total amount of ore to be taken from them is now impossible to determine.

All these lands are the property of either the public school fund or of the State institutions fund, covering the State University and schools. The annual payments, either for leases and contracts or for ore and minimums, are required to be set apart and become a portion of the invested funds of these institutions, interest on which alone is distributed year by year. The public school fund now has invested about \$14,000,000, and the University about \$1,550,000. It is entirely probable that in time these funds may reach a total far above \$50,000,000, and chiefly from royalties from mines on the Mesabi range. The State also owns lands on the Vermilion, and in the new district in Aitkin county, where explorations are under way; but neither of these is very well assured yet.

Salt Lake City. July 29.

(From Our Special Correspondent.)

Manager Henry M. Crowther, of the Continental Alta mine, with headquarters in Salt Lake City, has announced that his company will begin the construction of a plant in Alta for the treatment of its low-grade ores. Tests are now being made with the ore to ascertain the proper process. The company has set aside a fund of \$100,000 for mill construction and other purposes.

The Consolidated Mercur has gone back to the old method for the treatment of its ores after several months' trial with the Moore slimes process, which did not work as satisfac-

torily as was hoped. Some change has been made in the mode of distributing the ore into the cyanide tanks with the result that some of the evils experienced in the past have been corrected. The tailings are now running between 85 and 90c. a ton, whereas, about a year ago, they ran close to \$1.40 a ton.

The Utah Fuel Co. has taken a contract to furnish the Anaconda Copper Co. of Montana with from 100 to 200 tons of coke daily.

The annual stockholders' meeting of the Majestic Copper Mining & Smelting Co. will be held in Denver August 22. Reports received in Salt Lake from the eastern offices of the corporation are to the effect that good progress is being made with plans for the reorganization of the company. In the meantime development work is progressing at the O. K. and Harrington & Hickory mines, belonging to the corporation.

On August 12 the stockholders of the Columbus Consolidated Mining Co., operating mines at Alta, will meet in special session to authorize an increase in the capital stock of the corporation from 50c. to \$5 a share. The directors will probably meet on the same date to levy an assessment of 20c. a share, or \$60,000. With this amount the company will discharge its existing indebtedness of between \$30,000 and \$40,000. Early in September the new mill will be in operation. The officers of the company say with the indebtedness cleaned up before the mill begins operations the mine will be on a dividend paying basis before the close of the year.

An important decision has been handed down by the Supreme Court of Utah in which were involved certain interests now owned by the Daly-West Mining Co. The contestants were Mrs. Phoebe A. Hearst and James B. Haggin vs. the Putnam and Quincey Mining companies, William M. Ferry, Henrietta McLaughlin, as administratrix of the estate of D. C. McLaughlin, deceased; James T. Clabby, James Farrell, W. W. Armstrong, David D. Edwin, Henry Newell, David Keith and Walter Scott. The plaintiffs owned a certain interest in the Putnam Mining Co. of Park City. This concern, several years ago, in order to get out of debt, sold to the Quincey Mining Co. a portion of its property for \$50,000. The ground transferred developed into a bonanza and the Quincey company paid \$1,200,000 in dividends with money derived from the sale of ore from this particular property. The plaintiffs charged that the sale from the Putnam company to the Quincey was done through fraud and sued for a share of the dividends and asked that the sale be set aside. The judgment of the lower court was affirmed. The Quincey company sold the ground involved together with all its other holdings to the Daly-West company something over two years ago. The decision clears up the title to the property.

Bisbee. July 28.

The Lake Superior & Pittsburg will sink a very large four-compartment shaft in the ground lying between its Cole and the Oliver. This will serve to open the ore-bodies found in the 1,000-ft. level south from Cole, and may also reach other ore-bodies that are looked for to the southeast. In course of development of this ore more than \$50,000 worth has been taken out already, and awaits reduction. A winze from this level has cut ore down to the 1,100-ft. and will soon be connected with that drift. The long new drift, into P. & D. ground, has cut several ore seams, which will be followed as soon as the drifts are holed through and ventilation permits. Ore has also been cut on the drift that will connect this mine with Calumet & Arizona.

The Junction shaft is now down 920 ft. and is getting into softer material, which is a better indication.

The Greene Consolidated, which lies 40 miles south of here, is now shipping out daily about 90 tons of blister copper. The new concentrator will be in operation this fall and the output of copper will then be increased to nearly 100 tons a day. The mine is now in shape to produce from 3,000 to 3,500 tons of ore daily, for smelter and concentrators.

The Calumet & Bisbee is claimed to have just cut a 10-ft. seam of 2% carbonate ore with the drill at a depth of 850 ft. from the bottom of the shaft.

Toronto. July 28.

Further finds of hematite at Loon lake, some 25 miles east of Port Arthur, Ont., have been reported to the Provincial Bureau of Mines, being an extension of the Mesabi rock foundation. Wiley Bros. and R. H. Flaherty are stated to have struck hematite of bessemer quality, in addition to the deposit defined last year by Rinaldo McConnell, of Ottawa.

T. B. Caldwell has a number of men at work uncovering the outcropping of horded magnetite on the northeast arm of Lake Tebagami, and will probably put a diamond drill at work there shortly to locate the ore-bodies.

At a meeting of the shareholders of the Cramp Steel Co., Ltd., held in Toronto July 25, a resolution was adopted authorizing and instructing the directors to turn over to the newly organized Northern Iron & Steel Co. the quarry lands owned by the Cramp Steel Co., and also the rights to the bonus of \$60,000 voted by the town of Collingwood. This resolution practically implies the re-organization of the Cramp Steel Co. as the Northern Iron & Steel Co. A letter was read from the Imperial Steel & Wire Co., Ltd., offering to start the steel works with an order for 5,000 tons of steel for wire. Exception has been taken by some shareholders to the action of the majority, and on July 27 Garnett H. Meldrum, a shareholder, applied to the court for an injunction restraining the Cramp Steel Co. from carrying out the arrangement.

Senator Melvin Jones, of Toronto, a director of the Nova Scotia Steel & Coal Co., states that the steel plant at New Glasgow, N. S., is busy. The new furnace at North Sydney will be blown in during September and the remainder of the new steel plant there will be running not later than January.

A Provincial charter of incorporation has been granted to the Ontario Crude Oil Co., Ltd., capital \$300,000, with head office at Toronto. The provisional directors are John W. Stokes, of Sarnia; William D. Earney and James Kynoch, of Toronto.

Victoria. July 26.*(From Our Special Correspondent.)*

The Coast.—A controlling interest in the Copper King mine, at Kamloops, has been acquired by a syndicate of Vancouver Island mining men—not the Tyee Copper Co., as reported in the local newspapers. The Tyee company smelted in June 5,295 tons of ore, producing 467 tons of matte, the gross value of which, deducting costs of refining and purchase of customs ores, was \$59,245. The main shaft at the mine is now down over 480 ft. At Siwash creek, near Yale, on the Fraser river, the Mount Baker & Yale Mining Co. is installing a 10-stamp mill, and the International Mining Co. a 6-stamp mill.

Cariboo.—The last report from the Cariboo Consolidated states that values at bed-rock continue to improve, averaging \$22 per cu. yd. Pumping is being continued at Slough creek, and it is said the water pressure is steadily decreasing. Work is about to be resumed at the Laird claim, on Willow creek. The Waverley Hydraulic, on Grouse creek, is reported to be earning from \$600 to \$700 a day. Altogether conditions in the district have greatly improved, and gold production this year should show a considerable increase.

Lardeau.—Milling operations at the Gold-finch, at Camborne, have been resumed; work at the mine has been again started.

The Lucky Jack mine, at Poplar, has been "jumped" for the second time. Production is shortly to begin at the Mammoth, a claim on Goat mountain, owned by a California syndicate.

Slocan.—Experiments are being conducted with certain classes of Slocan ores to ascertain their amenability to treatment by the Elmore process. It is stated that in several instances the results obtained have been satisfactory. The amendment to the Lead Bounty Act, fixing July 1, 1903, as the date from which bounty on lead production may be claimed, has received the assent of the Governor-General.

Nelson.—Work on the Mollie Gibson, which recently passed into the hands of new owners, has been tentatively resumed. Operations under the old company were suspended at the mine some 18 months ago. The output from the Hunter V mine at Ymir is being steadily increased, mining being carried on by quarrying

methods. Some remarkable results are obtained by a minimum of drilling. Thus, as an instance, for one 13-ft. hole drilled by hand and loaded with 100 sticks of powder, 300 tons of rock were broken down. The monthly production of ore from the Ymir district now averages rather over 7,500 tons.

Rossland.—An increased number of men are being employed at the War Eagle-Centre Star mines, breaking down ore to be sent to the new concentrator which is now in operation. The mines are now producing four carloads of milling ore a day. Le Roi last month is reported by the manager to have earned a profit of \$20,000 on shipments of specially selected ore.

It is reported that negotiations are in progress for the sale of the Copper Chief group of claims, on Sophie mountain.

Boundary District.—The Montreal & Boston Consolidated Co. has already begun work unwatering the Brooklyn and Stemwinder mines, in Phoenix camp, and preparations are being made to blow in the smelter at Boundary Falls.

Similkameen.—The Nickle Plate 40-stamp mill has begun crushing.

East Kootenay.—The Crow's Nest Pass Coal Co. has entered into an agreement with the Canadian Pacific railroad for the lease, commencing October 1, of the latter's branch line from Fernie to the Coal Creek mines. Coal is hauled from the mines to Fernie for market distribution and for the manufacture of coke.

The Detroit-Yukon Mining Co. is operating extensively on Bear creek, and recently there was received at the mine machinery weighing 200 tons in the aggregate, including two steam shovels and a sluicing plant capable of handling 800 yards a day.

The Ogilvie Company's prospecting dredge on the Stewart river is giving very satisfactory results. In consequence more dredges will next season be placed in the river.

At the St. Eugene a tonnage of 500 tons per day is being produced, and concentrated to 100 tons, averaging 68% lead besides silver values. The recent discovery of a high grade ore-body is being exploited.

Monterey. July 27.*(From Our Special Correspondent.)*

The reported leasing of the Descubridora mines, in the State of Durango, to the Guggenheim Exploration Co., has been confirmed, and it is further stated that the lease includes the Durango Central railroad, and that it is for a period of 20 years, as a shorter period would not warrant the expenditure needed to work the low-grade ores. Mr. Robert Bender is on the property arranging matters for the immediate starting of the work under the superintendency of J. B. Underwood. The judgment for \$200,000 Mexican against the Descubridora, for taking ore out of an adjoining property, will probably be settled by compromise.

Since the renewal of activities at the Vacas mines it is learned that A. E. McCaughan, of Durango, has sold the Catorce Marcos, San Cayetano and La Cumbre, in Parilla, near Vacas, which have been idle for some time, for \$75,000 gold, and new machinery has been put in and work will soon be started. At Topia, Durango, the Madrugada, of the Miller & Sibley Co., of Bradford, Pa., has shown up a large and fair body of silver-lead ore, and despite the difficulties of transportation, careful management is making it a paying proposition. The continued increase of new work in the Guanacavi district has induced the Mexican International railroad to push the building of its road in that district.

It is understood that the 100-ton smelter of the Amazon Gold Mining Co., at Chacala, is to be blown in this month. At the Animas mines of Laveaga Bros. & Victor Gomez, the old pan amalgamation plant is being replaced by a 30-ton cyanide plant. The rumor that the American Smelting & Refining Co. had acquired one-fourth of the stock of the Torrean smelter has been denied by the principal owners in the Torrean works.

At Parral, in Chihuahua, the Rayo, near the Adela, owned by Messrs. Johnson, Crowell and Peterson, is said to be in bonanza with 3 ft. of several ounce gold ore. A survey is being made for the wagon road from Parral to the camp of Guadalupe-y-Calvo, which is to cost \$60,000

Mexican, of which one-third each is to be paid by the Federal government, the State of Chihuahua, and the citizens of the camp. The new owners of the Pinos Altos properties are preparing to increase the reduction plant from 60 to 250 tons and put in a cyanide plant. Encouraged by the success of Mr. R. S. Towne, in his magnetic zinc separation at the mill of the Montezuma Lead Co., the sub-company of the Mexican Metallurgical Co., at Santa Barbara, and a number of others are preparing to experiment on their zincy lead ores, of which there are large bodies in Santa Barbara.

A large copper property is being taken up west of Santa Barbara by T. M. Hecker and associates, who have formed a company in Butte with a \$500,000 gold capital for development. W. K. Ryan, of Ryan & Dudley, railroad contractors, of Denver Colo., who has been gathering up some Mexican mines, has just bought 106 pertinencias in Santa Eulalia, near Chihuahua, known as La Isla, La Ibera and El Continente.

The Gavilanes, 75 miles west of Durango, is said to have been sold to Chicago people for over \$500,000 gold. The Santo Domingo and Hay tunnel, adjoining the Velardeña, has been purchased by Otto Koehler, Otto Wahrmund and S. D. Bridge, of the Jimulco Mining Co., and will be worked under D. C. Irish, of Colorado. The American-Mexican Mining and Development Co., which has option on ground for a smelter in Torrean, is planning a pyrite smelter for Velardeña. This is in addition to the one contemplated by the Guggenheim interests. The Avino mines are temporarily closed while a gas plant and engines are being installed. W. B. Jeffries is general manager, and Frank Fletcher, consulting engineer.

The Penoles Co., of Mapimi, is said to have made a strike of 45% lead ore, with several hundred oz. silver and 1 oz. gold, on the Chona vein, which is dipping into ground owned by Monterey people, and on which the latter are preparing to sink a shaft.

The Vivasillas, of San Dimas, has been sold by L. M. Raines to Chicago and Cleveland people for \$50,000 gold. J. T. Judd, of Guanajuato, has sold to Boston and Salt Lake City people, represented by J. A. Coram, of Boston, a group of mines in Guanacavi, known as the Nueva Australia, Soto and Nueva Porvenir, containing about 150 pertinencias, and covering the vein for two miles; the price paid being something over \$1,000,000 gold.

Perth. June 20.*(From Our Special Correspondent.)*

Kalgoorlie.—The excitement the past fortnight has been the reaction of the market in shares of the Boulder Deep Levels, consequent on suspicion that the high assays at first reported from the Telluride lode at the 900-ft. level had in some way been tampered with. Mr. Nichols has since sampled the mine carefully, and assays reveal much lower values. The Government has ordered an inquiry into the matter. The fact of the big ore-body discovered remains, and taken in conjunction with recent finds in Chaffers, has given renewed attention to the southern end of the belt. A bore-hole put in from the Boulder main reef, 1,400-ft. level, was continued into Chaffers' ground and passed through a big sulphide formation, assaying from a few hundredweight up to over 4 oz. of gold per ton.

The Associated is pushing on with development on the Brown-Hill shoot, and a winze is being put down at a point where the ore is worth over 5 oz. per ton.

South Kalgurli has cut the lode at the 525-ft. level, 3 ft. wide, value 17 dwt. per ton.

Ivanhoe.—Working costs for May were 22s. 6d. per ton; estimated profit for the month, £22,587.

Sons of Gwalia.—Working costs were 17s. 3d. per ton. The mine looks well at all points. Reserves of ore at March 31 were estimated to be 345,580 tons, of average value of 50s. per ton.

The Mulline district is going ahead well. Many prospectors are getting out good crushing. The Golden Pole, a local company, has now got a good supply of water.

In the Warren river oil areas, boring is going on satisfactorily, but nothing special has yet been discovered.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of the *ENGINEERING AND MINING JOURNAL*. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the *JOURNAL*, and making this office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and be of any service to them that they can.

TO ENGINEERS VISITING LONDON.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers non-resident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution, and thus enjoy the advantages of temporary office accommodations in the city of London.

PERSONAL.

Mining and metallurgical engineers are invited to keep the *ENGINEERING AND MINING JOURNAL* informed of their movements and appointments.

Mr. John B. Farish, of Denver, is in New York.

Mr. Frank Klepetko has been visiting the Lake Superior copper region.

Mr. Robert G. Reilly is with the Mogollon Co., at Cooney, New Mexico.

Mr. W. Spencer Hutcheson has been inspecting mines near Silverton, Colorado.

Mr. Edward M. Conley, American vice-consul in Mexico City, is in New York.

Mr. A. C. Brinker, recently of Denver, Colo., is now at Flat Iron, South Dakota.

Mr. C. A. Ulrich, mining agent of New Zealand, is at Nelson, British Columbia.

Mr. Henry C. Frick, of Pittsburg, sailed on July 25 for an extended tour in Europe.

Mr. W. L. Austin is temporarily at the Mansion House, Brooklyn Borough, New York.

Mr. R. T. White, of New York, is at the new Michigan smelter, at Houghton, Michigan.

Mr. Charles Martin, of Beaumont, Tex., has gone to Rosario, in the State of Durango, Mexico.

Mr. W. E. Defty has returned from Sonora and is now in San Bernardino county, California.

Mr. Robert Flenniken, of the Cherry Valley Iron Co., of Pittsburg, has returned from a trip to Europe.

Mr. Newton Booth Knox, of San Francisco, passed through New York August 1 on his way to London.

Mr. W. J. Sharwood has been appointed assistant professor of chemistry at the University of California.

Mr. E. J. Berwind, president of the Berwind-White Coal Mining Co., has returned from a tour in Europe.

Mr. Hugh L. Cooper, chief engineer of construction for the Mexican Light & Power Co., is in New York.

Mr. J. Morgan Clements has just returned to New York, after spending a month in the Wisconsin zinc region.

Mr. N. C. Bonnevie, of Bonnevie & Lee, has returned from Hinsdale county, Colo., where he has been examining mines.

Mr. Karl Eilers, of the American Smelting & Refining Co., is visiting smelters at Leadville and other Colorado points.

Mr. George Hardy, of Carnegie, Pa., is examining gold and silver properties in the Yaqui river country, Northern Mexico.

Mr. Frank Manning is en route to Korea to enter the employ of the Oriental Consolidated Mining Co., as mining engineer.

Mr. W. E. Bradley, M. E., is conducting the

work on the property of the Denver & Rock Island Development Co., in Montana.

Mr. Frank H. Goodyear, vice-president of the Buffalo & Susquehanna Iron Co., sailed on July 28 for a six weeks' trip in Europe.

Mr. John Mackin, of Chicago, has been elected managing director of the Kimberly-Montana Gold Mining Co., at Jardine, Montana.

Mr. J. M. Powell, a pioneer miner of Skagway, Alaska, is visiting at his former home, Indianapolis, after an absence of 32 years.

Mr. Thomas Morrison, of Pittsburg, has been elected a director of the United States Steel Corporation, to succeed Mr. C. M. Schwab.

Mr. George W. Peck, president of the American Consolidated Copper Co., of New Mexico, is in the East in the interest of the company.

Mr. Paul C. Morf, an attorney making a specialty of mining litigation, has removed from Calaveras county, Cal., to 171 Broadway, New York.

Mr. Alexander C. Humphreys, president of the Stevens Institute of Technology, Hoboken, N. J., was injured on July 25 by a fall from his horse.

Mr. E. M. Bend, consulting engineer at Torreon, Mex., is in Chicago contracting for mining machinery, etc., to be shipped to the Torreon district.

Dr. A. T. Grove, secretary of the American-Mexico Mining & Development Co., has returned to Chicago from a visit to Torreon, Mexico.

Mr. C. G. Memminger, vice-president and general manager of the Savannah-Florida Phosphate Co., is spending the summer at Highlands, North Carolina.

Mr. Robert Nye, recently of Placerville, Idaho, has been appointed superintendent of the Keystone mine, at Sierra City, in Sierra county, California.

Mr. Frank Higginson has been appointed temporary superintendent of the Hale & Norcross mine, at Virginia City, Nev., to succeed the late J. R. Ryan.

Messrs. Enrico Cairo and Luigi Greppi, respectively general manager and mechanical engineer for the Adriatic railways, Italy, are visiting the Pennsylvania coal regions.

Mr. James McKinty has been appointed superintendent of the California & Virginia, Ohpir and Mexican mines, at Virginia City, Nev., to succeed the late J. R. Ryan.

Mr. J. M. Callow, of Salt Lake City, Utah, mechanical and consulting engineer for the Montana Ore Purchasing Co., of Butte, Mont., is in Butte installing mill equipment.

Mr. Hans Herberg, engineer of the St. Petersburg Eisenund Draht Institute of St. Petersburg, Russia, is now in this country inspecting some of the more important steel and other manufacturing plants.

Mr. E. Renshaw Busb, associate mining engineer with Messrs. Ricketts & Banks, left New York for Newfoundland July 28 on professional business. Mr. Busb expects to be absent about three months.

Mr. Richard Eames, Jr., consulting engineer for the Associated Security Co., having completed the erection of a concentrating plant near Abualuco, Jalisco, Mex., has returned to his New York office.

Mr. Screenwassa Kushnasami Iyeugar, of Bangalore, Mysore province, Southern India, who has been sent to this country by the State of Mysore to study metallurgy and mining, will enter the Colorado School of Mines this fall.

Mr. Edward W. Parker, of the United States Geological Survey, will edit the mining department of the general economic history of the United States, to be prepared by the department of economics and sociology of the Carnegie Institute.

Mr. J. Cuthbert Welch is superintendent of the smelter for the Montreal & Boston Consolidated Mining & Smelting Co., at Greenwood, B. C., and not superintendent of mines, as a slip in the types made us say in our issue of last week. Mr. G. H. Collins is superintendent of mines for the company.

OBITUARY.

E. M. Wuerpel, employed by the Peñoles Mining Co. of Mexico, died at Mapimi, Dugo, Mex., July 26.

Dr. Isaac Roberts, a well-known geologist and astronomer, died at Crowborough, England, July 18.

Santiago Chamberlain, for many years a mine owner in Mexico, died at Concepcion del Oro of paralysis, July 24. He was a resident of Monterey.

David J. Matlack, a veteran iron founder, for 56 years connected with the Cramp Shipbuilding Co., as superintendent of the iron foundry, died of heart disease at Langhorne, Pa., July 25, aged 73 years.

Rear-Admiral H. C. Taylor, Chief of the Bureau of Navigation of the United States Navy, died at Copper Cliff, Ont., July 26, aged 59 years. Admiral Taylor was on a visit to his son, Mr. Roger Taylor, superintendent of smelters at the Canadian Copper Co. works, at Copper Cliff.

TRADE CATALOGUES.

The Baltimore Gas Machinery Co., of Baltimore, has issued a booklet describing its well-known suction gas producers.

Wickes Bros. of New York have issued their valuable monthly stock list for July. It includes prices for new and second-hand boilers, engines, pumps, generators, power equipment and iron-working machinery.

The July 'Progress Reporter,' issued by the Niles-Bement-Pond Co. of New York, is a St. Louis Exposition number, and contains illustrations and descriptions of the machinery exhibited by this company at the great fair.

The Emerson Steam Pump Co., of Washington, D. C., has sent out its annual catalogue containing descriptions and illustrations for the Emerson double-cylinder steam pump. It contains many convincing arguments as to the efficiency and reliability for this well-known pump.

The Cape Asbestos Co., of Turin, Italy, with offices at 8, The Minories, London, E. C., has issued an exceptionally artistic catalogue. It includes, besides complete descriptions of the company's products—*asbestos cloths, packing materials, etc.*—many fine illustrations of war vessels upon which its specialties are used.

The H. W. Johns-Manville Co., New York, has issued a neat and complete catalogue covering mica-plate, cloth, segments, rings and mica in all its various forms required by the electrical industry, also 'Vulcabeston,' 'Transite,' 'Electrobestos' and 'Niagrite.' A copy can be had by addressing the company, at 100 William street, New York.

The Cyclone Drilling Machine Co., of Orrville, Ohio, has made an exceptionally interesting presentment of the merits of the Cyclone drilling machine in its descriptive catalogue just issued. The system by which this drill operates is carefully and convincingly explained, and the cuts and illustrations add to an intelligent understanding. Besides the drill, portable engines, boilers, water tanks and other products of the company are fully and intelligently described.

The Cancos Manufacturing Co., of Philadelphia, manufacturers of Black Squadron four wedge ring packing and steam and hydraulic packings of every description, has prepared a convenient little memorandum book for engineers which it sends free upon a request. The book contains miniature maps of the United States and its island possessions, Canada, Mexico, and South America, populations of cities in the United States, calendar, postal regulations, weather bureau signals, mensuration and other mathematical rules, weights and measures, data about coal, and other useful information, besides square-ruled pages for notes and memoranda.

SOCIETIES AND TECHNICAL SCHOOLS.

South Dakota State School of Mines.—The catalogue of this institution, just issued, gives a total enrollment of 166. The next term begins September 21.

INDUSTRIAL.

Albert Kohler, formerly of the firm of Weisel & Koch, mechanical engineers and contractors at Parral, Mex., announces that he has severed his connection with this firm, and has established an office for the sale of mines, smelters and mills. He will also take contracts for the installation of all kinds of machinery.

The steel plant of the Jones & Laughlin Co. at Pittsburg has resumed operations. The mills have been running at about 65% of the normal capacity, but orders have come in recently which the officials of the company believe warrant a resumption in full. Between 3,500 and 4,000 men will be affected by the change.

The Crocker-Wheeler Co., of Ampere, N. J., has received the following request from Tokyo, Japan: "I beg you please to send me a copy of your precious catalogue, in which I have a great interest, as I shall commence some trifling business for the electrical engineering in after a few months, if you favor it for me I should be in great thankfulness."

The National Wire Corporation will change its general executive offices from New Haven, Conn., to the Engineering building, 114 Liberty street, New York, about August 1. All communications should be addressed to the New York office after that time. The company feels that it will be able to handle its business, which consists of all of the standard and special wires, wire rope and other wire specialties, to better advantage with the increased facilities which an office in New York city will give them.

The General Electric Co. has selected Cochrane feed water heaters for its plants at West Lynn, Mass., and Harrison, N. J., where Curtis steam turbines are to be installed. These heaters are rated at 3,000 and 1,000-h.p. respectively and will take the exhaust steam from the auxiliaries. Three 5,000-h.p. Cochrane heaters have also been installed in connection with steam turbines at the Delway (Mich.) station of the Detroit Edison Co. and a 600-h.p. Cochrane feed water heater will be used in the new turbine station of the Iowa and Illinois Interurban Railway Co., Clinton, Iowa.

A 2,000-h.p. Cochrane heater which has been ordered by the Electric Co. of America will be installed with steam turbines in its new plant at Marion, Indiana.

The Allis-Chalmers Co., of New York, has secured a contract, through Thomas E. Murray, consulting engineer for the Brooklyn Rapid Transit Co. and the New York Edison Co., for nearly 100,000 horse-power of equipment, which will entail an expenditure of upward of \$2,000,000. The contract calls for 6 turbines of 5,500 k.w. (8,250 h.p.) capacity. Each is to be direct connected to 25 cycle, 750 r. p. m., three-phase alternating generators of similar size. The generators will be wound to give either 6,600 or 11,000 volts. This is the largest contract of its description ever placed in this country.

Adam Cook's Sons, of New York city, report a wide demand for Albany grease, of which they are the only makers. R. O. Cumback, used Albany grease for some time "and thinks it one of the best brands of grease on the market," while the Woodman Cook Co., of Portland, states in a recent letter to the manufacturers that it is using Albany grease with "entire satisfaction." This well-known lubricant can be used with equally good results on either slow or fast running machinery.

The National Wood Pipe Co., of Los Angeles, Cal., has finished a large pipe line 1,500 ft. in length almost 5 ft. in diameter. It connects the head of the main Imperial valley irrigating ditch, which drains its water from the Colorado river, at Yuma, Cal., with the new power-house of the Holton Power and Electric Co. The line consists of two parallel lines of continuous wood pipe, 5 ft. in diameter at the mouth and 52 in. throughout the remainder of its length. Both divisions are huilt of long redwood staves, held together by 1/2-in. steel bands, and the staves are fitted tongue and groove fashion end to end, the ends of the steel bands being clamped in grooved iron shoes. This is but one of the large contracts which this company has recently filled.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

Copper Queen Mining Co.—Work on the Sacramento shaft of this company's mine at Bisbee is being carried steadily forward. Larger machinery will be installed when the shaft is completed.

San Juan.—Ore is being sacked in large quantities at this mine at Douglas and shipment to the Copper Queen smelter will begin soon.

GRAHAM COUNTY.

Shannon Copper Co.—This company is turning out about 20 tons of copper bullion daily at its plant near Clifton.

PINAL COUNTY.

Saddle Mountain Mining Co.—This company is opening up a large copper mine in the San Carlos strip, above Dudleyville. George B. Chitenden is general manager.

Troy-Manhattan.—Concentrating machinery will be installed at once at this mine at Troy. The wulfenite strike made recently on the 300-ft. level remains good, and the ore body continues to widen.

CALIFORNIA.

AMADOR COUNTY.

Kennedy Mining & Milling Co.—At this mine at Jackson, Web Smith, superintendent, a rich pocket has been found. The main shaft is to be sunk to the 2,800-ft. level.

CALAVERAS COUNTY.

Angel's.—At this mine, at Angel's, owned by James V. Coleman, of San Francisco, the 40-stamp mill is running steadily. The milling plant is soon to be doubled.

Foot & Thompson.—At this mine, Rich gulch, some rich rock has been encountered.

Gertrude Mining Co.—At the Demarest mine owned by this company a new mill is to be put up.

Lightner.—At this mine, at Angel's, Alex Chalmers, superintendent, shaft sinking has been resumed from the present depth of 850 feet.

Maltman Mining Co.—This company at Angel's has consolidated with the Black Oak Mining Co. Work will be resumed at the Maltman mine.

Melones Mining Co.—The mill of this company at Robinson's is running night and day and a full force is employed.

Sultana.—At this mine, Angel's, the mill is running steadily.

Summit View.—At this mine near Hodson, B. D. Beckwith, superintendent, a hoist building, engine room and blacksmith shop are being put up. The entire plant will soon be lighted by electricity.

Utica Mining Co.—This mine at Angels has its assessment reduced by \$58,000 before the Board of Equalization on the ground that the group was not paying at present, that available rock was mostly worked out, and that the company was carrying on extensive exploratory work in the hope of developing ore bodies at greater depths.

Voinich.—At this mine, near Bear mountain, high grade ore was found when the shaft penetrated the big vein. The intersection was made at a depth of 461 feet.

Woodward & Fuller.—In this mine, near El Dorado, a 3-stamp mill is being installed.

EL DORADO COUNTY.

Angier.—At this property, near Georgetown, a tunnel is being run to cross-cut the ledge.

El Dorado Copper Co.—Heavier machinery will be installed at this mine, near Georgetown, and the sinking of a 3-compartment shaft is to be resumed.

Red Raven Mining Co.—Extensive development work on this group, formerly known as the Uncle Sam, near Shingle, is to be done. Water for power will be brought by pipe from the Crawford ditch. It is a Los Angeles corporation.

Rescue Mining Co.—New machinery is being shipped by this company to the Bonaset mine,

recently bonded from J. T. Uhlenkamp. The company has also made the last payment on the Rescue mine, near Rescue, formerly the Coon Crossing. A. F. Anable is superintendent.

South Slope Gravel.—At this mine, near Onion valley, owned by Bosquit & Sons, good gravel has been struck.

INYO COUNTY.

Arono Mining Co.—A cyanide plant is being put in at the mine at Ballarat.

Republican.—At this mine at Ballarat, formerly the World Beater, the ore body continues to improve in depth. The mill handles about 20 tons of ore daily.

KERN COUNTY.

Yellow Aster Mining Co.—The rumor that this mine at Randsburg has been sold is denied by John Singleton, president of the company.

MARIPOSA COUNTY.

Princeton.—At this mine, owned by the Mariposa Commercial and Mining Co., Mount Bullion, the hoist and adjoining buildings were destroyed by fire, entailing considerable loss. The 50-stamp mill was saved.

Spread Eagle.—This mine at Whitlock, under lease to Nevills & Hanna, has yielded \$120 per ton from 28 tons of ore.

NEVADA COUNTY.

Banner Hill.—This company has purchased the hoist from the Union Blue mine, North Bloomfield.

Blue Tent.—At this mine, Blue Tent, 15 stamps are running.

PLACER COUNTY.

Bald Mountain.—At this mine, near Westville, a tunnel is being driven. F. W. Venske has been elected president and J. L. Stoakes, secretary.

SHASTA COUNTY.

Advance Mining Co.—This company has begun active operations on quartz mines on Dog creek, a few miles from Delta.

Gambrius.—A 2-stamp prospecting mill with concentration has been placed on this mine at Whiskytown.

Gladstone.—At this mine, French gulch, owned by the Hazel Mining Co., J. O. Jilson, manager, a triple compartment shaft is to be started to take the place of the old single compartment shaft.

SIERRA COUNTY.

Bellevue Mining Co.—In the tunnel of this company, near Gibsonville, C. B. Wingate, manager, a fire occurred which caused damage amounting to \$10,000.

Empire.—This mine at Gold Valley is about to be started up and the mill is being repaired.

New Enterprise.—At this mine 12 miles from Downieville, J. S. Herron, manager, the main tunnel is now in 300 ft. A shaft will be sunk to prospect the gravel.

SISKIYOU COUNTY.

Carlton.—This copper mine on Dutch creek has been bought by T. L. Rankin, of Denver, Colo.

Harris Bros.—At this mine on Taylor creek, about \$4,000 was taken from about 600 lb. of rock recently. A 2-stamp mill has been purchased by the owners.

Medina Mining Co.—This company, operating at Oro Fino, G. W. Anderson, superintendent, has started its mill on good ore.

Red Ant.—This mine, owned by Alex. Rosborough, at Humbug, is to be developed. It adjoins the Punch Creek, or Mono mine.

Wounded Buck.—It is reported that this "prospect" has been bonded to Eastern men for \$100,000. In a very shallow cut the rich ore yielded some \$40,000 in a few days. The mine is close to the Oregon State line and is on the crest of the Siskiyou mountains.

TULARE COUNTY.

Black Mountain.—A 50-h.p. boiler for the 5-stamp mill at this mine has been purchased.

TUOLUMNE COUNTY.

American Exploration Co.—This company is preparing to operate mines near Big Oak Flat. Two syndicates have been formed. The La

Fiesta Mining Co. is to work the Kanaka group and the Eclipse Co. is to develop the Markham group. The American company is to develop prospects.

Badger.—This mine, near Jamestown, has been bonded to the Jerome Canyon Copper Co., of Arizona.

Buckeye.—T. A. Piper has bought from A. W. Stinchfield this placer claim and mining rights for \$20,000.

Josiah and Venezuela.—These claims have been bought by W. C. Stanley from Wm. Olsen.

COLORADO.

FREMONT COUNTY.

United States Reduction & Refining Co.—The Union mill of this company at Florence has shut down and will not resume until a sufficient ore supply is guaranteed.

GUNNISON COUNTY.

Commercial.—A good strike is reported at this group on Gold hill.

Gold Links & Demurrers.—This group of 16 claims at Pitkin has been sold by S. F. Pearson, W. H. Eckbert and A. E. Reynolds. New machinery will be installed and active development work begun.

West Gold Hill Mining Co.—Machinery is being installed at this company's mine on West Gold hill.

LAKE COUNTY—LEADVILLE.

(From Our Special Correspondent.)

Best Friend.—The tunnel on this claim, at the head of Big Evans gulch, is in 1,160 ft. and an upraise has been started to catch the ore shoot.

Coronado.—This shaft is going down steadily and is now 85 ft. below the lower level. The flow of water in the Penrose has not been lowered, and it is possible that drifting will have to be done to cut the flow.

Favorite.—From the old workings the Green brothers are shipping 30 tons a day of a good grade of sulphides. A new shaft in the gulch is being sunk.

Forest City No. 2.—This mine, at South Evans gulch, is shipping about 50 tons a day of a good grade of sulphides. This property joins the New Monarch.

Huckleberry.—This mine is shipping ore that runs \$100 per ton.

Iron Silver Mining Co.—This property declared a dividend of \$50,000 on August 1, making the dividends paid to date \$3,000,000. The property has produced a little over 10,000 tons of ore per month this year.

McRae.—This shaft, on Fryer hill, has signed a contract with the Salida smelter to ship considerable iron ore running about 50% excess and with fair silver values.

New Monarch.—The stockholders at a meeting re-elected Timothy Goodwin manager. They also examined the property. The Cleveland shaft will be sunk as well as the New Monarch. All the ore from the Winnie is shipped to the smelter at Salida.

Ollie Reed.—Sinking on the new shaft will soon begin at this mine.

Oolyte Mining Co.—Owners of the Tabor, Zoo, Oolyte and Bush claims, on Fryer Hill and Big Evans gulch, will start work soon. The old shaft on the Oolyte is down 180 ft., and is in the blue lime.

Rattling Jack.—This claim, adjoining No. 1 shaft of the Ibex, has opened a streak of ore that runs \$30 per ton at the 200-ft. level. The ore resembles that found in the Ibex.

Ruby.—This mine, in the Twin Lakes district, has opened a vein said to run \$4,000 per ton, and is shipping ore that nets \$1,000 per ton.

Saguache Gold Mining Co.—This company has extended its territory by securing the Derry ranch and the Glacier and Nelly Bly placers, consisting of 1,750 acres. This section of ground lies about 12 miles south of Leadville.

Saguache Mining Co.—This company, operating placer ground on Twin Lakes creek, has leased the ground in California gulch from Georgia gulch, opposite Front street, down to

Malta. The company will at once put in dredging machinery. Milwaukee capital is interested.

Wilkesbarre.—This mine in the St. Kevin district is shipping an oxide ore which runs 300 oz. silver per ton. It was found in a tunnel in 300 ft. The claim is under lease to Rube Morseman.

Winnie.—This mine of the New Monarch group is shipping about 150 tons of sulphides daily. The output goes to the smelter at Salida.

OURAY COUNTY.

Atlas.—From this mine at Sneffels, 200 tons of ore are to be shipped to the Smuggler mill at Telluride.

Bankers' National.—The tunnel at this mine, Imogene basin, is now in 500 feet.

Camp Bird, Ltd.—The contract for 10 additional stamps for this mine has been awarded to the Allis-Chalmers Co.

Golden Crescent.—This claim at Mineral point has been purchased by Hobson & Herzinger. A contract for sinking the shaft has been let.

Ouray Smelter.—The new water pockets for the furnace have been put in place, and the furnaces blown in. Ore is coming in fairly well.

Treasury Tunnel Mining & Reduction Co.—The tunnel at this company's mine at Red mountain is now in 5,000 ft. The intention is to continue it for several thousand feet, when it will intersect a number of known veins, among which are the Tom Boy, Argentine, Smuggler, Columbia, Cimarron and Virginus.

SAN JUAN COUNTY.

Pride of the West.—A bond on this mine in Cunningham gulch has been taken by Eben Smith. Extensive development work is being planned.

SUMMIT COUNTY.

Cashier.—The lower tunnel at this mine at Breckenridge has penetrated the 40 to 80-ft. ledge sufficiently to disclose a body of gold ore.

Colorado & Wyoming Development Co.—A new discovery is reported at this mine at Mineral hill at 12 ft. from the surface.

Jessie.—The 40-stamp mill is now dropping its entire 40 stamps on good ore from two levels.

TELLER COUNTY—CRIPPLE CREEK.

(From Our Special Correspondent.)

Labor Situation.—Military rule has ended in this county, and the civil authorities are once more in sole charge. It is hardly expected that there will be any more trouble in the district. There are over 4,000 men who have been given recommendation cards from the Mine Owners' Association, and the greater number of these are working. No member of the Western Federation of Miners can get work in this district, and there are very few members of this organization left.

Cripple Creek Homestake Co.—Grading is now in progress for a new mill on this property. It is understood that it will be much larger than the present one. The company owns the property of the old Ironclad Co. and also the Magna Charta Co., the ground being situated on Ironclad hill. The ore is a low-grade oxidized ore and can be treated by the cyanide process without roasting.

Golden Cycle Mining Co.—Mr. McClintic, of West Virginia, has been appointed receiver for the company by the United States Court in that State and has arrived to take possession. Other litigation, however, is pending that may cause some delay in this matter. The mine has been closed down for some time on account of litigation. The trouble is between the two factions of the stockholders.

Mary McKinney Gold Mining Co.—The legal battle between this company and the Morning Glory Mining and Leasing Co., which was set for trial in the United States Court in Denver, has been postponed until November by Judge Hallet. The suit brings in the question of apex rights and involves about \$1,000,000. A number of the most prominent mining lawyers and engineers in the State are retained on the case.

Ophir.—A new plant has been installed on this property and work will be commenced again next week. Considerable gold has been uncovered in the property the last few months.

The ground is situated on Raven hill, not far from that of the Doctor-Jack Pot Co. Mr. Henry Dahl, of Anaconda, is in charge of the property.

Stratton's Independence, Ltd.—It is rumored that the directors of this property have approved of the applications for leases, and that leases will be granted at once. This will give work to a great many men now idle. The property discontinued work on company account about a month ago and since then has been idle.

Thompson.—Mr. S. H. Babbitt has secured a lease on this property and will commence operations at once. A large amount of ore has been taken from the property during the past year by lessees. It belongs to the Elkton Company.

IDAHO.

CANYON COUNTY.

Dewey Mining Co.—Machinery for the 100-ton cyanide plant for this mine in Thunder Mountain district is now being installed.

KOOTENAI COUNTY.

Panhandle Smelter.—The excavation for this smelter at Sandpoint is completed, and the foundations begun. There will be a single stack lead-silver furnace of 250 tons capacity, with provision for additional furnaces if necessary.

NEZ PERCES COUNTY.

Green Banner.—A rich strike is reported in a ledge 100 ft. wide at this mine in Little Canyon.

SHOSHONE COUNTY.

Callahan.—A two-year bond has been taken by Boston capitalists in the mine at Wallace. The reported price is \$150,000.

ILLINOIS.

FRANKLIN COUNTY.

Zeigler.—The strike in the mines at this place owned by Joseph Leiter continues. The mines are closely guarded, and trouble is anticipated upon the arrival of non-union men to take the place of the strikers.

LASALLE COUNTY.

(From an Occasional Correspondent.)

Acme Coal Co.—The top works of this mine at Streator have burned. The company has not yet decided whether it will rebuild as it owns another tract of coal land further south in the State which it is considering developing.

SANGAMON COUNTY.

(From an Occasional Correspondent.)

Wilmington & Springfield Coal Co.—The mine of this company north of Springfield has resumed operations after being idle several months.

INDIANA.

CLAY COUNTY.

(From Our Special Correspondent.)

Clay County Block Coal Mining Co.—This company has incorporated to do a general coal mining business by sinking shafts in this and Park counties. The capital stock is \$50,000. The principal offices will be in Terre Haute. The incorporators are Charles H. Ehrman, Clifford Forsyth, W. J. Mordock and Frank H. Haie.

MARION COUNTY.

(From Our Special Correspondent.)

Walker Mining Co.—This company has incorporated at Indianapolis for the purpose of doing a general mining business in coal and other minerals. The capital stock is \$50,000. The directors are O. L. Walker, Jno. S. Sandy, Eli Sluss and others.

MISSOURI.

JASPER COUNTY.

Blackberry.—The mill at this mine at Joplin was burned July 22, entailing a loss of about \$10,000.

Independence.—This mine, east of Joplin, has been sold by J. A. Graves and E. D. Smith to

Thomas and Birch F. Rhodus, of Chicago, for a reported price of \$40,000. Steps will be taken to increase the output.

MONTANA.

DEER LODGE COUNTY.

(From Our Special Correspondent.)

Allen Gold Mining Co.—This company has two placer camps on French gulch, 20 miles from Anaconda. At the head of the gulch the ground is opened up by bedrock flumes. The face of the bank of gravel has a width of 800 ft., with a depth averaging 25 ft. The pay is through the gravel from the surface to bedrock. Three miles below the company has in operation an Evans hydraulic elevator, which is successfully handling the ground, which has not sufficient fall for sluicing. The company is also developing some quartz claims in the vicinity. W. R. Allen, of Anaconda, is president and general manager.

Blue Eyed Nellie.—This property, 6 miles from Anaconda, will resume operations after an idleness of 12 years. The ore is a silver-lead carbonate in lime. The mine was worked to a depth of 500 ft. and is said to have produced nearly \$1,000,000 worth of ore. F. G. Brown, of Anaconda, owns the property, which is under lease and bond to Butte people.

LEWIS AND CLARKE COUNTY.

Red Mountain Tunnel Co.—A lease and bond have been taken on this company's property at Rimini by Allen G. Mason, of Tacoma.

Wood Placer Mining Co.—Control of this company at Helena is said to have been sold to Butte investors for \$125,000.

MISSOULA COUNTY.

Duquesne.—This property in the St. Regis district has been sold by the sheriff to satisfy a claim of \$20,000 held by Anton Lutz, of Pittsburgh, Pa.

SILVERBOW COUNTY.

Black Rock Mining Co.—This company, with a capital of \$500,000, has been organized at Butte. The incorporators are: Oliver T. Earle, of Butte; Charles Edward Heidel, of Minneapolis; Albert R. Leland, of Butte; A. B. Choate, of Minneapolis, and Emma T. Earle, of Butte.

NEVADA.

LINCOLN COUNTY.

Horseshoe.—The lease and bond on this mine at Fay have been renewed by G. Pray Smith, who has also secured options on the Ross and Buck properties, adjoining.

Nelson.—The mill at this mine in Mountain City is crushing 30 tons of second-class ore daily.

Ne Plus Ultra.—A new shaft has been started at this mine at Pioche and a steam hoist is to be set up.

NEW MEXICO.

GRANT COUNTY.

Burro Mountain Copper Co.—The 10-ton smelter of this company is now in successful operation. Theodore W. Carter is superintendent.

LINCOLN COUNTY.

Montezuma Mining Co.—At the annual meeting of this company these officers and directors were elected: J. M. Blocker, Bridgeport, Tex., secretary, superintendent and director; D. J. M. A. Jessett, Capitan, N. M., attorney and director.

SANTA FE COUNTY.

Sunny Slope Gold Mining Co.—Several placer claims in the southern part of the county have been leased by this company to W. C. Olsen and G. Seberg, of Racine, Wisconsin.

SOCORRO COUNTY.

Carthage.—The coal mines at this place have been sold to Powell Stackhouse, who represents the Colorado Fuel & Iron Co. and other interests. A railroad is to be built from San Antonio to Carthage.

PENNSYLVANIA.

ANTHRACITE COAL.

Philadelphia & Reading Coal & Iron Co.—Work on the collieries of this company at Shenandoah is suspended from July 30 to August 8. A glut in steam and domestic sizes is ascribed as the cause.

BITUMINOUS COAL.

Frick Coke Co.—It is reported that this company will build 1,000 new coke ovens in the Connellsville district. They will be of the beehive type.

Lehigh & Wilkes-Barre Coal Co.—The Mineral Spring colliery of this company at Parsons has closed down, throwing out about 600 men. No reason is given.

Pittsburg Coal Co.—This company has signed contracts to furnish coal to the Great Northern railway, the Omaha and the Northern Pacific railroads.

Seger Coal & Coke Co.—This company has consolidated with the Glen Easton Coal Co. under the name of the Colonial Coal & Coke Co. The mines of the former company are at Ligonier, Pa., and those of the latter at Moundsville, West Virginia.

United Coal & Coke Co.—This company, a subsidiary plant of the United States Steel Corporation, has completed and started 1,000 coke ovens in the Pocahontas region.

Wilkes-Barre & Scranton Coal & Iron Co.—This company has begun its large new coal plant at Wilkes-Barre. The plant is located on the site of the old Hillman Vein Coal Co. breaker, which was abandoned several years ago.

SOUTH DAKOTA.

CUSTER COUNTY.

(From Our Special Correspondent.)

Empire.—A new hoisting plant, pumps and air compressor at the shaft have been installed at this mine. The shaft will be sunk 200 ft. The ore will be shipped east for the manufacture of sulphuric acid.

Extreme Gold Mining Co.—At the annual election of this company these officers were elected: J. Y. Scott, Washington, Pa., president; W. H. Chambers, McKeesport, Pa., secretary; W. J. Andrews, Washington, Pa., treasurer; J. N. Wright, Custer, general manager. The officers, with P. N. Ross, Evanston, Ill.; E. G. McClure, Washington, Pa., and Isaac Downing, Custer, are the directors.

Ivanhoe Co.—A new boiler has been installed in the hoisting plant at this company's mine. Sinking has begun in the shaft.

LAWRENCE COUNTY.

(From Our Special Correspondent.)

Columbus Consolidated.—At the annual meeting of this company the directors elected were: H. J. Mayham, Denver; William Saunty, Stillwater, Minn.; F. F. Prince, Worcester, Mass.; J. S. Moodie and W. F. Teller, Kansas City; M. Thompson and H. J. Putnam, Deadwood; A. Z. Conrad, New York, and Herbert S. Shaw, Denver. The officers are: H. J. Mayham, president; William Saunty, vice-president and treasurer; G. D. Begole, Denver, secretary and assistant treasurer; M. Thompson, general manager.

PENNINGTON COUNTY.

(From Our Special Correspondent.)

Antimony.—A shaft 100 ft. has been sunk on this property, owned by Steven Bryer. The vein carries gold and antimony.

Clara Belle.—The shaft in this mine is down 225 ft. and has struck the rich ore shoot. An experimental run in a small mill was satisfactory.

WEST VIRGINIA.

MERCER COUNTY.

Pocahontas Consolidated Coal Co.—This company at Bramwell has purchased the properties in the Pocahontas coal field formerly operated by the Norfolk Coal & Coke Co., Lick Branch Colliery Co., Angle Colliery Co., Delta Colliery Co., Shamokin Coal & Coke Co., Caswell Creek

Coal & Coke Co. and the Rolfe Coal and Coke Co. These companies held about 8,500 acres of coal land under lease from the Pocahontas Coal & Coke Co., the annual output being about 1,000,000 tons of coal. They also owned and operated 1,600 coke ovens. Isaac T. Mann is president, and Elwood Jones general manager.

WYOMING.

ALBANY COUNTY.

(From Our Special Correspondent.)

Ideal Mining & Investment Co.—This company is operating in the Medicine Bow range, about 50 miles west of Laramie. The property has been worked since 1878 and by means of a stamp mill has produced a large amount of gold. A 20-stamp mill was built in 1890. A cyanide tailing plant, which will handle 150 tons per day, is being erected. W. B. McNeel is the manager.

CARBON COUNTY.

North American Copper Co.—The output at this plant at Encampment from June 12 to July 8 aggregated 1,000,000 lb. All departments are in active operation.

UTAH.

(From Our Special Correspondent.)

Ore and Bullion Settlements.—For the week ending July 29 Salt Lake banks reported settlements to the amount of \$356,700.

JUAB COUNTY.

Tintie Ore Shipments.—For the week ending July 30 shipments aggregated 107 carloads, as follows: Ajax, 2; Bullion-Beck, 5; Centennial-Eureka, 42; Eagle & Blue Bell, 1; Eureka Hill, 2; Eureka-Hill (concentrates), 4; Gemini, 12; Granite, 1; Grand Central, 11; Joe Bowers, 1; Lower Mammoth, 1; Uncle Sam Consolidated, 3; Uncle Sam Consolidated (concentrates), 3; Victor Consolidated, 1; Yankee Consolidated, 5.

PIUTE COUNTY.

(From Our Special Correspondent.)

Gold Development Co.—A complete air compressor plant and machine drills have been ordered by this company.

SALT LAKE COUNTY.

(From Our Special Correspondent.)

Bingham Consolidated.—A new ore shoot, which promises to become an important one, has been encountered in the Commercial group in upper Bingham. The vein shows a width of 10 ft. between walls of copper, gold and silver bearing sulphides. From the Bingham mines of this company 300 tons of ore are being sent to the smelter daily.

Bingham Consolidated.—Shipments from this plant during the week ending July 30 aggregated 243,626 pounds.

FOREIGN MINING NEWS.

AFRICA.

NATAL.

The Mines Department reports the production of coal in May at 83,004 tons, as compared with 51,849 tons in May, 1903. The exports for the month were 159 tons, and 38,234 tons were sold to steamers in the port of Durban.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—Shipments for the week ending July 23 are as follows in tons: Granby, 7,750; Mother Lode, 3,774; Emma, 805; Oro Denoro, 264; total for week, 12,593; total for year to date, 444,266 tons.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rosslund Ore Shipments.—Shipments for the week ending July 23 are: Le Roi, 1,280; Center Star, 1,540; Center Star, milled, 240; War Eagle, 1,110; War Eagle, milled, 360; Le Roi, No. 2, 490; Le Roi No. 2, milled, 300; Spitzee, 30; Kootenay, 30; Jumbo, 250; Cliff, 80; Velvet-Portland, milled, 25; total, 6,055; year to date, 200,413.

MINING STOCKS.

(Full quotations given on pages 206 and 207.)

New York. Aug. 3.

The recovery in the leading steel securities has given hope, but the approaching national election would seem to dissipate the belief that the public is preparing to enter the stock market.

Amalgamated Copper, after several days of weakness, has recovered on smaller sales to \$52.25. Anaconda was invisible. The curb coppers, lacking the support of their sponsors, who are apparently on vacation, have been unusually quiet.

In gold and silver list there is no temptation to speculate, as the Comstocks are collecting another batch of assessments, and the Colorado properties are still suffering from the recent labor troubles. Consolidated California & Virginia, on the Comstock, made a few match sales at \$1.15@1.20, while Mexican brought 86c. Isabella, of Cripple Creek, reappeared at 21 cents.

Boston. Aug. 2.

(From Our Special Correspondent.)

This market has been slow and uninteresting for the most part the past week. Sentiment, however, concerning the copper shares continues confident, and prices are fairly well sustained. There was a day of depression last week much the same as was witnessed in the New York list. Copper Range Consolidated touched \$51 Wednesday, having experienced an \$8 decline from its recent high price, but easily recovered to \$55.50, and closed at \$54.50. The continued decline of Daly-West has been a sore disappointment to holders, as the price was further depressed to \$10.75 Monday; subsequently it rallied to \$14., and closed at \$13, which is \$2.25 below a week ago. A number of local houses have recently issued circulars about this property, which has brought about a particularly bearish sentiment. Nothing definite comes from the property.

Osceola has been in good request lately, with light offerings. The result is that the stock has advanced \$3.75 to \$65. Wolverine touched \$78.50 on the appearance of the annual report, which shows a surplus of \$167,240 earned above dividends for the fiscal year ended June 30 last. Calumet & Hecla has also been in good demand, and the price of \$480 is the highest of the year. December 31 last there were 3,094 Calumet shareholders. Several hundred own but one share, and as many more own two.

Utah sagged to \$36.62½, but rallied to \$38.25. Bingham went off to \$23, but recovered to \$25.25, and Centennial to \$23, with recovery to \$24.25. Dominion Coal has advanced \$6 to \$48 on light trading. Mohawk shows good demand at \$32@43, and United States, which sagged to \$21, is back to \$21.87½. Reports have been current that the latter was seeking to purchase the Bullion-Beekman property in the Tintic district, but it meets with a denial. Trinity has been quiet at \$7.50@8. It is just announced that the Champion Copper Co. paid dividend number four of \$1 per share June 15. Copper Range and St. Mary's Mineral Land are equal owners of the 100,000 shares.

Salt Lake City. July 30.

(From Our Special Correspondent.)

July was a good month for mining dividends, but a poor one in so far as the stock market was concerned. A total of \$642,500 was paid to the shareholders of 10 companies, the contributors being: Utah Consolidated, \$400,000; Silver King, \$100,000; Daly-West, \$72,000; Grand Central, \$25,000; Mammoth, \$20,000; Annie Laurie, \$12,500; Sacramento, \$5,000; Tetro, \$3,000; Century, \$3,000; Salvator, \$2,000. On the Mining Exchange, \$357,327 shares of stocks were transferred, bringing \$110,055; this week's proportion being 71,500 shares for \$24,902.70. The trading of the week was confined largely to low-priced stocks, but interest was centered mostly upon Daly-West, which has been falling from day to day, selling as low as \$13 a share. The fall in this stock to a good many is still shrouded in mys-

tery, but it seems to be pretty well understood among others that although the company continues to run the usual tonnage through its mill it is not getting the values out of the ores. The highest price paid for the stock this week was \$15.75. Daly and Daly-Judge are unchanged, while Sacramento closed several points to the better. Some heavy transfers of New York Bonanza were made. Century has continued weak, only 1,700 shares being transferred. Holders of Tetro wishing to realize on a dull market caused a break in that stock and a decline of 5½c. was recorded. Butler-Liberal closed the week some stronger.

San Francisco. July 28.

(From Our Special Correspondent.)

The market for the Comstock shares has been a little stronger, with an increased demand for stocks. Some of the Gold Hill group were rather weak, but in general prices kept up very well.

Some quotations noted are: Ophir, \$2.55; Consolidated California & Virginia, \$1.15; Mexican, 89c.; Caledonia, 41c. Sierra Nevada, 25c.; Potosi, 17c. per share.

On the San Francisco & Tonopah exchange, business was fairly active, though not quite so good as for two or three weeks past. The demand for stocks was pretty good, though there was an easing off in prices. Montana Tonopah brought \$2.45; Tonopah Midway, 52c.; McNamara, 48@50c.; Tonopah Gold Mountain, 20c.; Red Top, 18c.; Rescue, 11c. per share.

On the California exchange business was dull. Buyers seem to be indifferent and prices eased off accordingly. Wolverine sold at 40c.; Occidental, 80c.; Piedmont, 64c. Associated Oil trust certificates brought 20 cents.

Monterey. July 27.

(From Our Special Correspondent.)

Exchange on New York remained practically unchanged during the week at 215.5 with a dull market.

Mining stocks also were quiet, the only dealings recorded being, in El Oro, Victoria, \$40; Maria del Oro, \$40; Aurora, \$10; and in Pachuca, Union, \$300, and Soledad, \$770.

COAL TRADE REVIEW.

New York, Aug. 3.

ANTHRACITE.

The trouble over the check-weighman award has gone so far that a strike has been formally authorized in those mines where the umpire's decision is not accepted. No strikes have yet been ordered officially, however, and it is believed the trouble will be settled.

Practically the only feature this week is the advance in wholesale prices of 10c. per ton, and the expectation of another 10c. rise on September 1. This is the regularly monthly increase fixed at the opening of the season. Momentarily there is a lull in buying, intensified by the warm weather, which always affects the domestic sizes. Production keeps up well, but as stocks begin to accumulate, the opinion becomes unanimous that mining will be irregular in the near future.

Shipments to upper lake ports continue heavy, but there is noted a relaxation in the demand from inland points. Some inconvenience is reported at lake shipping ports, owing to the congestion of boats. The movement to the Northwest is slow.

In the all-rail trade conditions are unchanged, and, judging from the canvass of sales-agents no improvement is in sight yet. Of course the early fall may show a revival, but present inquiries do not corroborate this belief.

Steam sizes are especially dull at this season, and their accumulation, now rather heavy, alone warrants producers in curtailing mining. To some extent arrangements at the breakers recently have lessened the output of the small coal; but there is still a large tonnage.

In retail circles sellers have taken advantage of the rise in wholesale prices, and at New York \$6.15 is asked.

Wholesale prices, f. o. b. New York harbor ports, are: Broken, \$4.15 per ton; stove, egg and chestnut, \$4.40.

BITUMINOUS.

The Atlantic seaboard soft coal trade is reported in some quarters as maintaining itself fairly well; in others it is quiet. The tonnages keep up and show well in the aggregate; still some districts are discontented, claiming others are being favored. The result is that there is discussion in the trade, tending toward a re-adjustment as regards shipments by the main-line roads, that is, an equalization of freight rates, so as to eliminate the feeling of favoritism complained of.

Ocean freights have fallen off somewhat, inducing extra purchases for immediate shipment, with promise of more. Some people believe that these purchases will affect the fall trade, inasmuch as the tonnage then will be impaired owing to the extra deliveries now.

In the far east business runs smoothly, although orders are not as plentiful as they have been. Along Long Island Sound consumers are calling for fair quantities of coal, but there is no briskness to the trade. At New York harbor little is doing. In this territory there appears to be enough coal moving on demurrage to keep prices down to the minimum. The lower grades are striving for 90c. at mines, for tidewater delivery, but the accumulation of coal at tide has made it expedient to discount this price in order to dispose of their stocks promptly. The better grades of coal are correspondingly higher.

All-rail trade is slightly better, and in certain sections new orders are reported. Transportation from mines to tide is up to all demands. The car supply is excellent, as the main-line roads are permitting their cars to go over other roads leading to points heretofore embargoed.

In the coastwise market vessels are in good supply. Large craft from Philadelphia quote rates as follows: Boston, Salem, Portland and Portsmouth, 75c.; Long Island Sound, 60c.; Lynn, Newburyport and Gardiner, 85c., with towages to the latter port; Saco, 90c. and towages; Bath, 80c. From New York harbor freights are 55@60c. around the Cape.

Birmingham. Aug. 1.

(From Our Special Correspondent.)

Despite the strike of the United Mine Workers, there is a steadily increasing production of coal in this State. The strike continues quietly, though it is announced that two of the larger operators, the Sloss-Sheffield Steel & Iron Co. and the Tennessee Coal, Iron & Railroad Co., will make efforts this week to resume operations at their mines; if the old labor will not return to work, then they will introduce other labor. It is learned that there is considerable non-union labor ready to take up places of strikers in the coal-field and deputy sheriffs have been secured to protect properties.

The Broken Arrow Coal & Mining Co., a small commercial coal company with mines in St. Clair county, supplying coal when the Talladega furnace is in operation, has signed the temporary contract with the union miners and will resume operations this week. This makes 32 temporary contracts signed in the State, and the output of coal at these mines is growing right along. Then the non-union mines in the State and the convict-labor mines are producing a large quantity of coal also, bringing up the aggregate to a very satisfactory output.

The Empire Purchasing Co., recently formed by Leo K. Steiner, Frank Nelson, Jr., and others, has secured possession of the properties of the Empire Coal & Coke Co., consisting of coal lands with mines opened on them, coke ovens and railroad tracks convenient in Walker county. A decree has been signed by the referee in bankruptcy here, N. W. Trimble, in the case. The Empire Coal & Coke Co. was placed in the hands of a receiver last September on petition of creditors. A trustee was afterwards appointed and the properties were operated. The liabilities of the company were about \$300,000. The new owners intend to develop the properties on a large scale.

Three fatal accidents took place in the coal

mines of Alabama during the past month, making the total over 30 for the year. There were 50 fatal accidents last year.

Chicago. Aug. 1.

(From Our Special Correspondent.)

Continued dullness marks the coal trade in both anthracite and bituminous. There has been a slight spurt in anthracite due to the approach of an advance in price of 10c., but this does not mean any continued business. Rather it probably means a falling off in early August, by way of compensation. Receipts of anthracite by lake are good, with prospects that they will be heavy in the month just opening. With city trade unusually slack all over Chicago territory, there is a fair prospect now of an accumulation of dock stores against the winter such as did not seem likely to be made a few weeks ago.

In the bituminous market the packinghouse trade is advancing again with increasing employment of men at the stockyards. Threshing coal is actively sought, the demand being unusually good. Smokeless and other eastern coals are very quiet. Quotations are: Smokeless, \$3@3.15; Hocking, \$3; West Virginia splint, \$2.30@2.40; Youghiogheny, \$3; Indiana and Illinois run-of-mine, \$1.35@1.60; screenings, \$1.20@1.40.

Cleveland. Aug. 1.

(From Our Special Correspondent.)

The coal situation has not changed. The market, on the whole, is dull, with prices hanging around the bottom. The prices of slack have shown signs of weakness during the past week. The market had been held stiffly at 30c. at mines for this product, but buyers would not come in on that basis, and to induce a little heavier covering some of the mines have cut the price to 25c. Other mines have met the competition with the result that the prices are now about steady on that basis, but with little greater activity.

The steam coal situation is about the same. If anything it is a little weaker than it was. The market is not at all steady. Operators are running pretty close to the edge, and the market is very easy. The prices now range about 90@95c. for run-of-mine, but it is understood that some better prices could be obtained with a good order.

The lake situation is practically unchanged. The market has been steady but vessel-owners have been clamoring for better rates than they have been getting, though there is hardly the demand for boats which would warrant them in getting more.

Pittsburg. Aug. 2.

(From Our Special Correspondent.)

Coal.—The threatened general strike in the anthracite coal regions has had a good effect in the Pittsburg district. It is generally acknowledged that since the trouble between the anthracite miners and operators broke out afresh local operators have commenced to accumulate a certain per cent of their production. During the late strike bituminous coal sold from \$5 to \$6 per ton. Shipments to the lakes are being rushed, and the demand for fuel is evidently exceptionally large. Prices are still being quoted at \$1@1.10 per ton, run-of-mine.

Coke.—It is said that the H. C. Frick Coke Co. has awarded a contract for 1,000 new ovens in the Connellsville region. These are to be built for operation early next fall. Production for the week in the Connellsville region amounted to 150,347 tons, a decrease of 4,908 tons over the previous week. The shipments aggregated 6,972 cars, distributed as follows: Pittsburg and river points, 2,746 cars; points west of Pittsburg, 3,136 cars, and points east of Everson, 1,090 cars, a decrease of 68 cars. Coke prices are somewhat stiffer, and for contracts running over the balance of the year standard Connellsville furnace coke cannot be had under \$1.50, while for early delivery some can be picked up at \$1.40@1.45. Standard 72-hour Connellsville foundry coke is held at \$1.80@2, according to delivery.

San Francisco. July 28.

(From Our Special Correspondent.)

Mr. J. W. Harrison's circular of July 28 says: "Since our last, there has been but one arrival from Australia, with 1,573 tons. There are six cargoes now afloat which should arrive here prior to September 1. There are 35 vessels in all, afloat and to load at Newcastle, on the present chartered list, with a carrying capacity of about 92,000 tons; a number of these vessels will not deliver their cargoes here for several months yet. Freight rates from the colonies are quoted firm at full figures, hence no low-priced Australian coal can be looked for this year. This port will not be a very seductive one for coal carriers to seek in view of the dismal outlook for grain carriers outward, as we have a surplus of foreign vessels now here, and we will have a very meager quantity of grain for export. The major portion of the engaged tonnage has already passed out of first hands, and is now for sale by our local wholesale dealers. Business in the fuel line is very quiet, as fuel oil controls fully 75% of the steam demand, and sales for domestic uses at this season of the year is never brisk; there is no change of quotations, the prices remain steady. A coalition has been formed this month between the Western Fuel Co. and R. Duns-muir's Sons Co., which gives absolute control of the California market to the Western Fuel Co. for all British Columbia products; the facilities gained by this combination will enable them to handle shipments at a minimum figure, and their intention, as expressed by themselves, is to give the consumers a portion of the benefits thus derived."

Pacific coast coals in large lots to dealers are quoted as follows: Wellington and New Wellington, \$8; Richmond, \$7.50; Roslyn, \$7; Seattle and Bryant, \$6.50; Beaver Hill and Coos Bay, \$5.50; white ash, \$5.25. For Rocky Mountain coals, ex-car, to dealers, prices are \$14 for Colorado anthracite, \$11.50 for Castle Gate, Clear Creek, Rock Springs and Sunnyside. Eastern coal is nominal at \$14 for Pennsylvania anthracite and \$13 for Cumberland. Foreign coal in cargo lots is quoted at \$13 for Welsh anthracite, \$8.50 for cannel and \$7.50 for Wallsend and Brymbo.

Foreign Coal Trade. Aug. 3.

Exports of coal and coke from the United States for the six months ending June 30 are reported as below by the Bureau of Statistics of the Department of Commerce and Labor:

	1903.	1904.	Changes.
Anthracite	1,084,998	1,124,295	I. 39,297
Bituminous	2,656,945	2,788,417	I. 131,472
Total coal	3,741,943	3,912,712	I. 170,769
Coke	205,922	268,968	I. 63,046
Total	3,947,865	4,181,680	I. 233,815

The coke exported went chiefly to Mexico. The coal exports were distributed as follows:

	1903.	1904.	Changes.
Canada	2,875,252	2,798,870	D. 76,382
Mexico	401,394	500,542	I. 99,148
Cuba	208,852	235,332	I. 31,480
Other West Indies	111,421	139,887	I. 28,466
France	2,848	9,311	I. 6,463
Italy	33,193	47,075	I. 13,882
Other Europe	11,518	34,309	I. 22,791
Other countries	102,465	149,386	I. 47,921
Totals	3,741,943	3,912,712	I. 170,769

Summer shipments to Canada have not quite made up the shortage of the first quarter of the year.

Imports of coal into the United States for the six months ending June 30 are reported by the Bureau of Statistics as follows:

	1903.	1904.	Changes.
Canada	934,494	639,947	D. 294,547
Mexico	5	221	I. 216
Great Britain	1,211,524	40,997	D. 1,170,527
Other Europe	356	50	D. 306
Australia	129,633	108,558	D. 21,075
Japan	12,326	29,662	I. 17,296
Other countries	1,019	756	D. 263
Totals	2,289,357	820,151	D. 1,469,306

Imports this year were chiefly on the Pacific coast, the import trade in the East having fallen to its normal small proportions.

Messrs. Hull, Blyth & Co., of London and Cardiff, report, under date of July 23, that the possibility of political complications has made business very difficult. Prices are nominally unchanged, as follows: Best Welsh steam coal, \$3.66; seconds, \$3.42; thirds, \$3.30; dry coals,

\$3.42; best Monmouthshire, \$3.36; seconds, \$3.30; best small steam coal, \$1.98; seconds, \$1.80; other sorts, \$1.56.

The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, both exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½% discount.

The freight market remains weak, but very little chartering has been done for a day or two. Some rates quoted from Cardiff are: Marseilles, \$1.30; Genoa, \$1.23; Naples, \$1.14; Las Palmas, \$1.32; St. Vincent, \$1.44; Rio, \$2.04; Santos, \$2.46; Buenos Aires, \$1.74.

IRON TRADE REVIEW.

New York, Aug. 3.

Accounts from the iron market this week show a good deal of irregularity. In some lines there is apparently a slight improvement, but in others very little is to be said. The situation seems to have resolved itself into a quiet struggle between consumers and producers. Buyers are taking only what they need for immediate necessities, but a good many of them are willing to contract for future deliveries. Makers, however, are not ready to accept any long contracts on the basis of present prices, apparently anticipating an improvement in the fall. The consequence is that very little has been done, except, as noted above, for immediate necessities.

It is announced that the wire plant of the Trenton Iron Co., at Trenton, N. J., has been sold to the United States Steel Corporation, and will be operated by the American Steel & Wire Co. This will close the independent existence of a company which was organized 57 years ago by Peter Cooper. It has been recently owned by his son and by his grandsons, the heirs of the late Abram S. Hewitt.

Exports and Imports.—Exports of iron and steel, including machinery from the United States are valued by the Bureau of Statistics of the Department of Commerce and Labor as below, for June and the six months ending June 30:

	1903.	1904.	Changes.
June	\$8,472,942	\$10,507,097	I. \$2,034,155
Six months	48,081,823	59,808,424	I. 11,726,601

June exports this year were somewhat smaller than those of May. The increase for the half-year was 24.4 per cent. The chief items of exports this year were as follows, in long tons:

	1903.	1904.	Changes.
Pig iron	7,357	25,009	I. 17,652
Bars	21,675	28,596	I. 6,921
Rails	4,106	134,247	I. 130,141
Sheets and plates	8,426	15,405	I. 6,979
Structural steel	15,900	21,236	I. 5,276
Wire	45,112	59,363	I. 14,251
Nails	18,532	20,898	I. 2,366

Exports of iron ore for the six months were 5,126 tons in 1903 and 7,721 tons in 1904; showing an increase of 2,595 tons. The notable increase shown in the table above is in steel rails. The exports of rails in June were 51,101 tons, of which 30,017 tons went to Canada and 13,524 tons to the East.

Imports of iron and steel into the United States for June, and the six months ending June 30 are valued as follows:

	1903.	1904.	Changes.
June	\$4,604,777	\$2,030,798	D. \$2,573,979
Six months	25,319,750	11,097,713	D. 14,222,037

In the first part of 1903 activity was very great, and manufacturers were still drawing on Great Britain and Germany for material. The chief items of imports were as follows, in long tons:

	1903.	1904.	Changes.
Pig iron	452,451	61,933	D. 390,518
Billets and blooms	175,561	35,982	D. 139,579
Scrap iron and steel	62,887	8,581	D. 54,306
Bars	12,054	10,007	D. 2,047
Wire-rods	9,779	9,787	I. 8
Rails	72,644	30,448	D. 42,196
Tin-plates	25,988	34,391	I. 8,403

The only item showing a considerable increase was tin-plates. In most others there were large decreases.

Imports of iron ore for the six months were 459,490 tons in 1903 and 163,176 tons in 1904; showing a decrease of 296,314 tons this year.

Imports of manganese ore and oxide into the United States in June were 28,602 tons in 1903 and 11,026 tons in 1904; a decrease of 17,576 tons, or 61.5%, this year.

Birmingham. Aug. 1.

(From Our Special Correspondent.)

There is more strength to the pig iron market in this State, and furnace companies appear to be better pleased. If the coal miners' strike were only settled, the iron manufacturers could hardly be in a better mood, the demand for iron being good, sales aggregating fairly good and indications rife for an advance in quotations. Some of the companies during the month of July sold considerably more iron than they produced in the month. The Sloss-Sheffield Steel & Iron Co. is on the verge of withdrawing from the market again for a short period, while some of the smaller companies have been selling their product right along. The shipments from this district are picking up right along and the production now, curtailed as has been stated before, is not sufficient for the demand. The Tennessee Coal, Iron & Railroad Co. has all its furnaces at Bessemer, five in number, now out of blast. During the past week another furnace at Ensley was blown in by this company, making up for the one which was closed down at Bessemer. The Sloss-Sheffield Co. maintains a production at six of its seven furnaces. The Woodward Iron Co. still has the fires banked in its two furnaces.

The following quotations are given: No. 1 foundry, \$10; No. 2 foundry, \$9.50; No. 3 foundry, \$9; No. 4 foundry, \$8.50; gray forge, \$8; No. 1 soft, \$9.50@ \$10; No. 2 soft, \$9.50.

Cast iron pipe is still in active demand, and the manufacturers in this section of the country are operating their plants steadily. Shipments are heavy, the product going out in all directions.

At the steel plants there is no change, and the output of billets, steel rails, steel rod, wire and nails is good. The Alabama Steel & Wire Co. expects to put two more open-hearth furnaces in operation after this month at the new steel plant at Gadsden.

BY TELEGRAPH.

Birmingham, Ala., Aug. 2.—The iron production in Alabama has been further curtailed on account of the coal miners' strike. The Alabama Consolidated Coal & Iron Co. has ordered three furnaces banked. The Republic Iron & Steel Co. has blown out one of the Thomas furnaces, leaving only one stack in operation there. This will leave only 16 furnaces in this State actively making iron.

Chicago. Aug. 1.

(From Our Special Correspondent.)

If any change has occurred in the market for pig iron, it is a change that strengthens the seller. The situation, however, is not materially different from that of last week. Sales are not in large amounts, nor do they extend for so long a time ahead as buyers in many cases wish; they are mostly restricted to 60 or 90 days. Agents are reluctant to make heavy contracts at prevailing prices, which are said to represent no profit under existing conditions of manufacture.

For northern the prospects are almost bright; the demand is gradually increasing, and everything points to a firmer tone than has been known for many months. Southern is in less relative activity, but apparently past the stagnation point.

Prices remain about the same as last week: \$9.25, Birmingham, for southern No. 2, or \$12.90 Chicago, and \$13.25 for northern No. 2 represent the lowest quotations; prices range 25c. and 50c. above for small lots and unfavorable conditions. No. 1 on both northern and southern sales is 50c. higher and No. 3 is 50c. lower than No. 2.

Coke is a trifle firmer, with something like activity in spot business, due to the expiration of contracts, not yet renewed owing to present low prices.

Cleveland. Aug. 2.

(From Our Special Correspondent.)

Iron Ore.—The buying of ore has been very dull and light. Shippers, however, are beginning to send a little more material down the lakes, being actuated by a hope that the better tone in the pig iron market means a better tone for their market, too. The shipments have been so slow, however, that there is hardly any hope for a big total this year. If it exceeds 17,000,

000 tons it will be extraordinary. Meanwhile estimates for July shipment indicate close to 4,000,000 tons. The prices have not changed, neither have the rates of transportation.

Pig Iron.—Buyers have been taking a slightly increased amount for immediate consumption, but the main activity is in purchases for the future. As yet buyers have not come in with their orders. They are making inquiries only. The market for the last half of the year, therefore, is looking better than it has been. The market for spot material holds at \$11.85@ \$12 in the Valleys for No. 2 for spot shipment, with \$12 the minimum for future delivery. Buyers have tried to cover for a distant future delivery at the current prices, but the market is not weak enough to permit it, the furnaces refusing to sell for delivery in 1905. There has been a little better call for basic and bessemer, but it is only an occasional demand. The market is steady, but the prices are exceedingly low. The best quotation heard now is \$11.50@ \$11.60 for August and September delivery of basic with bessemer prices ranging about even. Malleable is not much in demand. Southern iron is under-sold in this market, and gets a very poor footing. The prices in Birmingham are now quoted at \$9.50 as the minimum by standard No. 2. Some prices have been quoted under these figures, but they represent iron not of a standard analysis.

Finished Material.—The market has been a little bit better in places and a little worse in others. The indication is that the market is spotty and the trend irregular. In structural, there is a little current business, but no contracts are appearing. The same is true of plates, rails and billets.

The resumption of work among the bar iron mills has given that market a little better tone, but the fact that the increased activity is gained at the expense of values is taken as indication that the producers are forcing the situation somewhat. The report that sheet prices have been cut is not true.

New York. Aug. 3.

Pig Iron.—The market is still irregular. Buying has been on a small scale for immediate necessities. Neither consumers nor makers seem to be anxious to make long contracts. For northern iron we quote: No. 1, foundry, \$14.50 @ \$15; No. 2X, \$13.75@ \$14; No. 2 plain, \$13.25@ \$13.50; forge, \$12.50@ \$13. For southern iron on dock prices are about as follows: No. 1 foundry, \$13.50@ \$13.75; No. 2 foundry, \$13@ \$13.25; No. 3 foundry, \$12.50@ \$12.75; forge, \$12@ \$12.25; No. 1 soft, \$13.50@ \$13.75; No. 2 soft, \$13@ \$13.25.

Bar Iron and Steel.—The market is dull. Refined bars are quoted at 1.45@ 1.49c., in large lots, with steel at the same figure. Common iron bars can be had for 1.35c. per pound.

Structural Material.—Business has been only in small lots. The local situation in the building trade continues very unfavorable. There is some talk of big contracts on the market, but they do not materialize. Large lots at tide-water are still quoted nominally at 1.75@ 2c. for beams, angles and channels.

Steel Rails.—Quotations remain \$28 for standard sections, f. o. b. mills. Light rails are quoted f. o. b. eastern Pennsylvania mills, as follows: 12-lb., \$27; 20-lb., 25-lb., 30-lb., and 35-lb., \$25; 40-lb. and 45-lb., \$24.

Tin Plates.—A general cut of 25 to 30c. a box has been made by the American Tin-Plate Co. It is said that this has been done to head off reductions by independent companies.

Philadelphia. Aug. 4.

(From Our Special Correspondent.)

Pig Iron.—Pig iron people have suddenly developed quite an interest in the market, and yet very little iron is selling. More inquiries have come to hand within a week than for a month past. Rumors are around about an advance in Alabama pig iron. Offers made last week in this market were withdrawn to-day. Handlers of basic are in sight of good business. Makers of No. 2X and No. 2 plain foundry have offers to take iron for fall delivery, and by Saturday the offers will be accepted or rejected. What the reason for this false alarm is, no one can tell. It is not probable that much late delivery

business will develop at present, though several dealers look for a partial covering by a good many consumers of nearby requirements. Quotations have not undergone any change. No. 2 foundry is selling at \$14.25.

Billets.—A moderate business is done at \$24 and consumers are watching the market, apprehensive of a change.

Bars.—Mills are generally at work. Small orders are again coming in.

Sheets.—All mills are getting business, some of it being for late delivery.

Pipes.—Agents report conditions unchanged. Discounts the same.

Tubes.—Tube orders this week show improvement to cover recently secured work.

Merchant Steel.—Manufacturers could draw business out of this market at this time for late delivery if they would cut prices enough.

Plates.—Our mills have pocketed some business for foreign delivery, and the understanding is that we are in sight of further European orders, but nothing definite is imparted. The only local demand this week is for boiler plate and $\frac{3}{8}$ -in. tank for current needs.

Structural Material.—Contractors are using up quite an amount of material in local construction, about double that of last year. We hear of specifications being made for Pennsylvania Railroad bridge work in New Jersey.

Rails.—Light sections and mine rails are the only orders heard of.

Scrap.—The scrap dealers here have lost two or three opportunities to get rid of some of their stock. They want more money.

Pittsburg. Aug. 2.

(From Our Special Correspondent.)

In a few lines the iron and steel trade has shown a marked increase in activity, particularly in pig iron, merchant pipe and wire goods. There is no definite evidence to show that consumption, as a whole, is at a greater rate than two months ago, the greater purchases of pig iron being due principally to contracts having run out while in the case of pipe and wire the regular fall demand is beginning to make itself felt.

There is a continuance of better feeling in the trade, which has now been noted for several weeks, but this is due principally to the general decline in prices and production having been arrested, so that one step has been accomplished toward the improvement which is expected at some time in the future, probably early in 1905. Until then the iron trade will have its ups and downs, perhaps moving up a little more, in the long run, than the downs amounts to.

Here and there additional blast furnaces are being blown out, but the rate of decrease during the latter part of July in pig iron has been much smaller than during June or the early part of July, and the low point is expected some time this month, with the majority of merchant producers in the Pittsburg and Valley districts idle and a number of steel works furnaces also idle.

A rather unexpected event in market circles was a reduction in tin-plate, announced by the American Sheet & Tin-Plate Co. last week, amounting on the surface to 15c. a box, but really to between 18 and 20c., inasmuch as the discount for cash in 10 days was increased from 1 to 2%. The new price is \$3.30 for 100-lb. coke plates, f. o. b. mill, Pittsburg, 30 days, less 2% for cash in 10 days. The move was rather unexpected by both the independent manufacturers and the jobbing and consuming interests. Many of the independents had business booked for the next 30 or 60 days, and as such business was taken with price guaranteed against decline, they have no recourse but to reduce prices to their customers. The leading interest was probably not so well provided with orders. The market had not been subject to shading, but the reduction was probably made because that leading interest feared that shading would soon develop, and desired to forestall this and keep the market under control. There is very little profit to independents at the new price.

Pig Iron.—Sales during the past week have been two or three times as large as the average

during June, while the proportion is still greater, making the comparison with the early part of July. Transactions are nearly altogether for small lots, for early shipment, indicating that consumers' old contracts have expired and that they are now buying from hand to mouth. In a few instances, however, inquiries are for extended delivery, and it is even reported that some long-time contracts have been made. As a general rule, however, furnaces ask a considerable advance for extended delivery over prices they will do for prompt shipment, and this frightens consumers off. Prices are a trifle stiffer and we quote the market now as follows: No. 2 foundry, \$11.75@12, Valley furnace, or \$12.00@12.85, Pittsburg; forge, \$11@11.15, Valley, or \$11.85@12, Pittsburg; Bessemer, \$11.75@12, Valley, or \$12.00@12.85, Pittsburg. Some furnaces, however, claim they will not do below \$12.25, Valley, for deliveries running over the rest of the year.

Steel.—It is reported that the Pittsburg Steel Co. is in the market for 5,000 tons of billets a month for the next 10 or 12 months, and that it is figuring on buying bessemer pig and making a conversion deal to put the iron into steel. It is not likely any of the steel mills would consider such a proposition just now, as it would be simply a means of evading the billet association prices, and they are endeavoring to adhere to these. On small lots of steel some concessions from the \$23 billet price might be obtained from small independent mills. Plates remain on the basis of 1.60c. for tank, while merchant steel bars are 1.35c. for bessemer.

Sheets.—There are some vague reports of 2.05c. being done on No. 28, but it is probable that if this has been done it has been on iron sheets, made from scrap. On standard steel sheets the market is quite firm at 2.10c., where it has stood for two or three months. Demand is a trifle better, as the fall season is approaching.

Ferro-manganese.—The market is not particularly active. The foreign and domestic producers continue to compete for business, and car-loads of 80% are available at \$41.50, but on any large lot this price could be shaded by \$1 a ton.

Cartagena, Spain. July 16.

(Special Report of Barrington & Holt.)

Iron and Manganiferous Ores.—Shipments for the week were one cargo, 3,150 tons dry ore, to Sydney, Cape Breton. Sales reported are at low rates, with no improvement. Freight rates remain low, 5s. 6d. having been paid to Glasgow.

Quotations are now as follows: Ordinary 50% ore, 6s. 3d.@6s. 6d.; special low phosphorus, 6s. 9d.@7s. 6d.; specular iron ore, 58%, 9s.; magnetic ore, 60%, 10s. 9d. for lumps and 8s. 9d. for smalls; manganiferous ores range from 9s. 3d. for 12% manganese and 35% iron up to 14s. for 20% manganese and 20% iron.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s. per ton. Shipments for the week were 270 tons to San Luis. There was also a shipment of 9,517 kg. copper pyrites to Marseilles.

CHEMICALS AND MINERALS.

New York, Aug. 3.

In heavy chemicals, high-test domestic alkali, for forward delivery, has been advanced to 75@80c. per 100 lb., in bulk, f. o. b. works: 48%, 87½@90c., and high-test caustic soda to \$1.77½@1.82½ per 100 pounds. Sodium sulphate, a by-product in the manufacture of muriatic acid, steady in price for many months past, has weakened to 60c. per 100 lb. in bulk, f. o. b. works, owing to an overproduction and resulting competition. Otherwise the chemical and mineral trades are quiet and uninteresting.

The foreign trade of the United States in the six months ending June 30 is shown below:

	Imports.	Re-exports.	Consumption.
Asphalt, tons	57,713	1,672	56,041
Cement, lb.	207,772,185	8,963,578	88,808,607
Chlorate of potash, lb.	104,156	3,536	106,620
Clay or earths, tons	117,735	110	117,625
Graphite, tons	10,132	5	10,148
Salt, lb.	204,234,007	1,065,304	263,228,703
Salt-peter, lb.	7,461,820	672,668	6,789,152
Soda, caustic, lb.	1,734,565	780,992	973,573
Soda, sal. lb.	2,371,069	8,470	2,362,599
Soda, ash, lb.	10,591,353	12,270	10,579,083

Exports of domestic products in the same period of this year and last were:

	1903.	1904.	Changes.
Cement, bbl.	109,697	185,507	I. 76,410
Gnnpowder, lb.	404,855	300,154	D. 104,701
Lime, bbl.	30,735	29,559	D. 1,376
Lime, acetate, lb.	30,292,287	33,104,275	I. 2,811,988
Salt, lb.	12,063,987	12,045,459	D. 18,328

Imports were chiefly from Germany and Great Britain: exports mostly to the West Indies, Central and South America.

Cyanide.—Prices are easy, 18@19c. per lb. f. o. b. New York being quoted, although a shade less would doubtless be accepted on a large contract.

Bleaching Powder.—Forward inquiry continues fairly good at regular contract prices—\$1.20@1.25 per 100 lb. for prime brands.

Imports of bleaching powder into the United States in the half-year ending June 30 were 44,136,255 lb., as against 58,371,197 lb. last year, showing a decrease of 14,234,942 lb., or 25 per cent. Of the imports this year 31,187,072 lb., or about 7% of the total, were from Great Britain.

Copper Sulphate.—New orders are few, and the quotation, \$4.75@5 per 100 lb., remains unchanged. Exports from the United States in June totaled 1,764,046 lb., making 24,157,584 lb. for the half-year. Compared with the corresponding six months last year, there is shown quite an improvement in 1904. The largest buyers are Austria and Italy.

Acids.—It is learned that nitric prices are to be advanced, owing to the continued high market for the raw material. Otherwise the acid trade remains unchanged.

We quote as below per 100 lb., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°	\$1.50	Oxalic, com'l.	\$5.10@5.50
Muriatic, 20°	1.60	Sulphuric, 50°	
Muriatic, 22°	1.75	bulk, ton	13.50@14.50
Nitric, 36°	4.50	Sulphuric, 60°	1.05
Nitric, 38°	4.75	bulk, ton	18.00@20.00
Nitric, 40°	5.00	Sulphuric, 66°	1.20
Nitric, 42°	5.50	bulk, ton	21.00@23.00

Brimstone.—Quiet. Shipments of Sicilian best unmixed seconds are quoted at \$21.625@21.75, and sales of domestic have been made at about the same price. Imports of brimstone in June into the United States totaled 13,900 tons, making 78,652 tons for the half-year, as against 98,475 tons in 1903; showing a decrease of 19,823 tons.

Exports of brimstone from Sicily to the United States in the half-year ending June 30 were, as below, in long tons:

	1903.	1904.	Changes.
Best seconds	61,466	51,081	D. 10,385
Best thirds	18,371	14,125	D. 4,246
Total	79,837	65,206	D. 14,631

The decrease shown this year is equivalent to 18.3 per cent. It is also noteworthy that whereas last year America received 29.2% of the total exports from Sicily, the proportion in 1904 is only 21.4%, indicating that other sources of supply of sulphur are being increasingly drawn on.

Pyrite.—Further sales of Spanish washed ore are reported at 7¼@8½c. per unit; of unwashed fines at 9½@10c. Non-arsenical ore continues in demand at 12@13c. per unit of sulphur, and domestic lump ore at 10@10.5c. per unit and fines, 9c. Spanish pyrite contains from 46@52% sulphur and domestic 42@44 per cent. Imports into the United States in June were 32,980 tons, making a total of 167,185 tons for the half-year, containing, approximately, 78,577 tons of sulphur. Compared with the corresponding half-year in 1903, there is shown a decrease of nearly 18% in 1904.

Nitrate of Soda.—This market maintains its strength. Spot goods are quoted at \$2.17½ per 100 lb. for 96%; futures, \$2.22½@2.25, according to position. For 95% quotations are \$2.15 for spot, \$2.20@2.22½ for futures. Imports into the United States in June were 23,236 tons, making 154,061 tons for the half-year, which is considerably more than 1903.

Sulphate of Ammonia.—Dull and easy at \$2.95 per 100 lb. for spot gas-liquor, and \$3@3.05 for shipment.

Phosphates.—A little new business is being done, but on the whole miners are keeping busy

on old contracts, making deliveries. Exports from the United States in June were 85,726 tons, somewhat better than previous months, and making a total of 436,178 tons for the half-year, chiefly to Germany, France and Italy. Compared with the corresponding half-year in 1903, there is shown quite an increase, notably in land pebble phosphates.

Ocean freights are as follows, per ton:

Ports.	Florida.	Bone, Al.	Sfax.
Baltic	\$3.36@3.62		\$2.16
Continental	3.12		\$1.44 \$1.80@1.86
Mediterranean	3.36		\$2.88 2.04 2.28
United King'm.	3.00	2.64@2.76	1.80

Charters are few, while shipowners are inclined to steady their rates.

Phosphates are quoted as follows, per ton:

Phosphates.	F. o. b.	C. i. f. Gt. Britain or Europe.
*Fla., hard rock, 77@80%	\$7.25@7.50	\$10.53@11.70
land pebble, 68@73%	3.75@4.00	7.70@8.40
†Tenn., 78@80%	4.00@4.25	10.27@10.67
78%	3.75@4.00	
75%	3.25@3.50	
‡So. Car. land rock	3.25@3.50	
river rock, 55@60%	3.00@3.25	6.33@6.56
Algerian, 62@70%		6.93@7.59
58@63%		6.15@6.60
53@58%		5.05@5.20
Tunis (Gafsa)		6.33@6.50
Christmas Isle, 80@85%		12.87@14.11
Ocean Isle, 82@88%		13.60@14.45
Somme, Fr., 70@75%		10.63@11.02
Bordeaux, Fr., 60@65%		7.60@7.72
55@60%		6.44@6.55
Liege, Bel., 60@65%		7.00@7.10

* F. o. b. Florida or Georgia ports. † F. o. b. Mt. Pleasant. ‡ On vesSEL, Ashley River, S. C.

Liverpool. July 20.

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

Trade in heavy chemicals continues quiet generally as regards export business.

Soda ash in tierces is selling about as follows: Leblanc ash, 48%, £5@5 10s.; 58%, £5 10s.@£6 per ton, net cash. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£4 15s. Bags, 5s. per ton under price for tierces. Soda crystals are in fairly good request at £3 7s. 6d. per ton, less 5% for barrels or 7s. less for bags, with special terms for a few favored markets. Caustic soda is quiet, as follows 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net cash. Special quotations for the Continent and a few other quarters.

Bleaching powder is dull, there being little doing outside of deliveries on running contracts. For hardwood £4 5s.@£4 10s. per ton, net cash, is about nearest value as to market.

Chlorate of potash attracts little attention from buyers, but quotations are unchanged at 2¼d.@3d. per lb., net cash.

Bicarbonate of soda is firm at £6 15s. per ton, less 2½% for the finest quality in 1 hundred-weight kegs, with usual allowances for larger packages, also special terms for a few favored markets.

Sulphate of ammonia is rather dull at £12 2s. 6d.@£12 5s. per ton, less 2½% for good gray, 24@25% in double bags f. o. b. here.

Nitrate of soda is quiet at £10 2d. 6d.@£10 10s. per ton, less 21% for double bags f. o. b. here, as to quantity and quality.

METAL MARKET.

New York, Aug. 3.

Gold and Silver Exports and Imports,

At all United States Ports in June and Year.

Metal	June		Year.	
	1903.	1904.	1903.	1904.
Gold: Exports.	\$12,507,588	\$1,577,544	\$31,336,241	\$68,504,363
Imports.	2,767,533	4,880,979	13,976,054	47,758,472
Excess Silver: Exports.	E. \$9,740,035	I. \$3,303,435	E. \$17,360,197	E. \$20,745,321
Imports.	1,556,410	4,430,334	17,505,359	26,387,699
Excess	I. \$494,395	E. \$1,713,025	E. \$7,524,065	E. \$12,646,861

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, New York.

For the week ending July 30 and total from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	\$3,000	\$32,402	\$797,915	\$86,053
1904	63,730,202	3,622,821	23,583,394	595,488
1903	32,161,843	3,583,020	11,972,272	1,174,900
1902	24,004,088	1,442,160	15,022,960	775,091

The gold movement was principally with the West Indies; that of silver with London.

Business continues to be generally dull, and the recovery in the stock exchanges seems to be due chiefly to manipulation by large interests.

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending July 30, gives the following totals, comparisons being made with the corresponding week of 1903:

	1903.	1904.
Loans and discounts	\$908,864,500	\$1,097,333,100
Deposits	909,837,700	1,204,905,600
Circulation	43,862,800	38,982,900
Specie	170,738,300	271,182,900
Legal tenders	80,786,200	86,048,100
Total reserve	\$251,524,500	\$357,231,000
Legal requirements	227,464,425	301,241,400
Balance surplus	\$24,060,075	\$55,989,600

Changes for the week this year were increases of \$3,522,400 in deposits, \$5,227,500 in specie, \$1,003,100 in legal tenders, and \$5,380,000 in surplus reserve; decreases of \$2,511,100 in loans and discounts, and \$169,700 in circulation.

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:

	1903.		1904.	
	Gold.	Silver.	Gold.	Silver.
N. Y. Ass'n—	\$170,738,300		\$271,182,900	
England—	180,291,355		173,348,025	
France—	512,338,690	\$228,074,005	543,874,540	\$225,428,315
Germany—	177,765,000	62,460,000	177,350,000	62,315,000
Spain—	72,920,000	102,340,000	71,630,000	102,080,000
Netherlands—	19,702,000	32,602,000	27,276,000	32,523,000
Belgium—	14,703,335	7,351,665	15,253,335	7,626,665
Italy—	94,940,000	11,576,000	111,760,000	19,948,000
Russia—	406,720,000	44,890,000	461,100,000	41,950,000
Austria—	226,790,000	65,330,000	241,430,000	63,795,000

The returns of the Associated Banks of New York are of date of July 30 and the others July 28, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The coinage executed at the mints of the United States in July was \$263,519 in half-dollars and \$192,000 in quarters, making a total of \$455,519 in silver. There was no gold or minor coinage during the month.

The silver market has ruled quiet but firm past week. London reports good buying demand for the Indian hazards.

The United States Assay Office in New York reports receipts of 54,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to July 16 are reported by Messrs. Pixley & Ahell's circular as follows:

	1903.	1904.	Changes.
India	£3,493,525	£5,482,138	I. £1,988,613
China	225,893	368,489	I. 132,496
Straits	490,729	58,103	D. 432,626
Total	£4,229,247	£5,908,730	I. £1,679,483

Receipts for the week were \$120,000 in bar silver from New York. Shipments were \$14,000 in bar silver to Bombay.

Indian exchange has been slightly firmer, notwithstanding the apparent abundance of money in India, and the Council bills offered in London were all taken at 16d. flat per rupee. Part of the latter demand is due to the placing of a new issue of rupee paper in India, which has been very largely subscribed for. Demand for silver in India continues very good.

The Treasury Department's estimate of the amount and kinds of money in the United States on August 1 is as follows:

	Total.	In Treasury.	In Circulation.
Gold coin (inc. bul. in Tr'y.)	\$1,342,422,740	\$197,445,631	\$644,112,980
Gold cts.	580,244,263	30,140,792	500,864,129
Silver dollars.	106,503,340	11,926,290	94,577,050
Silver cts.	12,653,000	102,234	12,550,766
Subsid silver.	346,681,016	15,001,782	331,679,234
Treasury Notes of 1890	450,206,888	17,505,015	432,701,873
U. S. Notes.			
Currency cts.			
Nat. Bk. Notes			
Total	\$2,818,711,247	\$272,121,744	\$2,546,589,503

Population of the United States August 1, 1904, estimated at 81,982,200; circulation per capita, \$31.06. For redemption of outstanding certificates an exact equivalent in amount of the appropriate kinds of money is held in the Treasury, and is not included in the account of money held as assets of the Government. This statement of money held in the Treasury as assets of the Government does not include deposits of public money in National Bank depositaries, to the credit of the Treasurer of the United States, and amounting to \$104,937,479. The amount in circulation shows an increase of \$25,437,976 over July 1, and of \$164,571,005 over that reported on August 1, 1903.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	\$0.40 1/2	\$0.47 1/2
Peruvian soles and Chinese pesos .....	.42	.44
Victoria sovereigns	4.86	4.87
Twenty francs	3.88	3.82
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

July, Aug.	Copper.				Tin.	Lead.	Spelter.	
	Lake, Cts. per lb.	Electrolytic, Cts. per lb.	Cathodes, Cts. per lb.	London, \$ per ton.			N. Y., Cts.	St. Louis, per lb. Oct.
28	12 3/4 @ 12 3/4	12 1/2 @ 12 1/2	12 @ 12 1/4	57	27	4.10	4.875	4.725
29	12 3/4 @ 12 3/4	12 1/2 @ 12 1/2	12 @ 12 1/4	57 1/2	27	4.10	4.875	4.725
30	12 3/4 @ 12 3/4	12 1/2 @ 12 1/2	12 @ 12 1/4	...	27 1/2	4.10	4.875	4.725
1	12 3/4 @ 12 3/4	12 1/2 @ 12 1/2	12 @ 12 1/4	...	27 1/2	4.10	4.875	4.725
2	12 3/4 @ 12 3/4	12 1/2 @ 12 1/2	12 @ 12 1/4	57	27 1/2	4.10	4.875	4.725
3	12 3/4 @ 12 3/4	12 1/2 @ 12 1/2	12 @ 12 1/4	56 3/4	27 1/2	4.10	4.875	4.725

London quotations are per long ton (2,240 lb.) 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 wire-bars.

SILVER AND STERLING EXCHANGE.

July	Silver.			Aug.	Silver.		
	Sterling Exchange.	New York, Cents.	London, Pence.		Sterling Exchange.	New York, Cents.	London, Pence.
28	4.87 1/2	58 3/4	267 1/2	1	4.87 1/2	58 3/4	267 1/2
29	4.87 1/2	58 3/4	267 1/2	2	4.87 1/2	58 3/4	267 1/2
30	4.87 1/2	58 3/4	267 1/2	3	4.87 1/2	58 3/4	267 1/2

New York quotations are for fine silver per ounce Troy. London prices are for sterling silver .925 fine.

Copper.—Again we have to report a very quiet market. Consumers in this country remain very apathetic, while abroad political complications have tended to restrict business. No copper has been pressed on the market by first hands, but second hands have been inclined to make concessions. The closing quo-

tations are given as 12 3/4 @ 12 1/2 for Lake; 12 1/4 @ 12 3/4 for electrolytic in ingots, cakes and wirebars, 12 @ 12 1/2 in cathodes; 12 @ 12 1/4 for casting copper.

The market for standard copper in London, which closed last week at £57 2s. 6d., opened on Tuesday at £57, and the closing quotations on Wednesday are cabled as £56 15s. @ £56 16s. 3d. for spot, £56 17s. 6d. @ £56 18s. 9d. for three months.

Statistics for the second half of July show an increase in the visible supplies of 2,200 tons.

Refined and manufactured sorts we quote: English tough, £60 @ £60 5s.; best selected, £61 @ £61 5s.; strong sheets, £69 10s. @ £70; India sheets, £67 10s. @ £68; yellow metal, 6 @ 6 1/2 d.

Exports of copper from New York and Baltimore for the week ending August 2 were 9,100 tons, principally to Germany and Great Britain. Imports at Baltimore for the week were 482 tons copper, while in the previous week New York received 69 tons.

Exports of copper in all forms from the United States for the six months ending June 30 are reported by the Bureau of Statistics of the Department of Commerce and Labor as below, the figures given here being in long tons of 2,240 lbs.:

	1903.	1904.	Changes.
Copper, bars, ingots, etc.	64,245	114,242	I. 49,997
Copper ores and matte.	5,984	9,005	I. 3,021

The increase in exports of bars, ingots, etc., this year was 77.8%. The report does not separate ores and matte; estimating their copper contents, chiefly on the basis of values, we find that the total exports from the United States, in all forms, for the six months were approximately equal to 117,024 long tons of fine copper.

Imports of copper and copper material into the United States for the six months ending June 30, with re-exports of foreign material, are reported by the Bureau of Statistics as follows, our figures being in long tons:

	1903.	1904.	Changes.
Fine copper: Imports	28,161	31,695	I. 3,534
Re-exports	1,016	107	D. 909

	1903.	1904.	Changes.
Net imports	27,145	31,588	I. 4,443
Ores and matte: Imports	121,167	132,877	I. 11,710
Re-exports	3,528	.....	D. 3,528
Net imports	117,639	132,877	I. 15,238

The copper contents of the ores and matte imported this year are stated at 7,362 long tons. This makes the total net imports, in all forms, this year equal to 38,950 tons of fine copper. Deducting this from the total exports given above, we find that we sent abroad in the six months 78,074 tons of copper more than we received.

Of the imports this year, Mexico is credited with 22,618 tons of fine copper and 31,286 tons ore and matte, containing 3,433 tons of copper—26,051 tons of metal in all. Canada and Newfoundland furnished 3,705 tons of copper and 92,392 tons of ore and matte, containing 3,661 tons of copper—7,366 tons of metal in all. These countries furnished 85.9% of the total imports this year.

Tin.—There has been a fair demand for early delivery, futures being rather neglected. Quotations have ruled steady at 27 @ 27 1/2.

The foreign market, which closed last week at £123, opened on Tuesday at £123 12s. 6d., and the closing quotations on Wednesday are cabled as £123 @ £123 2s. 6d. for spot, £123 7s. 6d. @ £123 10s. for three months.

Statistics for the month of July show an increase in the visible supplies of 500 tons.

Imports of tin into the United States for the six months ending June 30 were as follows, in long tons:

	1903.	1904.	Changes.
Straits	13,985	9,515	D. 3,470
Australia	132	135	I. 3
Great Britain	7,457	10,153	I. 2,696
Holland	584	363	D. 221
Other Europe	284	188	D. 96
Other countries	31	17	D. 14
Totals	21,473	20,371	D. 1,102

The decrease in imports was 5.4% this year. The larger part of the imports this year came through British and Dutch ports.

Lead.—Has ruled quiet but steady without any special feature. The ruling quotations are 4.10 New York, 4.02 1/2 St. Louis.

The foreign market is firm, Spanish lead being quoted at £11 13s. 9d., English lead £11 16s. 3d.

Imports of lead into the United States, in all forms, and re-exports of imported lead for the six months ending June 30 are given by the Bureau of Statistics as follows, the figures in our table being in short tons.

	1903.	1904.	Changes.
Lead, metallic	191	5,156	I. 4,965
Lead in ores and base bullion.....	52,229	50,537	D. 1,692
Total imports	52,420	55,693	I. 3,273
Re-exports	38,566	42,519	I. 3,953
Net imports	13,854	13,174	D. 680

In addition to the re-exports given above, there were 59 tons of domestic lead exported in 1903 and 166 tons in 1904, showing an increase of 107 tons. Of the lead imported this year 51,706 tons were from Mexico and 3,202 tons from Canada.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: Lead is quiet but firm, 4.02½c. being the current price for both Missouri brands and desilverized lead.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of July 16, that the price of silver during the week has been 14.75 reales per oz. Exchange is 34.87 pesetas to £1. Quotations are 67 reales per quintal, which, on current exchange, is equal to £10 15s. 1d. per long ton, f. o. b. Cartagena. Exports were 509,312 kg. pig lead to Marseilles.

Spelter.—Has ruled quiet but steady throughout the week, without any special feature. There has been a fair consumptive demand. Quotations are unchanged at 4.72½ St. Louis, 4.87½ New York.

The foreign market is firm, good ordinaries being quoted at £22 2s. 6d., specials £22 7s. 6d.

Exports of spelter, or metallic zinc, from the United States for the six months ending June 30 were 1,128 short tons in 1903 and 1,323 tons in 1904; showing an increase of 195 tons this year. Exports of zinc ore were 20,819 tons in 1903 and 14,541 tons in 1904; showing a decrease of 6,278 tons this year.

St. Louis Spelter Market.—The John Wahl Commission Company telegraphs us as follows: Spelter is dull, with little business. Latest sales are on a basis of 4.72½@4.75c. East St. Louis.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of July 16, that the demand for ore continues very good, and prices are firm at 67 fr. for blende, 35% zinc, and 47 fr. for calamine, 30%. Production is increasing, and several new plants for washing and concentrating ores are being put up. Shipments were 1,300 tons blende to Swansea.

Antimony is dull. We quote Cookson's at 7 @7½; Hallett's, 6½@6¾; U. S., Italian, French, Hungarian, Japanese and Chinese, 6@6½c.

Imports of antimony, in all forms, into the United States for the six months ending June 30 are reported as follows, in pounds:

	1903.	1904.	Changes.
Metal and regulus.....	3,236,846	3,184,395	D. 52,451
Antimony ore	1,765,068	1,402,680	D. 362,388

This shows a decrease this year of 1.6% in metal and 20.5% in ore imported.

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

Exports of nickel, nickel oxide and nickel matte from the United States for the six months ending June 30 were 1,188,393 lb. in 1903, and 2,235,665 lb. in 1904; showing an increase of 1,047,272 lb. this year. The imports of nickel ore and matte for the month of June this year were 492 tons. Last year these imports were not reported separately.

Platinum.—Quotations are nominally \$18.50 per ounce, but the tendency is upward, and higher prices are expected.

Platinum in manufactured forms is very firm. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 77c.; crucibles and dishes, 80c.; perforated ware, like cones, etc., 85c. per gram.

Imports of platinum into the United States for the six months ending June 30 were 4,512 lb. in 1903 and 3,499 lbs. in 1904; showing a decrease of 1,013 lb. this year.

Quicksilver.—Prices are unchanged. In New York large lots have been offered at \$43.50 per flask, with \$44.50 quoted for smaller orders. The San Francisco price continues \$43@44 for domestic business, but as low as \$41.50@42 has been offered for export. The London prices is £7 17s. 6d., with the same quotation from second hands.

Exports of quicksilver from the United States for the six months ending June 30 were 728,010 lb. in 1903, and 937,116 lb. in 1904; showing an increase of 209,106 lb. this year.

Minor Metals and Alloys.—Thallium is quoted at 60@65 marks per kg. at Breslau, Germany. Manganese metal is quoted 360 marks per 100 kg., f. o. b. Bremen, Germany. Manganese tin alloy, 55%, is quoted 365 marks per 100 kg. for first quality and 225 marks for second quality, both f. o. b. Bremen.

For other minor details and their alloys, wholesale prices, f. o. b. works, are as follows:

	Per 10	Per lb
No. 1. 99% ingots.....	33@37c.	Ferro-chromium (74%).....12½c.
No. 2. 90% ingots.....	31@34c.	Ferro-Tungsten (37%).....45c.
Rolled Sheets.....	4c. up	Magnesium, pure (N. Y.).....60c.
Alum-bronze.....	30@35c.	Manganese.....\$2.75
Nickel-alum.....	33@36c.	Mangan'e Cop. (20% Mn).....32c.
Bismuth.....	\$2.10	Mangan'e Cop. (30% Mn).....38c.
Chromium, pure (N. Y.).....	80c.	Molybdenum (Best).....\$1.70
Copper, red oxide.....	50c.	Phosphorus, foreign.....45c.
Ferro-Molybde'm (50%).....	\$1.00	Phosphorus, American.....70c.
Ferro-Titanium (10%).....	90c.	Sodium metal.....50c.
Ferro-Titanium (20@25%).....	55c.	Tungsten (Best).....\$1.25

Missouri Ore Market. July 30.

(From Our Special Correspondent.)

While the highest price was \$41, only \$1 per ton higher than the previous week, the assay basis price on medium and lower grade ores advanced from \$3 to \$5 per ton, owing to the extraordinary sharp competition for the limited output of the mines. Smelters who are holding back on purchases at the time the restriction movement was inaugurated, finding it imperative to increase their supply, were forced into the market with the minimum of reserve stock and an almost maximum demand, and the supply curtailed by too much water. It is thought in another week or two that all the mines will be again unwatered, and that the output will recoup to a possible 4,800 to 5,200 tons per week. Even then, with the new smelters in the field for the product of the Missouri mines, the output will barely meet the urgent demands of the capacity of all the works drawing a supply from this district. The assay basis was very elastic during the week, ranging from \$37 to \$39 per ton of 60% zinc. Lead dropped \$2 per ton, following the cut in pig lead by the American Smelting & Refining Co.

Following are the sales for the week:

	Zinc, lb.	Lead, lb.	Value.
Joplin	2,167,210	330,910	\$49,780
Webb City-Carterville.....	2,078,090	310,810	43,405
Galena-Empire	1,044,800	102,460	20,425
Duenweg	778,930	180,490	19,100
Prosperity	450,860	90,510	10,690
Alba-Neck	554,540	.....	9,260
Aurora	674,980	9,850	7,115
Carthage	259,880	.....	4,935
Grauby	302,920	32,000	4,335
Zincite	186,800	.....	3,550
Oronogo	179,180	8,010	3,155
Badger	143,170	.....	2,865
Baxter	104,920	1,870	1,490
Sherwood	88,250	8,260	1,810
Mitchell	62,250	.....	1,185
Spurgeon-Spring City.....	82,920	10,720	1,045
Beef Branch	64,440	10,650	855
Reeds	53,570	.....	960
McDowell	39,610	.....	670
Raymond	41,080	.....	500
Totals	9,358,670	1,096,540	187,130
Previous week	8,555,420	1,016,450	170,265

30 weeks this year.....	307,233,230	38,363,460	\$6,126,595
30 weeks last year.....	292,752,000	34,910,190	5,952,505
Zinc value the week.....	\$158,750;	30 weeks, \$5,069,085.	
Lead value the week.....	28,300;	30 weeks, 1,057,430.	

Unless the price of spelter advances soon some smelting company is pretty sure to sustain a very heavy loss paying present zinc prices, if forced to sell on present metal prices, as there must be some loss, especially for the coal smelters and the gas smelters that must buy gas.

Average Prices of Metals per lb., New York.

Mo.	Tin.		Lead.		Spelter.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan...	28.33	28.845	4.075	4.347	4.865	4.868
Feb...	29.43	28.087	4.075	4.375	5.043	4.916
Mar...	30.15	28.117	4.442	4.475	5.349	5.067
April...	29.81	28.132	4.567	4.475	5.550	5.219
May...	29.51	27.718	4.325	4.423	5.639	5.061
June...	28.34	26.325	4.210	4.196	5.697	4.760
July...	27.68	26.573	4.075	4.192	5.062	4.873
Aug...	28.29	.....	4.075	.....	5.725	.....
Sept...	26.77	.....	4.243	.....	5.686	.....
Oct...	25.92	.....	4.375	.....	5.510	.....
Nov...	25.42	.....	4.218	.....	5.338	.....
Dec...	27.41	.....	4.162	.....	4.731	.....
Year	28.09	.....	4.237	.....	5.400	.....

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673c. per lb.; February, 4.717c.; March, 4.841c.; April, 5.038c.; May, 4.853c.; June, 4.596c.; July, 4.723c.

Average Prices of Copper.

Mo.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan...	12.159	12.410	12.361	12.553	53.52	57.55
Feb...	12.778	12.063	12.901	12.245	57.34	56.37
Mar...	14.416	12.299	14.572	12.551	63.85	57.821
April...	14.454	12.923	14.642	13.130	61.72	58.247
May...	14.435	12.758	14.618	13.000	61.73	57.321
June...	13.942	12.269	14.212	12.399	57.30	54.398
July...	13.094	12.380	13.341	12.505	58.64	57.256
Aug...	12.962	.....	13.159	.....	58.44	.....
Sept...	13.305	.....	13.345	.....	56.82	.....
Oct...	12.801	.....	12.954	.....	55.60	.....
Nov...	12.617	.....	12.813	.....	56.30	.....
Dec...	11.952	.....	12.094	.....	56.36	.....
Year	13.235	.....	13.417	.....	57.97	.....

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.

Mo.	1902.		1903.		1904.	
	London, Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.
Jan...	25.62	55.56	21.98	47.57	26.423	57.065
Feb...	25.41	55.09	22.11	47.80	26.665	57.592
Mar...	25.00	54.23	22.49	48.72	26.164	56.741
April...	24.34	52.72	23.38	50.56	24.974	54.292
May...	23.71	51.31	24.89	54.11	25.578	55.430
June...	24.17	52.36	24.29	52.86	25.044	55.673
July...	24.38	52.88	24.86	53.92	26.760	58.095
Aug...	24.23	52.52	25.69	55.36	.....	.....
Sept...	26.88	51.52	26.75	58.00	.....	.....
Oct...	23.40	50.57	27.89	60.36	.....	.....
Nov...	22.70	49.07	27.01	58.11	.....	.....
Dec...	22.21	48.03	25.73	55.375	.....	.....
Year	24.09	52.16	24.75	53.57	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Company	Latest Dividend			Total to date.
	Payable.	Rate.	Total.	
†Amaigam'td Copper.....	Aug. 29	.50	\$769,430	\$25,042,697
Cambria Steel	Aug. 15	.75	675,000	7,800,000
Camp Bird, Colo.	Aug. 6	.18	147,600	1,607,304
Esperanza, Mex.	Aug. 12	.12	54,600	1,322,549
*Imperial Oil, Cal.	Aug. 6	.20	20,000	660,000
*Jeff. & C. C.&L. pf.	Aug. 15	2.50	37,500	675,500
Jeff. & Clearf., com.	Aug. 15	5.00	75,000	255,000
†National Carbon, pf.	Aug. 15	1.75	78,750	1,811,250
Quincy, Mich.	Aug. 25	2.50	250,000	14,620,000
Thirty-three Oil, Cal.	Aug. 6	.10	10,000	320,000
†U. S. Steel Cor., pf.	Aug. 30	1.75	6,304,919	111,792,816

*Monthly. †Quarterly.

ASSESSMENTS.

Company.	Delinquent.	Sale.	Amount.
Allouez, Mich.	Sept. 26	.....	\$1.50
Best & Belcher, Nev.	Aug. 19	Sept. 8	.10
Caledonia, Nev.	Aug. 31	Sept. 21	.15
Con. Imperial, Nev.	Aug. 10	Sept. 6	.01
Crusader Con., Utah.	July 27	Aug. 25	.00½
Gachupines, Mex.	Aug. 15	.....	.01½
Gould & Curry, Nev.	Aug. 12	Aug. 30	.10
Julia Con., Nev.	Aug. 11	Sept. 1	.03
Little Chief, Utah.	July 28	Aug. 16	.01
Middle Yuba, Cal.	Aug. 23	.....	.01
Overman, Nev.	Aug. 23	Sept. 12	.10
Silver Shield, Utah.	Aug. 24	Sept. 12	.03
Solden, Cal.	Aug. 24	.....	.06
Union Con., Nev.	Aug. 23	Sept. 12	.10
Wabash, Utah.	July 22	Aug. 15	.05

STOCK QUOTATIONS

Table with columns: Company, Par val., July 27, July 28, July 29, July 30, Aug. 1, Aug. 2, Sales. Lists various companies like Amalgamated, Anaconda, Best & Belcher, etc.

Table with columns: Company, Par val., July 27, July 28, July 29, July 30, Aug. 1, Aug. 2, Sales. Lists various companies like Adventure Con., Allouez, Amalgamated, etc.

COAL, IRON AND INDUSTRIAL STOCKS.

Table with columns: Company, Par val., July 27, July 28, July 29, July 30, Aug. 1, Aug. 2, Sales. Lists companies like Ailsa-Chalmers, Am. Agr. Chem., etc.

COLORADO SPRINGS, COLO.

Table with columns: Company, Par val., July 23, July 25, July 26, July 27, July 28, July 29, Sales. Lists companies like Acaia, Anaconda, Cole, City & M., etc.

SAN FRANCISCO.

Table with columns: Company, Location, July 21, July 22, July 23, July 25, July 26, July 27, Sales. Lists companies like Golden Anchor, MacNamara, etc.

SAN FRANCISCO (By Telegraph).

Table with columns: Company, August 1, August 2. Lists companies like Belcher, Best & Belcher, Caledonia, etc.

COLORADO SPRINGS (By Telegraph).

Table with columns: Company, Aug. 1, Aug. 2. Lists companies like Anaconda, Jack Pot, Cripple Ck Con., etc.

PHILADELPHIA, PA

Table with columns: Company, Par val., July 27, July 28, July 29, July 30, Aug. 1, Aug. 2, Sales. Lists companies like Am. Cement, Cambria Iron, etc.

STOCK QUOTATIONS

ST. LOUIS, MO.*

July 30

Company	Par Val.	Prices.		Company	Par Val.	Prices.	
		Bid.	Ask.			Bid.	Ask.
Am.-Nettie, Colo....	\$10	\$0.15	\$0.25	Columbia Lead, Mo.	\$10	\$2.00	\$3.00
Catherine Lead, Mo.	10	1.00	1.50	Con. Coal, Ill.....	100	16.00	18.00
Central Coal & C....	100	61.25	62.25	Doe Run Lead, Mo.	100	110.00	115.00
Central C. & C., pf..	100	70.50	72.00	Granite Bimet, Mt..	10	.38	.50
Central Lead, Mo....	100	110.00	115.00	St. Joe Lead, Mo....	10	14.50	15.00

*By our Special Correspondent.

SALT LAKE CITY.*

July 30.

Company	Par Val.	High	Low	Sales.	Company	Par Val.	High	Low	Sales.
Ajax.....					May Day.....	1/4	1 1/2	1 1/4	4,400
Butler Liberal.....	1	8 1/2	8 1/2	11,200	N. Y. Bonanza.....	1	2 1/4	2 1/4	23,500
Carra.....	1	5	5 1/2	2,000	Naildriver.....	5	10 1/2	10 1/2	7,600
Century.....	1	48 1/2	47 1/2	1,700	Sacramento.....				
Con. Mercur.....	5				Silver King.....				
Daly.....	2.20	2.10		300	Silver Shield.....		2 1/2	1 3/4	2,500
Daly Judge.....	20	2.25	4.10	385	Star Con.....	1	11 1/2	10 1/2	2,000
Daly West.....	1	15.75	13.00	1,170	Swansea.....				
Grand Central.....	1				Tetro.....	1	3 1/2	2 1/2	7,050
Joe Bowers.....		1/2	3/4	3,000	Uncle Sam, Con.....	1	16 1/2	16 1/2	1,000
La Retne.....	1	1 1/4	1 1/2	12,500	Victor Con.....				
Little Chief.....	1	14	14	200	Yaukey Con.....				
L. Mammoth.....					Wabash.....				

*By our Special Correspondent. All mines are in Utah. Total sales, 80,105 shares.

MONTREAL.*

July 29.

Company	Par Val.	Quotations	Sales	Company	Par Val.	Quotations	Sales
		High Low				High Low	
Doniphan Coal.....	100	45.00 42.00	295	Montreal Steel.....	100	40.00 35.00	
Dom. Coal, Pf.....	100			Mont'l Steel, Pf.....	100	100.00 75.00	
Dom. I. & St. Pf.....	100	8.8 1/2 8.50	135	Nova Scotia St.....	100	63.50 50.75	2,500
Dom. I. & St. Pf.....	100	30.00 27.75	95	N. S. Steel, Pf.....	100	112.00	15
Internat'l Coal.....	100	100.00		Ogilvie, Pf.....	100		
Int'l Coal, Pf.....	100	100.00					

*Montreal Stock Exchange.

Total sales, 3,101 shares.

DULUTH, MINN.

July 23

Company	Par Val.	Bid.	Asked.	Company	Par Val.	Bid.	Asked.
Calumet & Arizona.....	\$10	\$38	\$100	Lake Sup. & Pitts.....	\$10	\$30.50	\$31.00
Calumet & Bisbee.....	10	1.50	2.00	Pitts. & Duluth Dev.....	15	30.50	31.00
Calumet & Cobise.....	10	2.00	3.00	Shakespeare.....	10		20
Calumet & Pitsburg.....	10	28.50	29.00	United Mexican.....	10		50
Higgins Development.....	10		60	Wolverine & Arizona.....	10		3.50
Junction Development.....	15	14.00	18.00	Yaqui.....	10		1.00

MEXICO.*

July 22.

Company.	Shares Issued.	Prices, Mex.		Company.	Shares Issued.	Prices, Mex.	
		Bid.	Ask.			Bid.	Ask.
Durango:				Trompillo.....	1,200	\$1,800	\$1,850
Ca. Min. de Penoles..	2,500	\$2,700	\$3,200	San Rafael y An., aviadora.....	1,200	710	730
San Andres de la Sierra	200	10,000		Soledad, aviadora.....	670	770	780
Guanajuato:				Sorpresa, aviadora.....	900	285	300
Angustias, Pozos.....	2,400	38	43	Mexico:			
Cinco Senores y An., aviadoras.....	2,000	38	42	Alacran.....	2,400	20	28
Cinco Senores y An., aviadora.....	400	38	42	Aldebarren.....	2,000	38	43
Providencia, San Juan de la Luz.....	6,000	55	60	Buen Despacho.....	3,000	60	85
Queensland y Australia	300	10	15	Dos Estrellas.....	3,000	1,900	1,930
Guerrero:				La Esperanza (El Oro.....	3,000	1,500	1,500
Delina, 1st serie.....	2,500	33	40	La Reforma, aviadores.....	2,000	28	32
Delina, 2nd serie.....	2,500	25	30	Santa Ana, Esperanza.....	2,400	60	80
Garduno y Anexas.....	7,200	35	40	Michoacan:			
Hidalgo:				Luz de Borda, aviadora.....	3,000	15	23
Amistad y Concordia	9,900	78	80	Luz de Borda, aviado.....	1,000	8	17
Garmen, aviadora.....	1,100	85	95	Santiago y An., Tlal.....	4,000	7	19
Guadalupe Fresnillo Mill.....	1,000	170	200	Nuevo Leon:			
Guadalupe Fresnillo Mine.....	1,400	70	80	La Fraternal.....	1,000	580	620
La Reina y An., aviadora.....	5,600	21 1/2	5	Norias de Bajan.....	1,000	880	920
Luz de Maravillas, aviadoras.....	1,100		20	San Luis Potosi:			
Maravillas y An., aviador.....	1,080	110	150	Concepcion y An.....	3,000	60	65
Maravillas y Lobo.....	1,000	130	180	El Barreno, aviadora.....	2,000	78	80
Palma y An., aviador.....	1,800	4	8	Sta. Maria de la Paz.....	9,900	184	185
Refugio, aviadora.....	12,800	680	740	San Diego y Anexas.....	2,400	7	10
Santa Anay An., aviadora.....	60	50	70	Zacatecas:			
Santa Anay An., aviadora.....	800	25	35	Asturiana y An.....	2,500	20	30
Sta. Gertrudis y An., aviadoras.....	9,600	13 1/2	15	Candelaria y Pinos.....	2,500	12	20
Sta. Gertrudis y An., aviadora.....	28,800	78	80	Esperanza y An.....	2,400	6	8
Santo Tomas Apostel aviadoras.....	5,100	2	3	Lourdes.....	2,500	21	25
San Felipe de Jesus, aviadora.....	3,600	15	17	Luz de Minillas, aviadoras.....	2,000		
San Felipe de Jesus, aviadora.....	1,200	3	5	Nueva Quebradilla, aviadoras.....	2,400	25	40
San Rafael y An.....				Nueva Quebradilla, aviadas.....	600	30	50
				San Carlos y Anexas.....	2,500	50	60
				Sta. Maria de Gand.....	2,500	110	
				Miscellaneous:			
				Bartolome de Medina Nava, Chiuhautla.....	2,000	97	100
				Natividad, Oaxaca aviadora.....	1,800	950	13,000
				San Francisco Hac.....	6,000	80	
				Union Hacienda.....	3,000	290	

* Figures represent Mexican currency.

LONDON.

July 22.

Company.	Shares Issued.	Par value.	Latest dividend.		Quotations.	
			Amt.	Date.	Buyers.	Sellers.
American:						
Alaska-Treadwell.....	200,000	£. s. d.	s. d.	July, 1904	£ s. d.	£ s. d.
Anaconda.....	1,200,000	5 0 0	2 0	May, 1904	3 13 9	3 16 3
Camp Bird.....	820,000	1 0 0	9	Aug., 1904	1 6 3	1 8 9
Copiapu.....	112,500	2 0 0	6 10	May, 1903	17 6 1	2 6 6
De Lamar.....	80,000	1 0 0	1 6	May, 1904	12 6	15 0
El Oro.....	1,080,000	1 0 0	9	July, 1904	1 2 6	1 5 0
Esperanza.....	455,000	1 0 0	6	Aug., 1904		
Frontino & Bolivia.....	128,000	1 0 0	3 0	July, 1901	7 6	10 0
Le Rol.....	200,000	5 0 0	5 0	Nov., 1899	13 9	16 3
Palmarco & Mexican Standard.....	120,000	5 0 0	1 0	June, 1904	13 9	16 3
Stratton Independence.....	445,000	1 0 0	4 0	Sept., 1903	2 6	3 6
*St. John del Rey.....	1,000,007	1 0 0	6	Dec., 1903	2 0	2 6
Tomboy.....	546,265	1 0 0	6	Dec., 1903	9 6	10 6
Ympir.....	300,000	1 0 0	1 0	June, 1902	1 5 0	1 10 0
European:						
Linares.....	200,000	1 0 0	1 0	Mar., 1902	2 6	5 0
Mason & Barry.....	15,000	3 0 0	5 0	Apr., 1904	3 0 0	3 10 0
Rio Tinto.....	185,172	1 0 0	7 0	May, 1904	2 15 0	3 0 0
Rio Tinto, preferred.....	325,000	5 0 0	37 6	May, 1904	53 2 6	53 7 6
West Australian:						
Associated.....	325,000	5 0 0	2 6	May, 1904	6 0 0	6 5 0
Cosmopolitan.....	625,000	2 0 0	7 0	May, 1904	4 2 6	4 7 6
Great Boulder.....	495,388	1 0 0	2 6	July, 1904	2 3 9	2 6 3
Great Boulder Persever'ce.....	1,000,000	1 0 0	6 0	Aug., 1904	7 0 0	7 2 6
Great Fingall.....	1,750,000	2 0 0	1 0	June, 1904	1 3 6	1 4 0
Ivanhoe.....	1,400,007	1 0 0	1 3	May, 1904	10 9	11 3
Kalbarli.....	250,000	1 0 0	7 0	July, 1904	7 11 3	7 13 9
Lake View.....	200,000	5 0 0	5 0	July, 1904	7 11 3	7 13 9
Oroya-Brownhill.....	120,000	1 0 0	2 6	July, 1904	5 6 3	5 8 9
Miscellaneous:						
Brilliant Central.....	250,000	1 0 0	3 0	Aug., 1902	1 2 6	1 5 0
Briseis.....	450,000	1 0 0	3 0	June, 1904	3 6 3	3 7 6
Broken Hill.....	100,000	1 0 0	1 0	July, 1904	2 15 0	3 0 0
Broken Hill.....	600,000	1 0 0	8 0	Aug., 1904	8 0	8 6
Broken Hill.....	960,000	8 0	1 0	May, 1904	1 18 0	1 19 0
Broken Hill.....	275,000	3 0 0	1 3	June, 1904	12 6	13 9
Broken Hill.....	1,000,000	1 0 0	3	July, 1904	2 5 0	2 7 6
Broken Hill.....	497,412	1 0 0	4 6	June, 1904	5 8 9	5 11 3
Indian:						
Champion Reef.....	513,832	10 0	1 3	May, 1904	1 11 0	1 12 6
Mysore.....	568,043	10 0	4 6	July, 1904	6 8 9	0 11 3
Nundydroog.....	484,000	10 0	1 3	July, 1904	1 11 3	1 12 6
Oreogum.....	343,000	10 0	1 3	Aug., 1904	1 17 6	1 18 9
Oreogum, pf'd.....	240,000	10 0	4	Aug., 1904	1 8 9	1 11 3
South African:						
Angelo.....	600,000	1 0 0	7 0	Aug., 1904	6 15 0	7 0 0
Bonanza.....	200,000	1 0 0	8 0	Aug., 1904	1 5 0	1 7 6
British South Africa.....	4,436,019	1 0 0	rts.	May, 1899	1 6 6	1 7 7
Cape Copper.....	300,000	2 0 0	2 6	July, 1904	3 2 6	3 7 6
Cape Copper, ptd.....	75,000	2 0 0	2 6	July, 1904	3 0 0	3 5 0
City & Suburban.....	340,000	4 0 0	4 0	Aug., 1904	6 2 6	6 7 6
City & Suburban.....	2,000,000	1 0 0	1 0	Aug., 1904	14 5 0	14 15 0
Crown Reef.....	120,000	1 0 0	6 0	Aug., 1904	18 10 0	18 12 6
De Beers, preferred.....	800,000	2 10 0	10 0	July, 1904	18 13 9	18 15 3
De Beers, deferred.....	1,000,000	2 10 0	12 6	July, 1904	7 10 0	7 11 3
East Rand.....	900,000	1 0 0	5 0	July, 1903	20 10 0	21 0 0
Ferreira.....	90,000	1 0 0	22 6	Aug., 1904	5 6 3	5 8 9
Geldenhuis.....	200,000	1 0 0	7 0	Aug., 1904	5 17 0	6 0 0
Goldfields.....	400,000	1 0 0	8 0	Aug., 1904	8 5	

DIVIDENDS.

GOLD, SILVER, COPPER, LEAD, QUICKSILVER AND ZINC COMPANIES.—UNITED STATES.

Table listing dividends for Gold, Silver, Copper, Lead, Quicksilver and Zinc companies in the United States. Columns include Name and Location of Company, Authorized Capital, Shares (Issued, Par Val, Paid in 1904, Total to Date), and Dividends (Latest Date, Amt.).

COAL, IRON AND OTHER INDUSTRIALS.

Table listing dividends for Coal, Iron and other industrial companies. Columns include Name and Location of Company, Authorized Capital, Shares (Issued, Par Val, Paid in 1904, Total to Date), and Dividends (Latest Date, 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, Shares (Issued, Par Val, Paid in 1904, Total to Date), and Dividends (Latest Date, Amt.).

NOTE.—These dividends are published gratuitously. Readers are invited to send any additions or corrections which they think necessary to complete our list.