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Utah follows Montana in its output of silver. South Dakota, Nevada and Idaho also exhibit a healthy activity.

MINING IN THE State of Victoria, Australia, is doing fairly well, especially in the Bendigo district, although share speculation is very dull, the public being shy of the exchanges. Bendigo produced 118,822 crude ounces of gold for the first seven months of 1903, an amount 15,060 oz. in excess of that for the same period in 1902, and the highest since 1899. The leaders among the dividend-paying mines are not the same as during former periods, because, by reason of the absence of working capital and the hand-to-mouth policy of the companies operating in that famous region, a mine pays dividends one year and levies an assessment in the next. If Bendigo were developed on modern lines it would be one of the best districts for investment mining; at present it affords interesting examples of speculation in small sums of money, with all the vicissitudes attendant on such a method.

THE COMPLETION OF the new El Paso Drainage Tunnel at Cripple Creek has been delayed by the strike, but this important adit is now an accomplished fact. The portal of the adit is at the confluence of Cripple Creek and Requa Gulch, running northeast to the 600-ft. level of the El Paso mine. The elevation of the portal is 8,790 ft. above sea level; the grade is 1 to 370; the length is 4,212 ft. in straight line to connect with the southwest breast of the 600-ft. level of the El Paso mine. Two intermediate shafts were sunk to expedite the work. Actual construction was begun about February 1, 1903. The contract required completion by August 25, and it would have been fulfilled earlier had not a miners' strike intervened.

The plan is to continue this adit for the drainage of the other mines which are contributing to its construction and to make use of the drifts of the 600-ft. level of the El Paso mine from the 4,212-ft. point to the northeastern end of the old workings of that property; thence the line will run easterly to the Elkton mine. Work on this heading was begun several months since, and was continued until the gradually increasing flow of water made it desirable to bulkhead the drift until the outlet end is completed.

When these drainage works are carried out the district should put on new life, for a serious burden will be lifted from many productive mines, which have been handicapped by excessive water. The adit does credit to the good sense of the mine-owners who co-operated to carry it out.

ORE SHIPMENTS from the Lake iron region, including Escanaba as well as the Lake Superior ports, for the month of August, were the heaviest ever reported in one month in the history of the trade. The total for the month was 4,104,211 long tons, being an increase of 25,900 tons over the very heavy shipments of August, 1902. Notwithstanding this, and the fact that the July shipments were also very large, the movement for the present year has fallen somewhat behind that of last season. The total from all the

COLORADO IS GOING through much the same experience as that of a few years ago when the miners at Leadville went on strike, or the earlier disorders which marked the Populist régime of old Governor Waite; but, fortunately, the present governor is a business man with a level head, so that the results are not likely to be as bad as heretofore. As usual, the restlessness of a gang of labor delegates and agitators is fed by a press whose vaporings have not even the excuse of ignorance, being conducted by politicians who are well aware of the inflammable material with which they play in their efforts to pose as leaders of the workmen. The community is, however, better able to appraise the insincerity of their rhetorical confectionery and, in Denver particularly, the outrages on public sentiment have led to the formation of a Citizens' Alliance, which appears

to be doing its best to circumvent the group of agitators who have done so much to hurt the good name of the great mining regions of Colorado.

THE DIRECTOR of the Mint has published revised statistics which show that the United States produced \$80,000,000 of gold during 1902 and 55,500,000 ounces of silver, having a commercial value of \$29,415,000. Colorado is first in both gold and silver production, having yielded \$28,468,700 of the yellow metal and 15,676,000 ounces of the white metal, the latter being valued at \$8,308,280. California is a good second as a gold producer, with \$16,792,100, while Montana comes close to Colorado, as regards silver, with an output of 13,243,800 ounces, valued at \$7,019,214. Alaska has won the third place, ranking next to California, as a gold mining region, while

ports, up to September 1 of this year, was 16,429,854 tons; while for the corresponding period in 1902 it was 17,051,530 tons, showing this year a decrease of 621,676 tons or 3.6 per cent. It is now doubtful whether the shortage can be made up during the navigation season, although much depends, of course, upon the early, or late, closing of navigation. The shipments from the Mesabi Range, as well as those from the Vermilion, have held out well this year, Duluth and Two Harbors showing a gain in tonnage; but Ashland, Gladstone and Marquette have fallen somewhat behind. The port of Escanaba, however, shows some increase in its shipments.

Notwithstanding the large movement of ore in July and August, there has been very little shipment by wild tonnage. The regular contract vessels have been able to move nearly all the ore required. This is partly due to the fact that, since the first month of the season, there has been very little delay at the docks. Shipments have been made promptly, and those vessels which went up light have been able to put in a large number of trips. The only serious delays have been to boats, which undertook to carry return cargoes of coal from the Lake Erie ports.

COAL AND COKE PRODUCTION IN 1902.

The statistics compiled for Vol. XI. of "The Mineral Industry" show that the coal production of the United States in 1902 reached the great total of 299,823,254 short tons, an increase of over 2 per cent over the record-breaking output of 1901, in spite of the anthracite miners' strike in Pennsylvania, which reduced that State's output of anthracite fully 27,000,000 tons. How much of the great increase of 32,612,107 tons in the bituminous tonnage was due to the urgent demand caused by the shortage of anthracite cannot be determined. Probably, however, owing to the great industrial prosperity and the extraordinary demands on railroads which use in the aggregate an immense amount of coal, the bituminous production would not have been much less than it was, had the output of anthracite been normal.

It will be seen that there were no changes of rank among the leading coal-producing States, which are, in order, Pennsylvania, Illinois, Ohio and West Virginia. It is noteworthy that Ohio, the fourth in the list, now produces nearly as much coal as France.

The figures of production have been compiled from returns made by State mining officials, railroad freight agents and individual mining companies, to whom thanks are due for their co-operation and courtesy.

Exception may be taken to the prices per ton given in the table, but in this connection it is important to remember that the figures are for coal at

The collection of the figures of coke production is even more difficult than for coal, largely because coke, being a blast furnace fuel, a number of large iron companies have coke-oven plants and use the output as needed, shipping little or none. In such cases the price of coke is a matter of bookkeeping. The quoted market prices of coke were much higher in 1902 than in 1901, but it is probably safe to say

TOTAL PRODUCTION OF COAL IN THE UNITED STATES. (IN TONS OF 2,000 LB.)

States.	1901.			1902.		
	Tons.	Value at Mine.		Tons.	Value at Mine.	
		Total.	Per Ton.		Total.	Per Ton.
Bituminous:						
Alabama.....	9,099,062	\$10,000,892	\$1.10	10,329,479	\$12,498,669	\$1.21
Arkansas.....	1,816,136	2,068,613	1.14	2,125,700	2,338,270	1.10
California.....	151,079	394,106	2.61	88,460	248,622	2.81
Colorado (e).....	5,635,455	6,246,151	1.11	7,455,156	8,349,768	1.12
Georgia.....	354,825	426,685	1.20	e 375,900	450,900	1.20
Illinois.....	27,331,552	28,163,937	1.03	30,931,300	28,289,485	0.94
Indiana.....	6,918,225	7,016,143	1.01	8,900,000	7,885,000	0.85
Indian Territory.....	2,421,781	3,915,268	1.62	2,741,797	4,386,875	1.60
Iowa.....	5,617,499	7,822,605	1.39	5,407,144	7,908,004	1.46
Kansas.....	4,900,528	5,991,599	1.22	5,229,767	7,321,674	1.40
Kentucky.....	5,469,986	5,213,076	0.95	6,429,419	6,107,948	0.95
Maryland.....	5,113,127	5,046,491	0.99	5,525,785	6,225,639	1.13
Michigan.....	1,241,241	1,753,064	1.24	869,228	1,173,458	1.35
Missouri.....	3,802,088	4,707,164	1.24	4,067,166	5,324,788	1.31
Montana.....	1,396,081	2,009,316	1.44	1,707,109	2,389,953	1.40
New Mexico (d).....	1,084,257	1,540,357	1.42	1,090,373	1,537,426	1.41
North Dakota (b).....	166,601	214,151	1.29	296,800	371,000	1.25
Ohio.....	20,943,807	20,928,158	1.00	23,229,267	24,843,608	1.08
Oregon.....	69,011	173,646	2.52	e 60,000	150,000	2.50
Pennsylvania.....	82,305,946	81,337,586	0.99	96,946,203	106,861,899	1.08
Tennessee.....	3,633,290	4,067,339	1.12	4,252,552	5,278,921	1.25
Texas (c).....	1,107,953	1,907,024	1.72	e 850,000	1,300,000	1.60
Utah.....	1,322,614	1,666,082	1.26	1,641,436	2,068,200	1.26
Virginia.....	2,725,873	2,353,989	0.86	3,070,104	3,223,609	1.05
Washington (d).....	2,578,217	4,271,076	1.66	2,690,789	5,300,854	1.97
West Virginia.....	24,068,402	20,848,184	0.87	26,162,173	27,208,660	1.04
Wyoming.....	4,485,374	6,060,462	1.33	4,730,000	6,472,000	1.35
Total bituminous } Sh. tons.....	225,759,980	\$236,305,214	\$1.05	258,371,987	\$285,574,339	\$1.11
} Met. tons.....	204,808,110	.....	1.15	234,389,529	.....	1.23
Cannel:						
Kentucky.....	(g)	.....	.....	(g)	.....	.....
} Met. tons.....	(g)	.....	.....	(g)	.....	.....
Anthracite:						
Colorado.....	64,580	\$193,740	\$3.00	67,767	\$203,301	\$3.00
New Mexico.....	2,236	6,295	2.75	42,571	117,070	2.75
Pennsylvania.....	67,471,667	112,504,020	1.67	41,340,329	82,681,858	(f) 2.00
Total anthracite. } Sh. tons.....	67,538,536	\$112,704,055	\$1.67	41,451,267	\$83,002,229	\$2.00
} Met. tons.....	61,270,558	.....	1.84	37,604,343	.....	2.20
Grand total coal. } Sh. tons.....	293,298,516	\$349,009,269	\$1.19	299,823,254	\$368,576,568	\$1.23
} Met. tons.....	266,078,668	.....	1.31	271,907,872	.....	1.35

(a) Fiscal year. (b) All lignite. (c) One-third lignite. (d) One-half lignite. (e) Estimated. (f) Estimated; owing to the protracted strike in the Pennsylvania anthracite region and the abnormal conditions which resulted in the trade, the value of anthracite at the mine can be fixed only approximately. (g) Included in bituminous.

the mines, and the connection between average mine and market prices is not always close. For instance, retail selling prices of anthracite soared during the strike, but as practically all anthracite mines were closed the high prices offered for coal at the mines affected a very small fraction of the year's output, and

that the price of coke to iron and steel companies having their own coke-ovens advanced about in proportion to the advance in prices of pig iron.

MINE LITIGATION AND THE SURVEY.

Many of our readers are aware that it has been claimed that the officers of the United States Geological Survey have broken faith with one of the litigants involved in the cases which have burdened the mining industry of Butte City, Montana, for so many years. We had hoped that the controversy would not intrude into our columns, because it is calculated to create an undesirable impression. However, Mr. George H. Robinson, a mining engineer retained by Mr. F. Augustus Heinze, has seen proper to attack the actions of Mr. Walter H. Weed, who has been in charge of the geological investigations at Butte, and the statements of Mr. Robinson have been distributed in leaflet form, with the result of provoking the letter from Mr. Weed which is published in this issue. It is a coincidence that another correspondent sends in a good word for the Survey, and we publish his letter on the same page.

We view the whole incident with much regret, and only refer to it in order to prevent further misapprehension. Mr. Weed is an authoritative geologist; Mr. Robinson is an engineer of high standing, and any personal controversy or misunderstanding between such men is injurious alike to the profession which one represents worthily and to the Survey, of which the other is a distinguished officer.

The present difference is the outcome of earlier happenings. Some unpleasantness was created between the officers of the Survey and the engineers

TOTAL PRODUCTION OF COKE IN THE UNITED STATES. (IN TONS OF 2,000 LB.)

States.	1901.			1902.		
	Tons.	Value at Oven.		Tons.	Value at Oven.	
		Total.	Per Ton.		Total.	Per Ton.
Alabama.....	2,148,911	\$6,068,616	\$2.82	2,210,735	\$6,858,278	\$3.10
Colorado.....	671,308	1,626,279	2.42	e 750,000	1,875,000	2.50
Georgia and North Carolina.....	54,550	154,625	2.83	e 55,000	156,750	2.85
Indiana.....	.....	.....	.....	Nil.	.....	.....
Indian Territory.....	87,374	154,894	1.74	49,279	197,116	4.00
Kansas.....	7,138	15,079	2.11	e 10,000	21,000	2.10
Kentucky.....	100,385	208,015	2.07	126,559	272,101	2.15
Missouri.....	4,749	9,988	2.10	e 5,000	10,500	2.10
Montana.....	57,004	337,381	5.92	56,050	316,549	5.75
New Mexico.....	41,643	118,368	2.84	26,912	58,207	2.25
Ohio.....	108,774	299,490	2.75	e 150,000	412,500	2.75
Pennsylvania (c).....	14,353,917	27,065,951	1.89	14,941,091	31,077,969	2.08
Tennessee.....	404,017	952,782	2.36	.....	1,709,745	3.08
Utah.....	.....	.....	.....	.....	1,511,060	4.00
Virginia.....	907,130	1,483,670	1.64	973,348	1,761,026	1.80
Washington.....	49,197	239,028	4.86	40,569	202,845	2.00
West Virginia (b).....	2,283,700	4,110,011	1.80	2,249,744	4,189,529	1.84
Other States.....(f).....	564,191	1,607,476	2.85	e 750,000	2,250,000	3.00
Total coke } Short tons.....	21,795,883	\$44,445,923	\$2.04	23,090,342	\$51,864,575	\$2.25
} Metric tons.....	19,773,095	.....	2.25	20,947,421	.....	2.48

(a) Fiscal year. (d) Included in Colorado. (e) Estimated. (f) Includes Massachusetts, Illinois, Michigan, Wisconsin, New York and Wyoming.

Of the lesser coal producing States, Alabama, Indiana and Colorado retain their places. Maryland is slowly falling behind. Car supply hampered production to some extent in 1902, but some of the mines working the famous Big Vein in the Cumberland region are approaching exhaustion. Iowa alone, of the important coal-producing States, failed to increase its output in 1902.

practically it was only after the retail prices had fallen with the ending of the strike, that mine-owners got better prices for any considerable portion of their output. Similarly, though prices of bituminous coal at tidewater reached the highest figures in many years, as a result of the strike, a large part of the coal sold at tidewater during the year was covered by contracts made in March or April.

associated with Mr. Heinze when, about three years ago, Mr. George W. Tower, who had been assistant to Mr. S. F. Emmons in preparing the first geological report on the Butte district, resigned from the Survey and entered the service of Mr. Heinze. Subsequently, Mr. Clarence King, who had had no official connection with the Survey for many years, but, of course, was allied by friendship with the men whose chief he had formerly been, was one of the expert witnesses for the Amalgamated Company, while Mr. Tower appeared on the stand for their opponents. Mr. Weed, we believe, intended to be unprejudiced by his environment, and carried out his geological work with a single eye to excellence of scientific investigation; but difficulties were inevitable, especially in regard to the latitude to be permitted in publishing data which might affect the pending litigation. Finally it was agreed between Mr. Weed, as representing the Survey, under instructions from the Director, Mr. Charles D. Walcott, and Mr. Robinson, acting in behalf of Mr. Heinze, that the department would make no publication pending the existing litigation. This was in May, 1900; not until April, 1903, was anything published, and then it came in the form of a brief statement incorporated among other progress reports in a 'Bulletin of Economic Geology,' from which an early abstract was published in this JOURNAL.

It is now claimed that the "pending litigation," as specified in 1900, included lawsuits still in progress at the present time, and when experts on the stand, during a recent trial, used certain data given in Mr. Weed's report as evidence in support of their case against Mr. Heinze, it is no wonder that Mr. Robinson was provoked to irritation, although it is a pity that it should have included the charge of bad faith on the part of an officer of the Survey, who at most, we believe, has become the victim of difficult circumstances.

So long as the internecine strife of the Butte mine-owners persists, it is fairly obvious that any geological data published by any one are likely to be made use of as evidence on one side or the other; it behooves all geologists and mining engineers to pay attention to this fact; necessarily, it is incumbent upon the gentlemen of the Survey to be especially particular. In the meantime, the question arises, how long must a national scientific department such as the United States Geological Survey beg for permission to enter mines for the purposes of scientific inquiry? If the plea of litigation, present or possible, is brought up by those who control the mines of the country, it will be impracticable to collect the data, the elucidation of which contributes so largely to the furtherance of successful mining. Nay, rather would it not help to diminish the present protracted legal fights, with its squandering of time and money, if judgment could be based upon information collected by independent investigators instead of the special pleaders and skilled advocates who are now lined up under the guise of witnesses on matters of intricate geological structure? The fact is, Butte, with its endless litigation, is a spectacle calculated to make the judicious grieve; it represents a condition of affairs inimical alike to legitimate mining and to scientific inquiry, two pursuits which go hand in hand.

In the meantime, it appears from the facts that it was believed by the Director of the Survey that the progress report of Mr. Weed, published last May, did not contain data prejudicial to either of the parties in litigation, and that it was unfortunate, to say the least, that one of the parties made use of data given in Mr. Weed's report in order to strengthen its case; since then, the court has given a decision adverse to the party who quoted Mr.

Weed's report in evidence; therefore, apparently, the other side was not injured thereby. Finally, the result of the desire of the Director of the Survey to publish such early information concerning the geology of a district as would be of service to the mining industry has produced an unwarrantable misunderstanding which will doubtless cause him to withhold the complete report indefinitely, for we fear the litigation at Butte will continue until the Greek Kalends.

THE COPPER RANGE CONSOLIDATION.

The consolidation of the Trimountain and the Copper Range properties, which is about being consummated, calls attention to the new group of Lake Superior copper mines that were brought out during the boom of 1899. It is commonly reckoned that about three years are required to develop a new mine in that district, which time has more than elapsed. It is therefore now possible to summarize results. These may be considered on the whole satisfactory, rather than otherwise. The Baltic and the Champion, already consolidated by the Copper Range Company, and the Trimountain, which is now to be grouped with them, have proved to be the best of the lot. They are undoubtedly noteworthy mines, and operated together they promise to take rank with the big producers of the second class, the Calumet & Hecla being rated by itself in the first class. None of the other new mines has yet been put on a dividend basis, but several of them have become producers and promise to turn out well, the best of them being apparently the Mohawk, the Winona and the Michigan. The other new enterprises, such as the Elm River, the Rhode Island, the Victoria and others of less note have not yet materialized. The proportion of good mines secured out of the lot is, however, larger than would ordinarily be expected; it is especially interesting to remark how many of the good ones were brought out under the auspices of John Stanton, whose recognition in the Lake Superior copper industry is so thorough that we have no hesitation in singling him out by this commendation. The colossal failure of recent years in Lake Superior copper mining has been the Arcadian, the dismantling of whose expensive plant, indicating the final abandonment of the property, has lately been reported.

The copper from the new South Range mines contains a larger proportion of impurities—notably arsenic—than that of the older mines. It is not up to the standard of No. 1 Lake copper, but is rather to be considered as a high-grade casting copper.

MARKET CONDITIONS.

September 16.

The metal markets, for the most part, are quiet, the business done having been on a moderate scale; and with one exception, no material changes can be reported in the general conditions.

Copper remains very much the same as last week, and purchasers do not seem to be inclined to lay in larger quantities than they have been doing recently. The market is, therefore, rather dull.

Tin presents no special feature, consumption being still on a rather disappointing scale, while the supply seems to be fair.

Lead remains the exception in the metal list. The demand for early deliveries and the premiums, which have been paid for spot metal, have resulted in a general raise in prices. Business continues very

active, and it is evident that consumption is still on a large scale.

Spelter also remains strong, with no material change. The demand continues good, and conditions of production are not improved. Our Joplin report shows that zinc ores continue to command a high price. In fact, the sales of ore in the Joplin district, gauged by price, this year shows a considerable increase in amount, although the actual quantity sold fell off considerably.

Silver has been fairly well maintained, in the face of a demand which, to say the least, is not excessive. The market is being very skillfully managed, however, and there is no pressure to sell. An unusual feature is that in the month of August the imports of silver, in all forms, into the United States exceeded the exports by \$299,021. For the eight months ending with August, however, the excess of exports was valued at \$7,675,833. This is only a little more than one-half of the amount reported for the corresponding period in 1902.

The statement of the American Smelting & Refining Company, to which reference was made last week, will be found in full on another page. The results must be looked upon as very favorable. It was reported that the question of a dividend on the common stock has been under consideration, but at the meeting of the Board this week, the usual dividend on preferred was declared, while no reference was made to any payment on the common.

The iron markets begin to show some signs of revival. A little more new business is reported, both in raw materials and in finished products. This business, however, is generally of small dimensions, while it makes up a considerable amount in the aggregate. Moreover, there is more pressure for deliveries on old contracts. These may be taken as signs that the waiting period is approaching an end, but conditions are not yet satisfactory, and the disposition to contract at present is not as marked, as sellers would like to see. It is quite possible that further reductions may be made in several lines, and notably in steel billets. One important branch of the finished trade, that in structural material, has been practically killed for the season, and no great revival this year can be looked for.

The Western coal markets continue generally in satisfactory condition. In local markets, business is improving, as cool weather approaches, and the demand for steam coal is also reported to be better. The Lake trade continues very large, and coal is being rushed forward to the Northwest at an unprecedented rate. A few complaints are heard here and there of car shortage, but railroad transportation seems to be generally in better condition than for some time.

The seaboard bituminous trade continues quiet, with very little change in market conditions. If anything, buying shows an improvement. Prices are firm, chiefly because producers, at present prices of labor, and with existing railroad freights, can scarcely afford to sell for less.

The anthracite trade continues to take a heavy tonnage of coal, though business remains quiet. A little improvement in buying at some points has been reported, but weather conditions during the week have not favored the market, and no great increase of buying can be expected before cold weather.

METALLICS.

Gunpowder for mining purposes was first used in Freiberg in 1610, in England in 1670, and first used in Cornwall at Wheal Vor mine about the beginning of the 18th century.

DISCUSSION.

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

VOLATILIZATION OF METALS AS CHLORIDES.

The Editor:

Sir.—I have read with interest Mr. Mather's discussion, in your issue of September 5, 1903, of my article on the "Volatilization of Metals as Chlorides." Chlorides."

His theories in regard to the chlorides formed during the chloridizing roast accord closely with my own views, and I am very glad to have them so clearly expressed from another scientific standpoint. In my article I endeavored to confine myself to the actual products obtained, without confusing them with my theories in regard to the numerous changes no doubt produced by the varying temperatures of chloridizing roast. As Mr. Mather states, this most interesting subject is "worthy of further notice," and it was "but lightly touched on" by me because I felt, from past experience, that it could be so much better studied from a commercial plant in continuous operation, where temperatures and composition of gases are comparatively constant, than from an experimental plant where these conditions are variable, that it would be better to postpone an expression of theory until it could be founded on further experiment. Mr. Mather no doubt finds, with the rest of us engaged in research work, that our best books on chemistry are neither complete nor infallible, and I think they are, or have been until recently, particularly weak in regard to reactions in mass which we get in large operations. I wish to say in passing, that it seems to me this is one of the most inviting fields for research work in chemistry and I am glad to notice an increasing amount of literature on the subject.

Mr. Mather's remarks in regard to the influence of other chlorides on any particular chlorides, and the presence of a vapor of chlorides, or what he terms a "gaseous solution," as well as his summary at the bottom of the second column, have been substantiated to a large extent by our experience. In regard to temperatures, I do not dispute his statement that it is possible to accomplish a volatilization of some of the metals at lower temperatures than those mentioned in my article. We found that a copper ore mixed with salt and sulphur, lying under the culvert of a hand reverberatory furnace in operation, subject to the chloride vapors passing to the flue and exposed to a temperature of 650° to 750°C., gradually lost its copper to the extent of 60 per cent without rabbling or exposing a fresh surface to the atmosphere of the furnace. It took about six hours to accomplish this result.

I have no doubt that the simple volatilization of some metallic chlorides, gold, for instance, could be accomplished at a lower temperature than this, but I should like very much to have Mr. Mather publish the results of his experiments, when completed, on the volatilization of metallic chlorides below a temperature of 212° F.

It must be remembered that my paper related only to the volatilized products of a chloridizing roast. In this operation there must be at least sufficient temperature to produce chemical action, and to make the operation commercial it must be done quickly. We have found by extended experience that these conditions are met only at the temperatures mentioned in my original article.

In regard to the apparatus and operations of our experimental plant, Mr. Mather seems to have been with us in spirit if not in tangible form, for he speaks of "the frequent and radical exchange of types of furnace" used. This assumption of his, however, is incorrect. The first experimental furnace used after the laboratory experiments were completed was the White-Howell type. Although too small to do satisfactory work, it gave good results in volatilization. At no time did I abandon the idea that this form of furnace would ultimately give the best general results. To meet the conditions widely varying classes of ore were supposed to de-

mand, a hand reverberatory furnace was adopted as best suited to study these conditions. Mechanical rabbling was used for a time, but was not so flexible as hand rabbling. After a better knowledge of the volatilization of the chlorides was obtained a larger furnace of the White-Howell type was installed, and so far it has proven itself capable of yielding the best conditions for a thoroughly successful volatilizing roast: viz.—that of constantly exposing a fresh surface of the ore mixture to the oxidizing atmosphere of the furnace; of constantly but gradually moving the ore toward a higher temperature; and of obtaining a commercial tonnage without the disadvantage of a thick bed of ore at any one time in the furnace.

A typographical error in my article, giving the length of the furnace 30 to 50 ft. instead of 30 to 36 ft. has no doubt given rise to the next suggestion of Mr. Mather's that metallic chlorides might sublime in the cooler portions of the furnace. A furnace of the size mentioned above is easily kept at the required temperature throughout its entire length. The ore mixture is not heated before charging, but is fed mechanically as fast as it is discharged from the furnace, and does not remain cool for more than 2 or 3 ft. in the length of the furnace. Aside from the plain statement of the fact, this is best illustrated by the absence of flue dust, which shows that the heat is sufficient for chemical action to begin almost immediately after the ore enters the furnace. There can be no deposition of values in the furnace.

In regard to the SO₂ and SO₃ in the furnace gases, it must be remembered that commercial operations of this kind prohibit the use of exact theoretical amounts of the elements involved. If such amounts were used there is every indication that some SO₂ and SO₃ would still be formed, due to the formation of other than what I have called normal compounds, or to the failure of complete chemical reactions. Much of the SO₂ passes through the condensing solutions and escapes with the products of combustion. The advantages of SO₂ in the condensing solutions are, that it forms the cheapest solvent for the basic chlorides of copper; that it tends to destroy the solvent effect of sodium and copper chlorides on silver chloride by converting the former into the sulphates, thus rendering the separation of the silver chloride more perfect; and that it makes the lead completely insoluble by converting it all into the sulphate.

STUART CROSSDALE.

Denver, Colo., Sept. 9, 1903.

PELEE'S OBELISK.

To the Editor:

Sir.—A recent writer in the *Nation* (August 27) describes his fourth ascent of Mount Pelée on June 13 last, in the company of one of the officers of the French Scientific Commission. He describes the great volcano of Martinique as plugged by a vast obelisk of rock, 830 ft. high, with a base of from 300 to 350 ft. thick. Regarding the ascent of this huge column of solidified lava, he writes:

"During four days of my residence at Vivé the rise as determined by the French Scientific Commission was 21 ft., and the rate of ascension was far greater still in the preceding month. On the side where the great obelisk has pressed hardest on the encasing rock the surface is smoothed, almost polished, and shows parallel lines of grooving. The other sides are sluggy and bear evidence, especially on the side directed toward St. Pierre, of recurrent periods or episodes of eruption. These have not yet ceased."

From a geological standpoint the "obelisk of Pelée" means the extrusion vertically of a solid lava column 830 ft. in height. Taking its specific gravity as 2.75, the pressure on the visible base of the column would be very nearly 1,000 lb. per square inch, and the weight of the obelisk over 2,800,000 tons, assuming a mean thickness of 200 ft. This vast weight is no doubt supported by the pressure of molten lava at some depth in the crater. In other words, the bottom of this obelisk is molten lava, passing in

gradations upward into plastic and, ultimately, solid rock near the mouth of the crater. That the rock is comparatively cool and consolidated at the lowest visible point is evident from the pressure it has to sustain; and, as we have seen, one side of the obelisk is polished and striated from its contact with the enclosing crater rock. It appears to me that the resultant of the forces due to the pressure of molten lava below, and the weight of the obelisk above, would swell out the partially cooled rock at the zone of viscid plasticity so as to fill and plug the cavity. The small eruptions referred to, as still occurring, are probably due to escaping gases, though in some instances a little lava might spurt up through some temporary grooving or irregularity between the plug and its die, the crater walls. The whole phenomena resembles the casting of bars by compressing the molten alloy and forcing it through dies; for example, the manufacture of lead pipe.

Volcanic necks or plugs are common features in geology, attributed in the books to the plugging of a crater with viscid material and the subsequent erosion of the crater cone, leaving the neck or plug standing out prominently above the eroded surface. Here, however, we have a neck pushed out to a dizzy height above the cone; and it is obvious that, should the volcanic activity in Pelée cease under the conditions here described, much of the upper part of the obelisk might in a few years disintegrate and be carried away as dust, etc., yet leaving a great plug which geologists, according to our present teachings, would assume to be the result of crater erosion. Therefore this Pelée phenomena, though new to Science, may be old in nature, and many a "neck" throughout the world may have been formed by a similar extrusion and not by degradation of the enclosing cone. I therefore hold that the mighty obelisk Pelée has raised above the stricken city of St. Pierre is as new to Science as was the scorching gaseous blast that swept her citizens to destruction.

P. H. ARGALL.

Denver, Colo., Sept. 5, 1903.

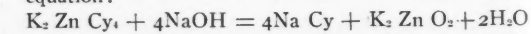
THE REGENERATION OF CYANIDE SOLUTIONS.

The Editor:

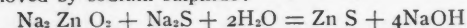
Sir.—My attention has been drawn to a letter in the columns of your JOURNAL from Mr. Wm. Orr, Denver, Colo., dated June 5. In the first place I may say that I am very pleased to observe that Mr. Orr confirms my opinion that the regeneration of working cyanide solution is not only feasible but desirable. Mr. Orr states that he obtained a patent (United States No. 689017) two years ago, in 1901, for the regeneration of working cyanide solutions by the joint action of caustic soda and sodium sulphide. This reaction has long been known; the converse reaction having been in use for many years for the desulphurization of soda and potash in commerce.

As the result of a long series of experiments, carried out five years ago, I found that at ordinary temperatures it was impossible to obtain complete precipitation of the zinc in ordinary working cyanide solution by sodium sulphide. It would appear that at ordinary temperatures a kind of equilibrium is set up, both zinc and sodium sulphide remaining in solution, and, moreover, such zinc as may be precipitated is thrown down in a form difficult if not impossible to separate from the solution.

I was aware that by the addition of sufficient caustic soda to decompose all the double cyanide that all the zinc might be removed, according to the equation:



The cyanide is actually regenerated by the caustic soda; subsequently the zinc, now in the form of potassium (or sodium) zincate, may be completely removed by sodium sulphide:

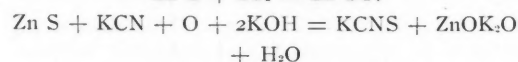
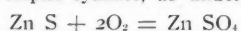


The net result is that to regenerate 52 parts of CN, combined with 65 parts of zinc, we must add to the solution 160 parts of caustic soda and 78 parts of sodium sulphide. Such a process involves an enormous increase in the alkalinity of the solution and a

corresponding increase in the consumption of zinc in the extractor boxes. On the point of cost alone I cannot see how it can pay to add 160 lb. of caustic soda and 78 lb. of sodium sulphide (anhydrous) to obtain 52 lb. of CN, equivalent to 130 lb. of potassium cyanide. Not knowing the cost of chemicals at Denver, I cannot speak for certain, but I know that on the Rand, from costs alone, the process would be impracticable. As the result of my experiments, however, I discovered that at a temperature of 65° C. the reaction was complete; the sodium sulphide precipitating its equivalent of zinc in a flocculent, curdy form, which readily settles and from which the clear supernatant solution may be readily removed by decantation. In August, 1899, two years before the date of Mr. Orr's patent, I applied for provisional protection for the regeneration of working cyanide solution by the action of sodium sulphide in warm solutions, not only for the Transvaal, but for the United States and other countries. I should have carried this patent through in the States, but owing to the war in the Transvaal I was prevented from so doing. The working of my process has already been described in your JOURNAL, and I need not go further into it, excepting in regard to the alleged excessive formation of sulpho-cyanate.

It is well known that when zinc is precipitated as a sulphide in presence of potassium cyanide that some of it is dissolved, the amount varying with the temperature. In cold solutions a considerable amount remains in solution, but this amount is, at 65° C., excessively minute.

Solutions regenerated by my process will, immediately after regeneration, give a dark coloration with silver nitrate, but after aeration the small quantity of zinc sulphide so dissolved is converted entirely into sulphate and sulpho-cyanate, as under



In practice the increase in sulpho-cyanate is almost inappreciable, for example in the following analysis of solution before and after regeneration:

	Before.	After.
	0.1 per cent	0.3 per cent
Free cyanide	0.31	0.31
Total cyanide	0.31	0.31
*Prot. Alkali (NaOH)	0.057	0.09
Zinc	0.078	0.01
Sulpho-cyanate (KCNS)	0.025	0.03
Ferro-cyanide (K ₂ Fe Cy ₂)	0.04	0.04

*Prot. Alkali = $\frac{1}{2}$ NaHCO₃ 0.05 per cent.
 $\frac{1}{2}$ NaOH 0.032 per cent.

*Prot. Alk. contains no carbonate or bicarbonates.

It may be stated that the amount of KCNS present in the above solution was altogether exceptional, as in our works it averages about 0.016 to 0.02.

There is no noticeable increase in the amount of sulphate, due to oxidation of sulphide, owing doubtless to the precipitation of CaSO₄ along with the zinc sulphide, as suggested by Mr. Orr.

I think you will see that Mr. Orr can hardly claim priority for his invention, owing to the fact that my provisional patent in the United States was applied for in August, 1899.

ANDREW F. CROSSE.

JOHANNESBURG, Aug. 9, 1903.

THE ORE DEPOSITS OF CANANEA.

The Editor:

Sir.—In September, 1900, I made a geological study of Cananea, and my observations were presented in an advertising circular by the parties for whom the reconnaissance was made. I have never since found time to publish my observations, but have been deeply interested in the contributions by Messrs. Weed and Austin.

As I am now flying southward on an express train for Mexico, away from library or other reference, I can only present, in a most desultory manner, my deductions on that most extraordinary mineral district. Those who have read the papers by Messrs. Weed and Austin will appreciate our points of friendly difference; in fact, they may reach a more correct deduction than any one of us.

Geography.—The Cananea district is coincident

with the axis of a typical "lost mountain" or isolated disconnected desert range of the general type met with in Arizona and Mexico. The range is the survival of the hardest in a district of intense atmospheric erosion.

Geology.—Throughout Arizona (south of the Colorado plateau) and in northern Sonora there is a geological sequence of rocks associated as the mineral matrix; these are, in apparent sequence,

1. Granites.
2. Paleozoic limestones.
3. Rhyolites.
4. Andesites.

At Cananea Nos. 3 and 2 constitute the chief rocks in order named. Specifically, the Cananea district is primarily a mass of rhyolitic porphyry (the hardest to survive in the topography) intrusive into Paleozoic limestones, which are secondary in relative importance and occurrence. This rhyolite, although it may represent the roots of an old volcano, is not volcanic, i. e., extruded, but is plutonic—a crystallized magma—for the present topography represents but the stubs of rock masses from which erosion has stripped a vast overlay.

Mineral Genesis. Cananea is of special interest in that much of its ores are largely concentrates of pyritic particles, original constituents of the porphyritic mass, and which can be found in the porphyry at localities quite remote from the workable mineral veins.

These particles are as original a constituent of the porphyry as the feldspar and the quartz. Now if the magma, from which this pyritic feldspar was congealed, contained copper, iron, and sulphur, and if this congelation was superficial, it is also probable that the latter more volatile minerals may have also been deposited in fissures in the congealed superficial porphyry from aqueous magmatic vapors rising from the heated magma below.

Structural Features Favor Ore Concentration.—Copper pyrite widely disseminated in igneous rock or pent up volatilized would be of no value were it not for structural conditions conducing to concentration.

The second fundamental feature of Cananea is a zone of fissuring running with the axis of the district, NW-SE, along which all the mines occur whether in rhyolite or in limestone, and the ore-bodies are largely concentrates of the widely disseminated magmatic pyrite and replacements along this zone, chiefly by circulating waters, although pneumatolytic deposits from primary magmatic phenomena may also have taken place.

Replacement or substitution, in a degree, might also be considered to have occurred, for both the feldspathic and silicious constituents of the rhyolite are decomposed; the gangue of silicious clay noted by Mr. Austin and the writer being a residual product of this substitution. In the Imperial (Old Boot) mine of Arizona such metasomatism has resulted in the perfect replacement of vast masses of similar rhyolite.

Broader Deduction.—In the Arizona-Sonora Province there is a rhyolitic intrusive magma, to which the origin of the copper ores (and other ores, as at Tombstone) is due. The finely disseminated copper pyrite is detectable in these rocks in some places as an original constituent; in others it has been aqueously concentrated along fissure zones (Cananea); and in others it has been collected probably by pneumatolytic processes—not improbably from gases escaping from the lower hotter magma, through its own cooling crust; depositing exceptionally at the contacts with the local Paleozoic limestones, or later andesite dikes of the district (Old Boot) replacing the limestone (Bisbee, and exceptionally Cananea) or making ore-deposits in the arches of anticlines in the overlying limestone (Tombstone).

In all instances, however, there are zones of fissuring which constitute the channels of deposition and which are an invaluable guide to the miner.

ROBERT T. HILL.

New Orleans, Sept. 6, 1903.

MINE SAMPLING.

The Editor:

Sir.—The articles and discussions which have appeared in the JOURNAL for the past few months on the sampling and valuation of a mine have been exceedingly instructive; although I have read each week's contribution as it came from the press, yet within the past few days I have read the entire matter as a whole, and find there is more information in such a second reading than one obtains in the first perusal of the weekly editions.

The sampling of a mine is not an easy or simple task, although many self-styled engineers think it so and will often return from a mine with a few sacks of hand-gathered samples and then write a voluminous report as to the merits of the property and the value of the ore-reserves therein. Sampling is hard labor under the best conditions, and the actual moiling requires the skill of a good miner, carefully watched, of course, and I have found that good moiling is often foreign even to miners, not to mention the young and uninitiated who come west to get their first experience in mining by doing sampling work. I well recollect the incident referred to by Mr. Rickard in the issue of Feb. 14, when he says, "It took six men (three of whom moiled while the other three held the boxes to receive the sample) the whole of one shift to take three samples over a vein 12 ft. in cross-section, and in accomplishing this they dulled 35 moils." This incident was at the Camp Bird mine some three years ago, when it was first examined. The moiling was done by strong, able-bodied miners and Mr. Rickard put me in charge of the sampling at the time. Many engineers regard the sampling of a mine as a perfunctory performance, to be gone through lightly, and they aim to accomplish the task in the shortest time and with the least trouble.

All these points are well known to the readers of the JOURNAL, but I desire to bring them out again, in order to more fully emphasize the hazard and risk courted when the sampling of a partially developed mine is given into the hands of an inexperienced college graduate—often unaccompanied by the engineer in charge—who has come west to supplement his college training with actual practice in the field. This procedure has been adopted by some engineers in the last two or three years, but it ought to be discouraged. Unquestionably it is a cheap way, for the young men are very ready to undertake the work and at a reasonable figure, some of them being glad to go for their expenses alone. When an engineer is retained to examine a mine, his clients are entitled to all the knowledge of that property which his years of observation and experience are able to yield him; in fact, his experience, knowledge and integrity are all that is valuable to his clients and he should give the products of such qualities to them unremittingly. It is obvious that any engineer can learn more concerning a mine under examination by being on the ground and overseeing the actual sampling, and sometimes taking a few himself, than he can possibly gather by going through the workings a dozen times and looking at the places sampled after the work is completed, especially in a wet mine where the fresh cuts soon become smeared. I have known of cases where inexperienced men have been sent out to a property for the purpose of sampling, even before their chief has been on the ground, and after the work was completed the engineer then came and walked through the workings and thought he thoroughly understood the chemical, physical and metallurgical conditions. One engineer of my acquaintance, and one who is well-known in this country and abroad, and with whom I was fortunate enough to be associated in my days of little experience, has gained an enviable reputation as a thorough engineer, and I attribute his success, in a great degree, to his thoroughness in sampling. He never intrusted this work to novices, and even when employing an experienced man he was present invariably and superintended the work; and to this day he will be found in his overalls, personally directing the sampling of any mine which he is ex-

aming. If one is sick and a surgical operation is necessary, is it satisfactory, after calling in the favorite doctor, to have him send a fresh medical graduate, whom he has known but a short time, to perform the operation, and after the wound is dressed have the surgeon arrive and pass an opinion on the case?

Please understand that I am not in any way criticising the employment of young college men; not at all; in fact I am very much in their favor, for I was one myself; but I am decidedly against their being sent to sample a mine, without the constant supervision of their chief, long before they have had sufficient sampling experience or are capable of assuming such responsibility, because, as before stated, the sampling of a mine is not a simple problem, and I know of no other process in mine examination that is more important, or from which the engineer himself can gain more information. It is neither fair to the clients nor to the young men. I am glad to learn from the discussion that in several localities, especially in South Africa, the engineers in charge recognize the importance of mine sampling to the degree that the samplers are "culled largely from trained engineers."

Let me say to those who take the trouble to transport over the country small hand rock-breakers for reducing samples, that three or four good men with short-handled hammers and old stamp-dies or hard rocks for breaking, with a canvas underneath, will break more rock and do it quicker and with less fines than an equal number of rock-breakers. I have tried them.

When there are two or more distinctly different vein materials, or when the vein does not equal the stoping width, I have found that much better results are obtained by sampling each class of material separately, as it is impossible to obtain an average by taking the sample across the entire width with a continuous cut, because the different materials differ widely in specific gravity. With the separate samples it is an easy matter to calculate the average across the full width. This is the best way out of the difficulty mentioned by Mr. Argall, in the issue of June 13 in his Figs. 1 and 2.

I have read the short articles of Messrs. Richard Parker and W. L. Austin in regard to the discrepancy in the assays of two quarters of a sample, which was rolled on canvas. Mr. Parker gave it as his opinion that the gold, which was free, very easily penetrated the duck, consequently the ore underwent a form of concentration. I agree with Mr. Austin that the gold does not penetrate the canvas; at any rate the use of whisk brooms in quartering would remove it; and I am surprised that neither of them considered the fact that the sample was wet or sticky, for my experience is that most any kind of an assay can be obtained from wet samples, especially if they contain free gold. Without doubt the free gold was enveloped in the sticky material as the sample was rolled, and it certainly could not be homogeneously mixed through the sticky matrix.

As to numbering samples, I have used wooden, brass, hard rubber and paper tags, and I have found the latter to be the easiest and best. Use a tough bond paper in sheets about the size of a nickel tablet and use a pigment pencil. Write the number in the center of the sheet and fold it in the center, then begin at the folded end and fold to the size of a lead pencil and crimp it by folding over each end. In this way the number is folded in many thicknesses of paper, and I have found that these withstand rough handling in samples which are extremely wet. After the sample is reduced and sacked, beside the number inside I number it by a very small number, made with a lead pencil, inside the neck of the sack just as close to the string as possible. It can be found by the sampler, but it is out of sight and unknown to anyone else.

After trying canvas and boxes for catching the samples I find the box, a 50-lb. powder box, is, unquestionably, the best thing to use. It can be obtained readily and can be used in wet levels, awkward stopes and anywhere in the mine. It will

catch all the sample if held properly and the samples are easily sacked from it. Mr. W. H. Weed does not explain how one can use a piece of canvas, 20 ft. long by 6 ft. wide, in wet levels, or at the top of high, narrow stopes. The box merely requires the watching of an area of not over 4 square feet, while the latter necessitates keeping an eye out for dropping material from 120 square feet.

I would like to call your attention to a method of sampling which recently came to my notice which I describe below. The incident is interesting only from the fact that it shows what a loose procedure may be employed and by an engineer of no little reputation, and whom many of the readers of the JOURNAL would recognize should I feel at liberty to mention names.

The mine in question was a mine of some size, containing three levels and having some 935 ft. of workings. The report of the engineer read as follows: "Cuts were made across the full width of the vein from wall to wall at intervals of three feet," which should have made some 310 samples. Notwithstanding this statement, the valuation of the property was based upon the assay value of 29 samples as located on the section cut. Subsequent investigation and examination of the workings showed that the statements regarding the sampling were correct, but the results were arrived at in the following manner: take, for instance, the triangular block of ground between the surface and levels Nos. 2 and 3. The sampling was begun in Tunnel No. 3 and samples were taken every three feet, then (and here is the dumbfounding step) these 17 samples were all dumped into one large sack and labeled "Sample No. 1." No attention was paid to quantity of ore from each three-foot section. As each cut was made the width was taken, and the 17 widths averaged and given as the width for Sample No. 1. The same process of reasoning (?) was followed in obtaining samples 2, 3, 19, 18 and 7, as well as the remaining 23 samples shown in the cut. The samples, as made up from the three-foot cuts, also represent different lengths along the drifts. The value of the block was then given as follows:

No. Sample.	Value. Per ton.	Length.	Width.	Length Factor.	Width Factor.	Total foot Value.
1	\$10.86	50'	3.7'	5'	3.7x5=18.5	\$169.38
2	7.24	50'	2.1'	5'	10.5	183.40
3	10.58	40'	2.5'	4'	10.0	312.00
19	20.80	60'	2.5'	6'	15.0	105.80
18	18.34	40'	2.5'	4'	10.0	76.02
7	18.82	30'	3.0'	3'	9.0	200.91
				27'	73.0	\$1,047.51

Average width 2.704'.
Average assay per ton \$14.35.

The above operation reminds one of that old *reductio ad absurdum* problem in algebra where, in letting $a = b$, the final result proves the startling fact that $2 = 1$. The fallacy was in the assumption that $a - b$

of sampling, the fallacy was in taking samples every three feet, throwing them into one sack and assuming the sack to be sample No. 1, or the average of the 50 ft. of drift from which they were taken. If such a process of elimination gave the correct averages it is difficult to understand why it was not carried further and one sample obtained for the entire mine, thereby reducing the assay bill to \$2.50.

Could one have guessed, for it was guess work, the value of the property after it had been sampled by such a method, whether it was worth \$500,000 or \$100,000? Fortunately the mine was afterward sampled correctly and carefully at 10 ft. intervals and in accordance with the best methods, such as have been outlined in the articles on this subject in the JOURNAL, resulting in the taking of some 150 samples, and you will readily believe that the difference in the gross value of the ore, as arrived at from the two methods of sampling, in a property of this size, although containing only 935 ft. of workings, amounted to \$95,009.59!

The description of the two methods affords a sufficient explanation.

F. H. MINARD.

Denver, Colo., August 15, 1903.

NOTICE.—The papers on mine sampling, together with the discussion on this subject, will be published in book form. It is requested that any reader who has detected typographical or other errors either in his own communication or in those of other contributors will kindly write, calling attention to the fact, so that the utmost accuracy may be secured.—EDITOR.

COAL PRODUCTION IN FRANCE.—The official report of the Ministry of Public Works gives the total production of coal in France for the first half of 1903 at 16,997,608 metric tons, which compares with 16,874,098 tons in the first half of 1902; showing the very small increase of 123,510 tons. The chief increase was in the Departments of the Nord and Pas-de-Calais.

SELIUM.—The London *Engineer* says that M. E. Mollard, a French investigator, claims to have discovered a new metal, or alloy, called selium, which is lighter and stronger than aluminum, but costs much less. Some of M. Mollard's claims for the new metal are so extensive that it would seem that further investigation is much needed.

COAL IN PORTUGAL.—A syndicate of Lisbon business men is said to have bought the coal mines near Oporto in Portugal, which have been worked heretofore only on a small scale. The intention is to work the mines extensively and furnish fuel for domestic and manufacturing purposes. This is now chiefly imported from Great Britain.

EDISON'S PROCESS OF NICKEL PLATING.—According to United States patent 734,522, issued July 28, 1903, to T. A. Edison, articles of iron or steel to be plated are first given a thin coating of nickel in an ordinary bath. They are then heated to bright yellow in a current of non-oxidizing gas, preferably hydrogen, in a cast iron chamber or clay retort. The passage of the gas is continued until the articles have cooled below the point of oxidation. The effect of the treatment is said to be to weld the nickel coating to the iron or steel so that it will not crack or flake off during subsequent treatment. It is claimed that nickel-plated ware can be produced in this manner more cheaply than tinned ware, the coating of nickel on the former being much thinner than the coating of tin on the latter.

A LARGE CHIMNEY.—The Edison Electric Company has just completed a large chimney at its South Boston plant. This chimney, which is of the Custodis construction, is 250 ft. 6 in. in height. The external diameter at the base is 24 ft. 11¼ in.; internal diameter, 19 ft. 6 in. The external diameter at the top is 17 ft. 4 in., internal diameter 16 ft. 8½ in. The walls of the chimney are 36 in. thick at the base for a height of 3 ft. 9 in., above which they decrease 2 in. in thickness in every 16 ft. 5 in. until a height of 200 ft. is reached. For the next 25 ft. the walls are 10⅝ in. in thickness, and for the last 25 ft. they are 8⅝ in. thick. The astragal starts at a height of 240 ft. 6 in. above the ground. The chimney stands on a concrete base 47 by 51 ft. in area, 14 ft. 2 in. deep. The laying of the foundation was begun April 20, 1903. In order to allow time for settling, the construction of the chimney proper was not commenced until May 27. Up to a height of 200 ft., 8 bricklayers and 12 laborers were employed steadily; above that height, 6 bricklayers and 8 laborers.

ACROSS THE SAN JUAN MOUNTAINS.

By T. A. RICKARD.

(Continued from page 386.)

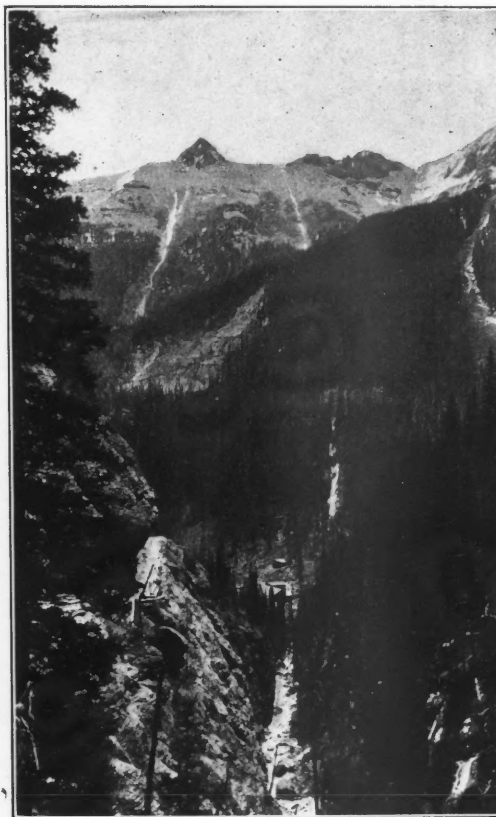
From Vulcan our trail took us over the eroded stumps of granite hills and across the river into the level stretch over which the town of Gunnison spreads itself drearily and wearily. Gunnison was a boom town, and when the wind goes out of a boom the wreckage is not enlivening. In 1880-1885 there were three smelters at work, and the combination, in the neighboring mountains, of iron, coal and precious-metal deposits won for Gunnison the splendid title of a "new Pittsburg." The town attempts to cover an area of two miles square, so that when you think you are in Gunnison you are out on the prairie, and when you imagine you are out in the country you are on a main street. In spite of it all, Gunnison wears an aspect of resignation, as if to say "it is better to have boomed and bust, than never to have boomed at all."

The next day, September 14, we started for Crested Butte, the center of an important coal region. The road follows the main branch of the Gunnison, a famous trout-stream known to every follower of Izaak Walton; the valley broadens at times into a goodly expanse of farm-land, dotted with cheerful homesteads. A few miles below Crested Butte the river is flanked by mountains, among which the rhyolite cone of Round Mountain and the basalt-capped mass of Mt. Wilkinson are conspicuous. Finally, the traveler reaches the confluence of several streams and a wide basin, on the western edge of which the town of Crested Butte has been built. A noble mountain, buttressed with steep cliffs and massive as an anchorage for an aerial tramway to Mars, overlooks the town from the east, and has given it the name of Crested Butte. It is a big stock of porphyrite.¹ On the west and south the gentler slopes of Mt. Wheatstone, fringed with pines, merge with the valley, and to the north a perspective of successive peaks indicates the Ruby Range. These gain height and mystery as seen through the smoke from the coke-ovens of Crested Butte, lying huddled under the long shadows of evening. In the center of the town we found a barrack-looking building, which turned out to be a very clean and comfortable hostelry. Next day, the 15th, saw us on the Coal Creek road, en route to Irwin and Floresta. On both sides of the cañon the hillslopes were a desolation of burnt timber, a glimpse of that destruction, through careless fires, which is gradually causing the deforestation of Colorado. The actual burning up of good trees is bad enough, but the effect of such fires on the young growth does the most serious injury to the possibilities of a future supply of timber from these devastated tracts of mountain-land.

As the higher altitude was gained, the scenery improved and became bolder. We were passing through a porphyrite country, and the large fragments which had rolled to the roadside showed handsome crystals of feldspar. A winding trail took us northward from the westbound road and brought us to the deserted hamlet of Irwin. The Irwin mining district was active in 1880 and succeeding years. The Forest Queen mine is credited with a production of over a million. In 1893 the fall in the price of silver flattened out the life of the camp, and until lately it has remained practically deserted. Quite recently a consolidation of a group of mines has been effected, and there is now promise of some activity. We visited the Ruby Chief mine, under the kind guidance of Mr. P. F. Ropell.

The Ruby Chief vein traverses a bedded series of coarse sandstones and shales belonging to the Ruby formation of the Upper Cretaceous. The vein occupies a fault-fracture, as was indicated by a break in the continuity of a layer of shale seen underground. The strike is N. E.—S. W., while the dip, northwestward, departs only slightly from the vertical. The accompanying sketch, Fig. 10, gives a typical section of the lode. In the footwall there is

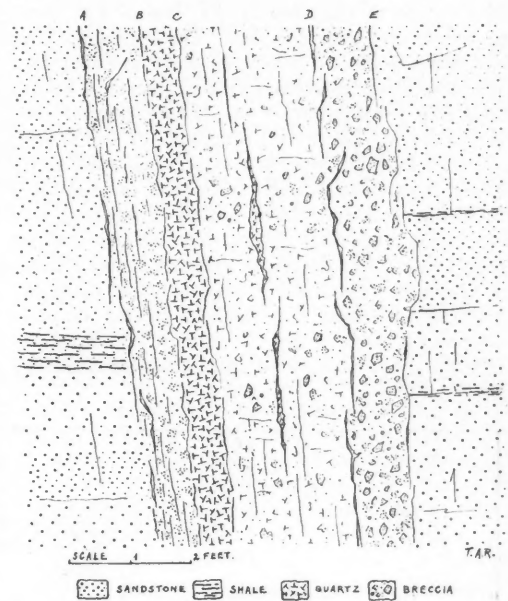
a band of shale. From A to B is a laminated casing of sandstone streaked with veinlets of quartz, which exhibit comb structure. B—C is a 6 to 8-in. vein of white quartz, streaked with arsenical pyrite, mispickel. This is the best ore. It usually carries ruby silver (proustite) and brittle silver (stephanite). Selected ore contains 65 to 100 oz. silver, and from 10 dwt. to 1 oz. of gold, per ton. This vein or "leader," B C, is usually characterized by a definite streak of pyrite, accompanied by zincblende, which speckles the quartz in lines parallel to the walls of the vein. C to D is mottled, obscurely brecciated country, with quartz surrounding the fragments of sandstone, and impregnated with arsenical pyrite. D to E is an outer band of obviously brecciated sandstone containing very little evidence of mineralization. The crystalline quartz, lining cavities or "vugs," is a very marked feature of the lode, more especially because this structure is so noticeable in the independent quartz-veins which occur in the outer country alongside of the vein. The quartz, encrusting the brecciated sandstone within the lode, is banded, due to contrast between layers of quartz and mispickel. Rhodochrosite was seen in a few specimens. Mr. Ropell informed us that the best ore had been obtained from the vein at the horizon where it traversed the conglomerate beds which form an integral portion of the Ruby formation. To these notes may be added the fact that porphyrite occurs in the vicinity. Mr. Emmons states that the porphyrite is found apparently as an intrusive sheet following the bedding of these sedimentary rocks, although the compound fracturing associated with the vein-structure "often gives it the appearance of a dike within the mineralized zone."²



IN HIGH ALTITUDES.

Leaving Irwin, we retraced our steps for a mile and crossed the shoulder of Ohio peak at Kebler pass, named after the president of the Colorado Fuel & Iron Company. The winding road was followed through a pine forest until, on the northwestern slope of the ridge, it descended abruptly into a narrow ravine. To ride over a deserted mountain road and then to come suddenly into full view of a compact little mining settlement is a sensation which does much to break the monotony of cross-country riding. This was Floresta, boasting the only anthracite mine

west of Pennsylvania. The old anthracite mine, known as Smith's, near Crested Butte, is now worked out, and the new anthracite region, tributary to



RUBY KING MINE

FIG. 10

Paonia, now being prospected between the Gunnison River and the Anthracite range, is yet in an immature stage of development.

A note on the Smith anthracite mine will be proper here. It was located 21 years ago, and opened up in 1882 by George Holt, now of Chicago, Howard F. Smith, now of Elkhart, Ind., and Dr. William A. Bell, of Colorado Springs, Colo. They erected a breaker, installed the requisite machinery and operated it for several years, until it was acquired by the White Breast Fuel Company, in which Messrs. J. A. and J. T. Kebler were interested. Shortly afterward it was acquired by the Colorado Fuel & Iron Company, which has since held and steadily worked the mine until April of this year, when it was abandoned as worked out.

The vein averaged from three to four feet in thickness, and the coal was of excellent quality. An approximate production of 5,000 tons a month was maintained. A spur of the Denver & Rio Grande Railroad from Crested Butte connected with the breaker. The incline from the mine to the breaker is 1,800 ft. in length, with a pitch of 45°, and is the longest and steepest in the State. The gravity system was employed.

The coal seam at Floresta is three feet thick, and dips north at an angle of about 20°. It lies with the hill-slope, the ravine having cut into the seam so as to give a line of outcrop on both sides. The agency which was chiefly instrumental in the development of anthracite from bituminous coal is indicated by the porphyrite, which appears in the form of the dikes in the railroad cutting and is clearly to be seen capping the hillside. The coal now being exploited occurs at a geological horizon which is 115 ft. above the base of the Laramie formation; of the Cretaceous. There is also another, poorer seam, one hundred feet higher. These coal-measures are covered by a sheet of porphyrite which extends for more than a mile along the north slope of the Anthracite range, the name of the much serrated ridge behind the mine. The metamorphic effect of the porphyrite on the coal is readily apparent; where the metamorphism of the sedimentaries is least, non-coking bituminous coals are found; where the metamorphism has been present, but not severe, the coking coals occur and in regions of intense local metamorphism the coal has been changed to anthracite. It has also been observed³ that a dike cutting across a coal seam affects its chemical and physical compo-

¹Crested Butte Folio. U. S. Geological Survey. "Igneous Rocks," by Whitman Cross.

²Anthracite—Crested Butte Folio. United States Geological Survey. "Description of the Elk Mountains," by S. F. Emmons.

³George H. Eldridge. Anthracite—Crested Butte Folio. United States Geological Survey.

sition for a short distance only, but an intrusive sheet will affect it for a greater distance and over an area commensurate with the extent of the eruptive itself.

The output of the mine at the time of our visit was 100 to 125 tons per day. The manager, Mr. Thos. McLaughlin, to whom we were indebted for many courtesies, informed us that there is much difficulty in keeping miners at Floresta, because the mine is not in operation, on account of snow, for more than half the year, which prevents men with families from coming here. Moreover, the narrowness of the seam and the conditions of working are such that only the most experienced miners can earn a good living. The work is much more arduous than that of ordinary lode mining, because of the cramped space and the subsequent disposal of the output. Owing to the slight dip of the seam, it is difficult to handle the coal underground; the chutes which carry

the chutes. These chutes for slate-picking are double. Each picker (boys and old or crippled miners) draws past him just as much coal as he can thoroughly clean, so that the coal is handled once only.

The upper landing is 10,175 ft. above sea level. This makes Floresta the highest coal mine in the United States, if not, indeed, the highest in operation anywhere. An average analysis of the anthracite shows:

Fixed carbon.....	87.51
Volatile combustible.....	7.62
Moisture.....	.72
Ash.....	4.15

The roof of the seam is a 30-ft. bed of sandstone, the floor is in shale. Along the railroad grade there are afforded several good sections of the sedimentary rocks, enclosing the coal, where they are intruded by porphyrite. A typical section showed that the dike consists of a porphyrite containing

MAGNETIC SEPARATION OF TIN AND WOLFRAM AT GUNNISLAKE CLITTERS.

By EDWARD SKEWES.

This mine is situated on the banks of the Tamar, a river which divides the counties of Cornwall and Devon. The mine was worked for many years, and the developments were conducted on a large scale, but principally for copper ore. The present—a German—company began operations about three years ago, and all their explorations have been confined above the adit level, which has a depth, at the shaft, of 480 ft. A 25-stamp mill of Californian pattern, containing a set of Cornish rolls, a crusher, 8 Buss tables for sand, Luhrig classifiers and Luhrig vanners, has been erected.

At the time of my visit an experiment of crushing by rolls and concentrating on two Buss tables was being made, but, to my mind, with not entirely satisfactory results, on account of the unevenness of the pulp. The Buss tables were giving every satisfaction in the treatment of the sands from the stamps.

From the mill the concentrates are taken to the calciner—a Bruckner, built by F. Bartle & Sons, Carn Brea, with a capacity of 10 tons a day. This calciner requires but little attention. The concentrates contain about 12 per cent of sulphur and arsenic, principally the former. From the calciner the concentrates are carried to the magnetic separator. The separator is about 6 ft. high, 12 ft. long and 6 ft. wide. The concentrates are gradually fed onto an endless traveling belt and conveyed over two sets of adjoining magnets. The belt is about 2 ft. wide. No. 1 magnet—4 ampere strength—attracts all the iron, which was formerly in combination with the volatilized sulphur of the iron pyrite. As soon as the belt travels beyond the influence of the magnets, the iron drops into a bin, which is at right angles to the belt. The No. 2 magnet, which attracts the wolfram, is of 12 amperes; the wolfram, not being so susceptible to the influence of the magnet as the iron, requires greater force to be attracted from the endless belt, and is diverted into a separate bin, which is also at right angles to the belt. The capacity of the magnetic separator is about 5 tons per day. The magnets have no effect on the tin, which is carried by the belt to the tail roll, and deposited.

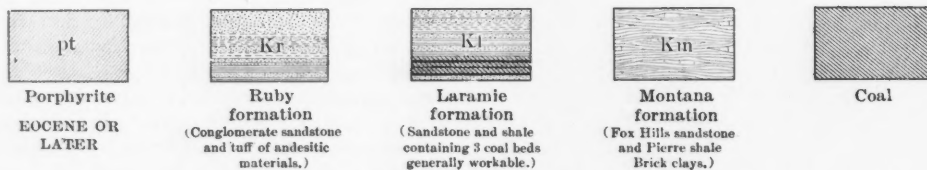
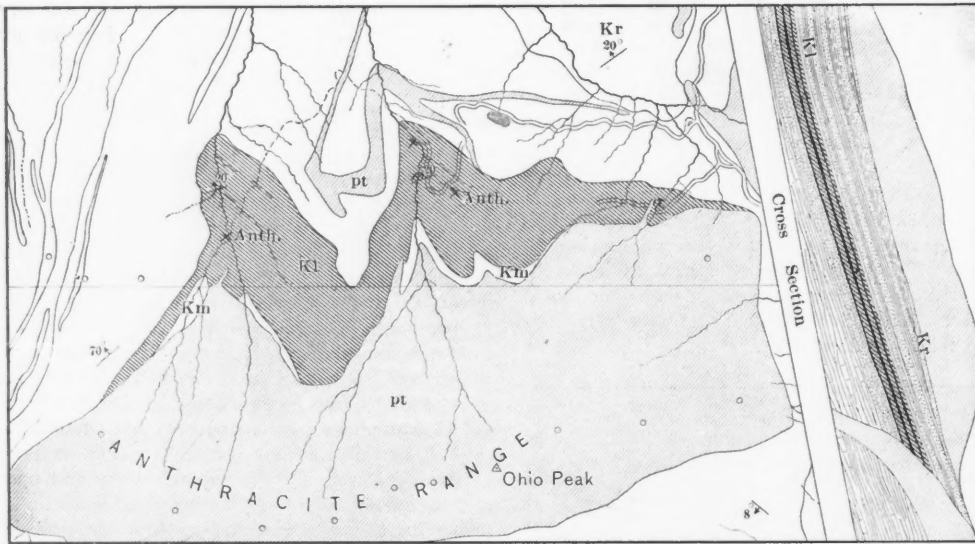
The wolfram is taken from the bin to the "tin house," where it is "tossed," that is, stirred in a sieve either by hand or machine, for a few minutes. Tapping by a bar or pounding with a hammer causes the waste or light particles to settle on the top in a uniform stratum, varying from 2 to 4 in. This top layer is treated again, whilst the heavy parts—about a ton—are bagged and sold as wolfram, containing from 60 to 64 per cent of tungstate of iron.

The tin ore is cleaned and prepared for market in the usual way, and ranks as the best tin sold in Cornwall.

The separator is noiseless, and largely automatic, and specially adapted to Cornish mines, as skilled nets, also that for driving the belt, is generated in nets, also that for driving the belt, is generated in the engine room.

This mine last year bought a waste heap, which had been formerly treated by the Greenhill Arsenic Company. This heap is on an adjoining claim, and is easily trammed to the mill. The Arsenic Company made a gallant—though expensive—effort 30 years ago to extract all the values, such as gold, silver, tin, arsenic, copper, sulphur, etc., by "secret processes," from the complex ores of this district. The result was that in this one heap of 65,000 tons, assay showed tin 0.3 per cent and wolfram 0.7 per cent. The dump is easily worked; it is principally "fines," and what is coarse is easily crushed, having been roasted and since oxidized. Over 40,000 tons of this dump have been treated, and the balance is being milled at the rate of 100 tons per day.

A little ore is being treated from the mine, and while the values are greater in tin, there is less wolfram.



CRETACEOUS

MAP OF COLORADO ANTHRACITE REGION, AFTER U. S. GEOLOGICAL SURVEY.

the product of the face to the entry are made of No. 16 steel sheets, 3 ft. wide, laid on the footwall, and nailed on to sides made of 2 by 6-in. scantling. When in constant use the angle of inclination is sufficient to keep the chute clear, but if the steel lining becomes at all rusty, the slope proves inadequate for the automatic descent of the coal, and the miner jumps into the chute and toboggans down the incline, pushing the coal before him with his feet. The men get 90c. for 2,600 lb., of which it is estimated that 2,000 lb. is clean coal, the balance going over the culm heap. Wages, as I got them from a scrutiny of the pay-rolls, averaged \$4.25 per day, with about 30 men at work. The men are largely Austrians; scarcely one-half of the workmen are English-speaking.

In the mine we found that pillars to support the roof were left 15 ft. wide, while the rooms or stopes were 25 ft. The drilling is done with machine augers, the hole being begun with a 2½-in. bit, and finished with a 1½-in. Holes are made from 4 to 6 ft. deep. Coarse black powder is used; it costs the miners \$3.00 per keg of 25 lb. The product of the mine is sent to the breaker, which has a capacity of 600 tons per day. Five sizes are made. The coal from the tippie goes over two sets of screen-bars, the fines going direct to the picking tables and the lump to the breaking rolls. These are toothed rolls of the usual type. Then follow revolving screens. The culm is handpicked as it runs down

large distinct crystals of feldspar. The bed of shale traversed by the dike is, near the porphyrite, hardened, and otherwise altered into a dark, massive rock. Fragments of shale are included within the dike. The joints in the sedimentaries cross the dike clearly, and are, therefore, later than the intrusion of the latter. There is no distinct parting or wall between the sedimentaries and the eruptive.

(To be Continued.)

PIG IRON PRODUCTION IN BELGIUM.—The production of pig iron in Belgium for the seven months ending July 31 is reported at 753,115 metric tons; of which 61,572 tons were foundry iron, 156,680 tons forge iron, and 534,863 tons bessemer and basic pig. The total shows an increase of 161,907 tons over the corresponding period last year.

PHOSPHATES IN JAPAN.—A British Consular report says that the phosphate deposits, near Shima, in Japan, are situated at the village of Kamo, and were discovered while exploring for the extension of a manganese mine. The quality of the deposits varies a good deal, but would seem to contain on an average about 10 per cent phosphoric acid. Exploration so far made shows that there is a considerable quantity of the phosphate. The mine is about 1½ miles from the port of Funatsu, on the Bay of Toba, so that shipments can easily be made.

The magnetic separator has been the salvation of this mine. In 1902, 108 tons of tin were sold at an average price of \$270, some of the tin from the dumps being worth only \$150; whereas, last June 2,540 tons were milled yielding 8 tons 16 cwt., which fetched \$380 per ton, and 19 tons 19 cwt. of wolfram realized \$4,970, or about \$248 a ton, making a total of \$8,360. Working expenses, including the wages of 140 men and boys and merchants' bills, totaled \$3,830, so that there remained a profit of \$4,970.

The yield of tin obtained was 0.378 per cent.

The yield of wolfram obtained was 0.72 per cent.

COST OF EARTH WORK.

H. P. Gillette, in his recently published treatise on "Earth Work and Its Cost," summarizes various data as to the cost of handling earth by picking and shoveling in the statement that the cost of excavating with pick and loading is about 40c. per cu. yd. for hardpan; 20c. per cu. yd. for tough clay; 15c. per cu. yd. for ordinary clay, gravel or loam, and 12c. per cu. yd. for very light sandy or loamy soils, wages being reckoned at 15c. per hour in all cases. After earth is once loosened and shoveled upon a board platform, as in casting in stages out of a deep trench, one man will shovel off the boards all that

ing other than large, square-pointed scoops should be used in handling earth off boards or in shoveling sand, unless it is to be cast some distance. With a large, square-pointed scoop a strong man can load sand into a wheelbarrow at the rate of 1 cu. yd. in five minutes. Roughly speaking, it takes 150 to 250 shovels of earth to make 1 cu. yd.; in casting into a wagon box at a good steady gait seven shovels are loaded per minute. This is for a vertical lift of about 5 ft., but in casting out of a trench with a vertical lift of 10 ft., only five shovels are cast per minute. In casting earth horizontally, nine shovels per minute may be done for a 5-ft. throw and about one-half as many for an 18 or 20-ft. throw. With wages at 15c. per hour, it costs about 5c. to carry a cubic yard 10 ft. in shovels, hence men should be close enough to the wagon they are loading, so as not to have to take any steps before casting. The further away a man is from the wagon the fewer shovels can be cast in a given time, and as each shovelful is also smaller, a man 12 or 15 ft. away from the wagon will load only about one-half as much as if he were within 4 or 5 ft. of it; hence it does not pay to crowd more than 6 men around a wagon, acting upon the idea that quick loading saves money by saving team time. Large square-pointed shovels should be used wherever possible. The work should be directed to a face wherever possible, and a temporary floor should be laid down at the face, so that earth picked down will fall on the floor, whence it can be easily shoveled. A high face of earth should be undermined with pick and then wedged off by driving in bars from the top. Wherever possible, in earth work, men should be paid by the cubic yard, not by the day.



CRYSTAL CAÑON, COLORADO.

The price of wolfram is about \$4 per unit. A little prospecting for wolfram is being conducted around Hemerdon, on Dartmoor.

IRON ORE IN LUXEMBURG.—The production of iron ore from the mines in Luxemburg in 1902 reached a total of 5,130,069 tons, an increase of 774,890 tons over the previous year.

RUSSIAN RAILROADS IN ASIA.—The work on the Orenburg-Tashkent line, which will connect the Russian Railroad System with the Trans-Caspian line, is now well advanced. The total length of the road will be 1,174 miles; about 960 miles are graded, and the rails have been laid for 288 miles from Orenburg. The bridge over the Ural River has been completed, and is in use.

two men can loosen and cast up. Although a man can possibly cast earth about 12 ft. vertically from floor to floor, it is best to have floors only 5 to 7 ft. apart. The quantity of earth that a man can handle with a shovel varies not only with the character of the soil, but also with the method of attack. If a man is shoveling from a face of earth over a foot high, one that he can readily undermine with a pick, he can load 1.8 cu. yd. per hour on an average, but if he is shoveling ploughed soil, where he must use more time to force the shovel into the soil, his output will be only about 1.4 cu. yd. per hour. If he is shoveling loose earth off boards upon which it has been dumped his output is about 2.5 cu. yd. per hour.

The size of the shovel makes a marked difference in the efficiency of the laborer. A small, round-pointed shovel must be used in tough soils, but noth-

THE OLDEST IRON COMPANY.

An interesting occasion was the annual meeting of the stockholders of the Thomas Iron Company, which was held at Hokendauqua, Pa., September 8. This company is the oldest iron manufacturing company in the United States, which has been in continuous operation under its original name, and without consolidation with any other company. It has nearly completed its fiftieth year. The preliminary meeting for organization of the company was held on February 14, 1854, in Easton, Pa. Officers were then appointed, and a charter applied for, which was granted under date of April 4, 1854. There were twenty-five stockholders at that time, of whom but one is now living, Mr. Samuel Thomas, of Catasauqua, Pa. At the recent meeting the president presented an historical sketch of the company, which will be included in its annual report, shortly to be published, and it was decided to observe the semi-centennial anniversary by a jubilee celebration on or about April 4, 1904. The operations of the Thomas Iron Company are well-known, and for many years the anthracite pig iron made in its furnaces was the standard for anthracite pig in the general market. In the earlier volumes of *The Mineral Industry* we were indebted to this company for extremely interesting records of costs and prices of anthracite pig. These figures had been carefully preserved in the records of the company, and could nowhere else be found for the earlier years of its history. We are pleased to know that the company remains active and prosperous, and that it has preserved its independence in the present day of consolidation.

The officers of the company are: B. F. Fackenthal, Jr., president; William H. Hulick, vice-president; James W. Weaver, secretary and treasurer. Directors, Samuel Thomas, William H. Hulick, William P. Hardenbergh, B. F. Fackenthal, Jr., Fred R. Drake, Joseph S. Rodenbough and J. Samuel Krause.

MANGANESE MINING IN RUSSIA.—The Russian Government has authorized the establishment of two branch banks in the Caucasus, for the special purposes of making advances on ore shipments and regulating the sale of manganese ores.

THE ORE DEPOSIT AT CONTACT, NEVADA.*

By CHESTER W. PURINGTON.

The district with which this paper has principally to deal is situated near the small settlement known as Contact, in Elko County, northeast Nevada, two miles to the west of Salmon River, a tributary of the Snake, and 40 miles to the west of the boundary of Utah.

The small mining community known as Contact received its name presumably because it is situated on the approximate junction of a mass of grano-diorite and limestone. A few words are not out of place regarding the unreasoning use of the word "contact" by prospectors, and occasionally by mining engineers of experience. According to the Standard Dictionary, a contact in mining is the line of delimitation between a metalliferous vein and its wall or country rock; in geology a contact is the junction of an igneous rock and the country rock, and generally of rocks of different ages or kinds. These definitions are perhaps as good as any that can be

and that the 1,500 ft. of limestone and quartzite overlying the grano-diorite and underlying the capping basalt on Ellen D. mountain represent the en-

The entire middle portion of the laccolite, with the overlying sediments, has been removed down to a general level of 6,000 ft., leaving the mass of grano-

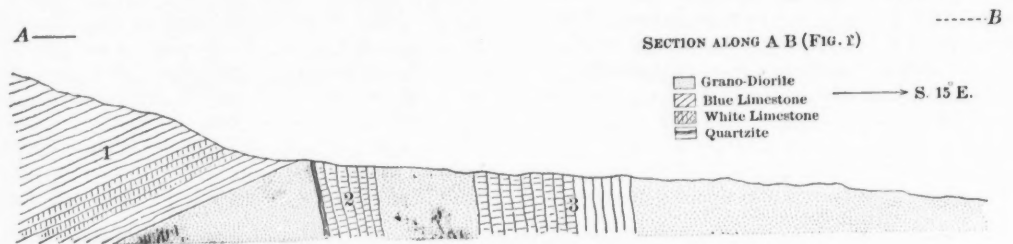


FIG. 2.

tire geological section at this locality. If the mass be considered as a stock, one must assume that the Cambrian and Algonkian rocks do not exist in this part of Nevada, whereas they are known to exist at

diorite with a low rough topography. On the north-western slope of Ellen D. mountain, and on the eastern and easterly-dipping slope of the mountain to the east, a capping of the more recent basalt is found of a thickness not exceeding 500 feet. That this basalt has covered and been partially removed from the region at a time subsequent to the bulk of the erosion of the other rocks, is interestingly shown by Table mountain. This is a small inlyer of basalt directly capping the grano-diorite, two miles to the east of the top of Ellen D. mountain, with an elevation of 7,000 ft.

At the junction of the grano-diorite and the limestone beds on the east slope of Ellen D. mountain, a complicated mingling of the two rocks has occurred. The accompanying section (Fig. 2), taken at a distance of 9,000 ft. ESE of the top of the mountain, illustrates the relations. The grano-diorite itself is of medium grain, with abundant plagioclase and orthoclase feldspar, a sparse amount of quartz, much biotite, and a subordinate amount of hornblende, which is somewhat decomposed to chlorite. The limestone, in blue and white alternating layers, blue predominating, appears with a fair degree of constancy in three parallel occurrences, as here illustrated. The southeast group of beds shows a thickness of 800 ft., with white limestone lying above the blue. Going up the hill to the west, 500 ft. of grano-diorite are succeeded by a layer of white limestone 300 ft. thick; this is in turn succeeded to the west by 20 ft. of white quartzite; 50 ft. of grano-diorite intervene, and are succeeded to the west by the main mass of the limestone with a predominating amount of blue beds and a thickness

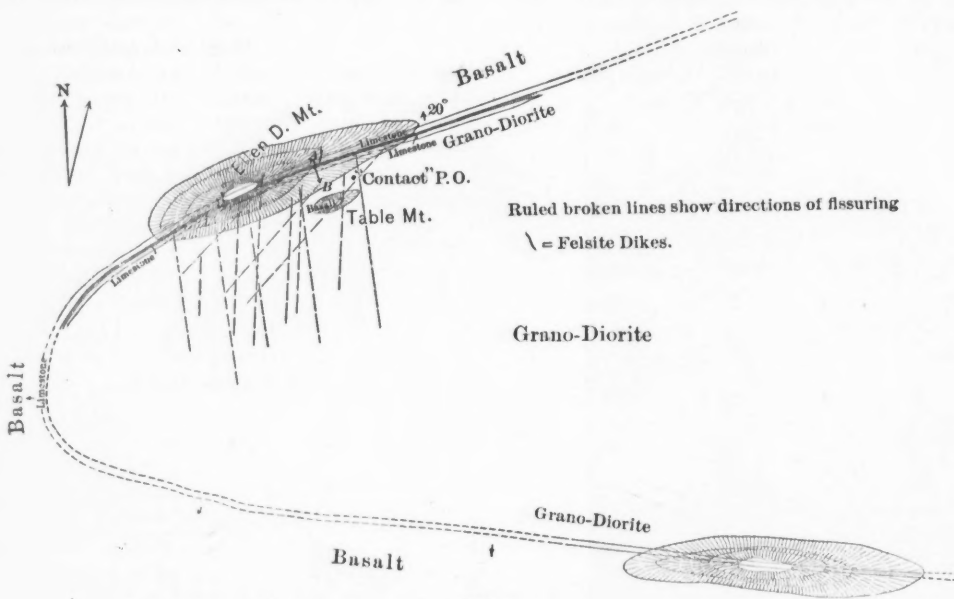


FIG. 1.

devised, although the substitution of the word "plane" for the word "line" may be deemed acceptable.

A contact, then, being defined as a plane, cannot have volume, and the name, as applied to a flat-lying ore-body, which application it frequently appears to have, is inexcusably wrong. I must frequently make use of this word in the following notes and have entered this mild protest concerning its much-abused significance in order that no misunderstanding may occur.

At Contact, the limestones, presumably Carboniferous, have been subject to distortion, in the form of an uplift. The Ellen D. mountain, at Contact, and another mountain 20 miles to the east, owe their origin to what I feel justified in calling a laccolite of grano-diorite, of which the central portion, together with the overlying sediments, has been removed by erosion. The definition of laccolite, given by Gilbert, in his "Geology of the Henry Mountains," applies to an intrusive mass of igneous, and necessarily plutonic rock, intercalated between layers of sediments, having a dome-shaped upper surface, and approaching in form a hemisphere. The form assumed by the overlying and distorted sediments must necessarily be that of a quaquaversal flexure, dipping away on all sides from a central point. At Contact the evidence that sediments underlie the grano-diorite mass is lacking, but the assumption is made that sediments similar to those found overlying the plutonic mass lie in place beneath this mass. This seems more probable than that the grano-diorite mass has intruded, in the form of a stock, through the entire mass of the underlying sediments,

Eureka, and Mr. C. D. Walcott states that in parts of Nevada the Algonkian rocks attain a thickness of 10,000 ft.

Of the quaquaversal, at present only portions of the

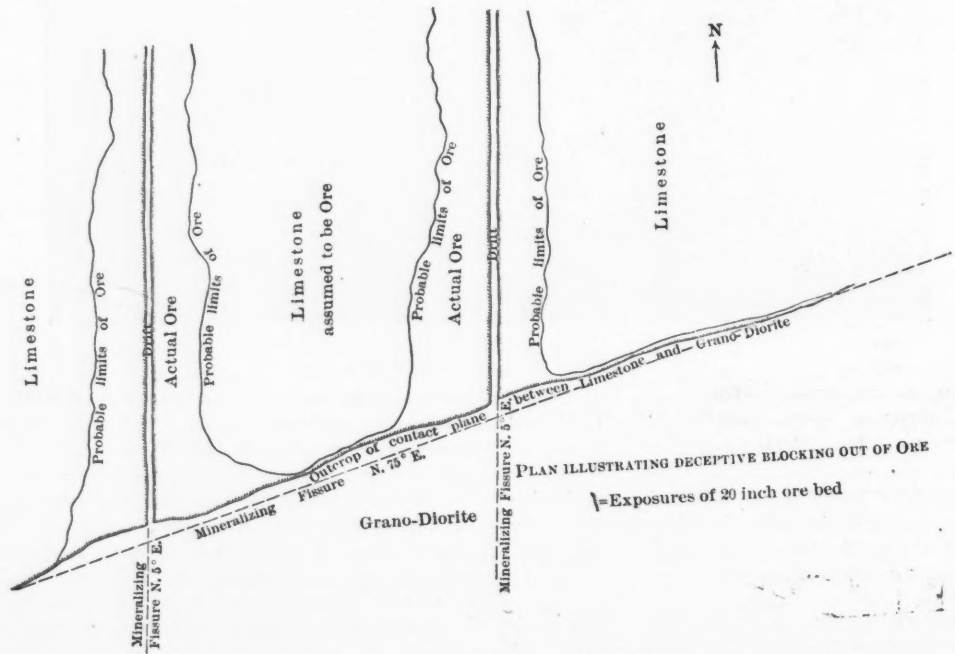


FIG. 3.

two legs on the western half remain. These, represented by detached fragments of the original mass, compose Ellen D. mountain, and its neighbor to the east, as represented in the sketch (Fig. 1).

of 1,500 ft. This upper and main group is capped directly by basalt, conformable in strike and dip, which composes the top of the mountain 8,000 ft. in height. The strike of the series is north 75° E.,

* Abstract from paper entitled "The Contact, Nevada, Quaquaversal," by Chester Wells Purington. *Proceedings of the Colorado Scientific Society*, August, 1903.

and the dip of the main mass of limestone and basalt layers is 20° NW.

Although the limestones are, in places, found in fairly fresh and unmetamorphosed condition, fossils were not identified, and thus the age of the beds can be judged only from the physical appearance, and from correlation with other points in the Great Basin. On this ground they are assigned to the Carboniferous horizon.

The structure, as represented in this section, is fairly constant along a strike of about seven miles, although at only a few places toward the east end of the mountain is the dip of the various groups so graphically shown. On the transverse ridge from which the section was drawn, the entirely unconformable dip of groups (3) and (2) was to be seen diagrammatically displayed. If the hypothesis be admitted that the grano-diorite is the eroded relique of an intrusive laccolite, it is an allowable deduction that the two easterly bands of limestone are layers lifted from the underlying sediments by the agency of the viscous plutonic mass at the time of its intrusion. Another explanation is possible, namely, that the intruded layers with unconformable dip have been broken off from the mass to the west and been partially submerged in the cooling mass. A rather uncertain correlation which can be made out between the beds of (1), and of (2) and (3) lends weight to this view. So unusual a phenomenon as the one here displayed is difficult to explain.

At the time of the deformation of the sediments by the laccolite, and slightly subsequent to it, fissuring occurred in both the grano-diorite and the limestone. The main fissuring, which resulted in a marked sheeting of the diorite, was in strike N. 5° E., to N. 5° W., and vertical. This was so prominently developed in some areas as to have induced a sort of coarse lamination in the grano-diorite. It was not, however, accompanied by a development of open space, in many instances. The subordinate systems were developed, one N. 75° E., following the lines of contact, and one N. 45° E., of limited development. This last direction determines the trend of one or two of the veins which have been worked for copper in the northeast part of the area. Dikes of felsite, in all probability of a chemical composition not different from that of the grano-diorite, but of porphyritic habit, penetrate the limestone, following for the most part the nearly north and south fissures. These dikes have generally a width of from 2 to 3 ft., but in one instance a dike 40 ft. wide occurs. At one point there occur two dikes of felsite, each 5 ft. wide, 50 ft. apart, with parallel strike N. 45° W., crossing the limestone beds of one (1), which dip into the mountain. All the dikes are undoubtedly offshoots from the main laccolite, and their porphyritic form is explainable from the fact of their having cooled under different physical conditions.

It is evident that the rock complex here considered presents five planes of contact. On all of these, but mainly on the east side of (1) band, and (3) band with grano-diorite, the north and south fissures penetrating the rocks have deposited copper ore. Small copper veins in the grano-diorite striking nearly north and south may be seen at numerous points for the entire distance along the east and west direction above referred to. Where these seams cross the contacts, especially when the felsite dikes occur in the immediate vicinity, the ore-bearing solutions appear to have exercised a selective activity of replacement along the adjacent limestone layers. Thus there have been formed ore bodies of an intermittent character, rarely exceeding 20 in. in width, and never, in observed cases, extending over 50 ft. laterally from the mineralizing veins or dikes. In one case a fissure, very nearly following in strike and dip the contact of grano-diorite, with (3), has been found to carry copper sulphides to a depth of 300 ft. from the surface. Had the grano-diorite been more easily subject to fissuring, and the amount of open space developed been important, it is likely that extensive ore bodies would have been formed.

It should be noted that, where the north and

south fissures cross the beds of limestone at other than right angles both to the strike and dip, it is the down side of the limestone beds which has been the more abundantly replaced by ore. In some cases toward the east end of the mountain, the fissures in the grano-diorite, apart from the limestone, have been worked as copper veins. These veins, carrying glassy quartz as gangue, form outcrops which stand out prominently on the hillsides above the more easily eroded grano-diorite country. The vein outcrops vary in width from one to four feet.

The minerals found in the quartz veins and mineralized beds of limestone carrying copper values are quartz gangue with small amounts of chalcodony, while the only contact mineral identified was garnet;* as ore, minerals, chalcopyrite, chalcocite, bornite, cuprite, malachite, azurite and chrysocolla. Molybdenite in small quantity occurs with the ore. In all probability the original sulphide was chalcopyrite, and at a considerable depth an impoverishment of the surface percentage of copper is to be expected. In a nearly rainless country such as the one described it is not likely that secondary changes have played an important part. The bornite and chalcocite are, in all probability, secondary. Secondary changes would have been aided through the forming of copper salts due to the influence of the limestone.

The occurrence here described presents an instructive feature bearing on the question of mine sampling. It may be seen that the contacts between grano-diorite and limestone are the seat of deposition of small bodies of ore along and to a short distance laterally from the crossing of the north and south fissures, and crossing of the dikes, and generally only under these conditions. The fissures carrying ore in the igneous rock are not regularly distributed, but may be said to occur at intervals averaging 300 ft. apart, for a distance of seven miles from east to west. The ore has no continuous extent across the main fissuring, from one mineralizing vein to another. Openings for development disposed along the north and south veins would show ore throughout the entire drift for considerable distances into the mountain away from the grano-diorite mass. Taking any two of these parallel drifts, it is clear that a possible inference might follow that they showed two sides of a bedded deposit of copper ore. How dangerous this inference would be becomes evident when the geological conditions are considered. The deception is rendered more striking when one of the mineralizing fissures running N. 75° E. is nearly coincident with the exposed edge of the plane of contact, as illustrated in Fig. 3. Instead of exposing two sides of one wide body of ore, the two parallel drifts are run merely on two narrow shoots of ore, having no connection the one with the other. An east and west drift to connect the two running north and south would at once disprove the existence of continuous ore between.

GERMAN IRON PRODUCTION.—The German Iron & Steel Union reports the output of the blast furnaces in July at 865,343 metric tons of pig iron; being 25,802 tons more than in June, and 159,422 tons more than in July, 1902. For the seven months ending July 31, the total output was, in metric tons:

	1902.		1903.	
	Tons.	P. c.	Tons.	P. c.
Foundry iron	913,188	19.4	1,031,118	17.9
Forge iron	704,162	14.9	431,976	7.6
Steel pig	228,906	4.8	519,007	9.0
Bessemer pig	2,873,441	60.9	254,710	4.4
Thomas (basic) pig			3,510,803	61.1
Totals	4,719,697	100.0	5,747,614	100.0

Steel pig includes ferromanganese, spiegeleisen, ferrosilicon and similar alloys; these were not reported separately until this year. The total increase in output was 1,027,917 tons, or 21.8 per cent.

*I would infer that pneumatolytic action in the formation of these copper deposits has been entirely subordinate.

ORE-BREAKING AND SORTING ON THE RAND.*

By H. S. DENNY.

In all the mines on the Rand the ore before being sent to the surface is regulated to a certain maximum gauge by an arrangement of sizing bars fixed over the station bins at the shafts. The object, primarily, is to reduce the largest pieces of ore to such a gauge that there will be no liability to choke the outlet from the bin; but it serves also the secondary and equally important purpose of preventing rocks of too great a size from passing to the ore sorting house.

The ore when delivered at the surface is usually classified into "fines" and "coarse rock" by dumping the skipload onto a grizzly in the headgear; the fines, being unsortable, go direct to the mill, and the coarse ore is sent to the sorting house.

The rock in the sorting house is subjected to scrutiny, either on floors, revolving tables or traveling belts, and the rejected waste goes to the dump. The sorted ore is fed into ore-breakers for further reduction.

The breakers may be classified into two generic types, the gyratory and the crank motion type, the former being largely represented by the Gates and the latter by the Blake machine. Each type has its supporters, but it is generally considered by the moderates that the former is the better machine when unit capacity is demanded, and the latter when multiplication of machines is not embarrassing to the general design, as its maintenance cost is less.

The general scope of the rock-breaker is to reduce the rock to about a 2-in. cube before delivering to the mill, but the average ore in the mill-bins will be found to exceed this gauge, owing to wear in the crushing part of the breakers.

In the most recent practice it is recognized that there is an advantage gained by subjecting the ore to a preliminary breaking; that is, to reduce its size before passing it to the sorting house in order that there may be closer uniformity in the sizes of the pieces of ore that are subjected to the sorting operation.

It is, I think, doubtful whether the practice of ore reduction in breakers is carried sufficiently far. It would appear that a material increase is to be obtained in the stamp duty if there were a succession of, say, three breakers, each reducing the ore to smaller gauge than the last until the final product did not exceed an average of, say, half-inch cubes.

The line of demarcation defining the point where ordinary breaking should cease and milling begin has never yet been accurately determined, and this limit should be ascertained by actual experiment.

Recently there has been much discussion regarding the question of sorting, and in some particular cases where sorting had been practiced hitherto it has been decided to abandon the operation, as it is claimed that more favorable results can be obtained without it. There are many aspects of this question which lend themselves to conflicting conclusions, but that there are some cases in which the operation is highly beneficial, there can be no doubt. To say that sorting is an operation that should apply to every proposal is more or less to claim that the same conditions are presented in each case. This we know is not so, and, consequently, the operation will more particularly apply to one case than to another, and there will be limits at which it will reach its highest efficiency and its lowest.

I propose to take a case representative of certainly the majority of the mines on the Witwatersrand and will deal with it both on a sorting and a non-sorting basis.

Assume that we have a mill of 100 stamps, a property of 100 claims and 40,000 tons per claim. The total tonnage would be 4,000,000 tons. Suppose each ton of ore delivered at surface to have the following value: 50 per cent fines, 12 dwt. per ton; 50 per cent

*Abstract from advance sheets of paper entitled "Observations on the Metallurgical Practice of the Witwatersrand," by H. S. Denny, read before the Chemical, Metallurgical & Mining Society of South Africa.

coarse rock, 12 dwt.; 100 tons contain 1,200 dwt., worth, at \$1.008 per dwt., \$1,209.60, equal to \$12.096 per ton. Without sorting we get, say, 80 per cent extraction, equal to \$967.68 from 100 tons; that is, \$9.676 per ton. Assume costs at \$5.76 per ton, divided as follows:²

Mining.....	\$2.52	per ton milled (15,000 tons)	\$37,800
Crushing.....	0.12	" "	1,800
Milling.....	0.60	" "	9,000
Cyaniding.....	0.60	" "	9,000
Slimes handling.....	0.12	" "	1,800
General.....	0.72	" "	10,800
Head office.....	0.36	" "	5,400
Mine development redemption.....	0.72	" "	10,800
	\$5.76		\$86,400

Leaving a profit of \$3.916.

One hundred heavy stamps crush 500 tons per day, or 15,000 tons per month, equal to 180,000 tons per annum. Life of mine equal to 22.2 years. The net profit made in that period is 4,000,000 tons at \$3.916 per ton, equal to \$15,664,000. The present value of that amount, at 5 per cent compound interest, is \$5,470,663.73. (In this calculation I have not allowed for amortization of capital.)

With 20 per cent sorting we have the following statement: 50 tons fines at 12 dwt., equal to 600 dwt. From the remaining 50 tons, containing 600 dwt., we discard 20 tons carrying 2 dwt., equal to 40 dwt., leaving 560 dwt. contained in 30 remaining tons. We thus have 80 tons of ore containing 600 plus 560 equal to 1,160 dwt., equal to, at \$1.008 per dwt., \$1,169.28, equal to \$14.616 per ton; 80 per cent extraction equal to \$11.694 per ton.

The costs in this case would be as follows:

Mining.....	\$3.15	per ton milled (15,000 tons)	\$47,250
Crushing.....	0.12	" "	1,800
Sorting.....	0.12	" "	1,800
Milling.....	0.60	" "	9,000
Cyaniding.....	0.60	" "	9,000
Slimes handling.....	0.12	" "	1,800
General.....	0.84	" "	12,600
Head office.....	0.48	" "	7,200
Mine development redemption.....	0.90	" "	13,500
	\$6.93		\$103,950

It might be argued that mining costs should be taken lower in this case as against the first, seeing that the fair proportion of general charges is spread over the larger tonnage mined. The statement would leave a profit of \$4.764 per ton milled; 18,750 tons per month, equal to 225,000 tons per annum; life of mine equal to 17.7 years; tons milled equal to 3,200,000, at \$4.764 per ton; net profit equal to \$15,244,800 earned in 17.7 years. The present value of that amount is \$6,429,644, or a difference in favor of sorting of \$958,980. In this comparison we have the same sized plant milling the product of 18,750 tons mined in the one case as against 15,000 tons in the other.

Against the extra cost of mining to produce 15,000 tons for the mill when sorting, we have the extra cost of milling, handling and treating the extra sands and slimes which we should have to incur without sorting. It must not be forgotten, too, that in the case of non-sorting every ton of waste rock has to be provided with 10 tons of water, and the cost of up-keep and cleaning out of slime pits will be increased by reason of the extra tonnage. I have assumed the cost of milling to be the same in both cases. The only extra capital expenditure for the case in which we adopt sorting is the sorting plant. It has been argued that if the mill capacity were increased to an extent sufficient to cope with the extra tonnage that this would be more economical than sorting.

Taking the cases above cited we must increase to 3,750 tons more; as one stamp will crush 150 tons per month, this is equal to 25 stamps more. With the increased tonnage working costs might be reduced to say, \$5.28; but a corresponding increase in the mill when sorting would also show reduced working costs, and therefore the comparison would only increase the favorable aspect for sorting.

The rock discarded I have estimated at 2 dwt., in value, \$2.016, per ton. We get 80 per cent extraction from this, equal to \$1.613. It has to be crushed, 12c.; milled, 60c.; cyanided, 60c.; converted into slime and handled, 12c.; total, \$1.44; and the margin in profit

would not cover its share in depreciation of plant and the loss of water involved, while at the same time it is preventing the treatment of more valuable ore if sorted; and all this, too, on the assumption that its corresponding residue would only be 0.4 dwt., and nothing in the slime, whereas it is probable that the sand residue and the slimes from it would be the same as the rest of the ore, and, therefore, more than 0.4 dwt.

I am presupposing, in these illustrations, that 20 per cent sorting is not only possible, but easy of actual fulfilment. There are, however, many variations in the cases to which sorting is applied, and each case must be judged on its individual merits. These variations may be expressed as lying mainly in the factor of reef thickness.

For instance, on a reef 3 in. thick, where the stopes average, say, 42 in., the reef matter in every ton of ore mined is only 7 per cent, and, assuming that we have 50 tons of fines, containing 3½ tons of reef, we have 50 tons of coarse rock containing the same proportion. In such instances it might be possible to sort 40 tons of waste rock in every 100 tons from the mine.

On the other hand, we may have 12 ft. of reef matter, of which we mine say the central 8 ft., and as the whole of our product would be reef, no sorting would be possible.

These are two extreme cases, and between their limits will occur the variations between nothing and 50 per cent sorting.

I have thus far assumed 50 per cent as representing the average percentage of fines in ore from the mine, but naturally there are considerable variations in this factor dependent directly on:

- (1) Setting of grizzly bars.
- (2) Method of stoping.
- (3) Nature of ground.

If machines are used exclusively for stoping, the percentage of the fines will be high, while if hand labor only is used the percentage will be low. On many mines a combination of the two is resorted to; 30 per cent, however, represents about the minimum and 60 per cent the maximum, and something between the two, say 40 to 50 per cent, will be the average.

With 50 per cent fines it is necessary to carry out an actual 50 per cent table-sorting to represent 25 per cent on the tonnage mined.

On the above showing it is clear that where it is possible to sort out waste rock of an average value of 2 dwt. that it is a highly profitable proceeding. It is possible, however, to sort too little or too much. On a 3-in. reef, with a 4-ft. stope and 40 per cent fines, 20 per cent sorting would be far too low, while on 3-ft. reefs and 4-ft. stopes, allowing 50 per cent fines, 20 per cent would be far too high, and the average value of the discarded rock would reflect this.

Each case must, as before stated, be figured out on the particular circumstances regarding reef and stope thicknesses which obtain.

In some cases on the Witwatersrand I have heard it argued that the quartzites immediately overlying or underlying the reef carry sufficient gold to make their treatment profitable, but I have not met any such cases personally, excepting in some isolated sections, where the occurrence is too limited to influence the general question.

Naturally the object of sorting is to discard rock which cannot be treated profitably, and if the value of the waste rock at any time exceeds this limiting factor, then the operation is done at a loss. That limit will vary according to conditions, and must be computed independently for each proposition.

It is not an easy matter to arrive at the value of waste rock. I know of no method of sampling in vogue to-day which could be called accurate. The best check on the work is the recovery set against the value in the mine, and the discretion of the manager must be relied upon to see that there is a proper correspondence between these two points.

There are methods which suggest themselves cer-

tainly, and of these, either of the two following might be adopted:

(1) A certain percentage, or even the whole of the waste rock coming from the sorting plant to be passed through a set of two or more breakers and reduced fine enough to be sampled. Samples to be taken constantly over a period of one month and the operation to be repeated every few months.

(2) Five or 10 stamps to be occasionally set aside entirely for waste rock, and the crushed product to be treated independently of the ore passing through the remainder of the mill.

Of these two alternatives the first is the more feasible, although the second is undoubtedly the more accurate, but the expense attaching to the latter method prohibits it. If a mine is not in a position to keep its full mill going, it might use some of the idle stamps for this purpose, and instead of treating the resultant pulp separately, simply take a careful series of screen samples.

Another point which has arisen and which bears very directly on our present condition wherein, owing to shortage of labor, we are in some cases only able to mine sufficient ore to feed a portion of our battery, is whether it is not of greater advantage to run the whole mill on unsorted ore than to adopt sorting and keep stamps lying idle.

Take the case of a mine equipped with 100 stamps, where only 500 tons of ore can be milled per day. If 25 per cent sorting is adopted only 75 stamps can be run, whereas without sorting the full mill could be kept running.

Assume the ore consists of 50 per cent coarse rock and 50 per cent fines and is worth, delivered at surface, 14 dwt., and that we secure 80 per cent recovery in either case, and that the waste rock discarded in the case of sorting is 2 dwt., we then have the following comparative statement:

Case for Sorting.—

100 stamps will crush 500 tons of ore per day.	
250 tons fines at 14 dwt.....	3,500 dwt.
125 tons sorted ore at 26 dwt.....	3,250 dwt.

Total 375 tons of ore at 18 dwt..... 6,750 dwt.

Eighty per cent of 18 dwt. amounts to 14.4 dwt. at \$1.008, equal to \$14.515 recovery.

Expenditure.—

Mining.....	\$3.36	per ton milled (375 tons)	\$1,260
Crushing.....	0.12	" "	45
Sorting.....	0.12	" "	45
Milling.....	0.60	" "	225
Cyaniding.....	0.60	" "	225
Slimes handling.....	0.12	" "	45
General.....	0.84	" "	315
Head office.....	0.48	" "	180
Mine development redemption.....	0.96	" "	360
	\$7.20		\$2,700

Profit \$7.315 per ton, equal to \$2,743,125.

Case for Non-Sorting—

Five hundred tons at 14 dwt. equal to 7,000 dwt., 80 per cent of 14 dwt. equal to 11.2 dwt. at \$1.008, equal to \$11.289 per ton.

Expenditure.—

Mining.....	\$2.52	per ton milled (500 tons)	\$1,260
Crushing.....	0.12	" "	60
Milling.....	0.60	" "	300
Cyaniding.....	0.60	" "	300
Slimes handling.....	0.12	" "	60
General.....	0.72	" "	360
Head office.....	0.36	" "	180
Mine development redemption.....	0.72	" "	360
	\$5.76		\$2,880

Profit \$5.529 per ton; 500 tons at \$5.529 equal to \$2,764.50. Difference in favor of non-sorting \$21.375.

In the latter case, however, there is an extra charge for loss of water and for depreciation of the extra stamps to be run, and if these allowances be made there is in the comparison above made remarkably little difference.

The whole issue hinges finally on the value of the rock discarded. If that value is only 1 dwt., then sorting will prove advantageous, but if we allow 3 dwt. for the waste rock, then it would pay to run the idle stamps, and it is on the determination of this factor that the policy adopted must be guided.

This comparison must in no way be confused, however, with the question raised in the first illustration in which the tonnage crushed is equal

²In these calculations the £1 sterling is taken at \$4.80; 1 shilling at 24 cents.

HIGH EXPLOSIVES; SAFE AND ECONOMICAL METHODS OF HANDLING.*

By J. H. KARKEET.

In no department of human industry has more rapid progress been made of late years than in the use of explosives. Through the work of the ablest chemists and the best engineers we have to-day explosives which are so varied in their method of action as to be adapted to all varieties of work, and are so completely under control that they may be handled freely in any class of work with perfect safety by careful and experienced operators.

The advantages of using strong explosives are manifold and manifest. If of two explosives of equal price one be stronger than the other, it is evident that less may be employed to do the same work, and the principal economy remains, even where the stronger commands the higher price, for the main expense of blasting is the labor of drilling, loading, etc., the cost of the explosive being one of the minor items. Therefore, it is economical to use the stronger explosive (even at a higher price). The completion of the work in a shorter space of time must also be taken into account, for the sooner the work is completed, the sooner we shall commence to realize the profit.

In many cases, however, strength is a matter of secondary importance, and in certain classes of work the mode of action becomes the paramount consideration. Of two explosives, one exerting a very powerful action upon a small surface and the other a milder but more sustained action upon a larger mass, it is evident that each will be useful in its own way. The one will shatter, the other will rend. In dealing with hard rock, economy lies in the use of the strongest grade, or No. 1. But in blasting a softer material No. 1 is too local in its action, and a larger mass can be broken with a weaker or slower explosive, or No. 2. The relative cost of the two explosives need not be considered; as a general rule, it pays to have explosives adapted to the work, without regard to the small difference in cost.

In many cases a heaving action, similar to that of black powder or gunpowder, but many times more powerful, is desirable. It is important, however, that this excess of power should be exerted in breaking up a larger quantity of rock, and not in throwing an equal quantity to a great distance. As compared with black or common gunpowder, for stopping and for work in light ground, the advantage of a still weaker explosive, such as No. 3, is obvious, from the fact that smaller holes may be used, and, consequently, much less labor required in drilling. For instance, if an ordinary compressed gunpowder cartridge, such as is used for coal mining, say 16 in. long by 2 in. in diameter, is required to break down 2 cu. yd. of coal, and we can store the same amount of energy (which means work) in the cartridge of an explosive, No. 3, which is 8 in. long and 1 in. in diameter, the miner, instead of drilling a 2-in. bore-hole, needs only to drill a 1-in. hole, thus saving labor and time, or the equivalent in money.

Moreover, the force of black powder, especially in seamy work, escapes at every crack, and thus much is wasted. On the contrary, the No. 3 explodes instantaneously and perfectly, and its whole force is utilized, no matter how shelly the rock may be.

Every miner knows the importance of having as much as possible of the charge at the bottom of the bore-hole. It is there that the maximum amount of work is exerted, and as high explosives contain energy in a smaller volume than ordinary gunpowder, or blast powder, they allow of concentration nearer the bottom of the bore-hole. Let us suppose two bore-holes, each 1 in. in diameter, with gunpowder to a depth of 4 ft., and give it 2 ft. of tamping; we charge the second hole with No. 3 explosive to a depth of 2½ ft., and give it 3½ ft.

of tamping; then fire both charges. It will be found that the second hole has given far better results.

In deep bore-holes, when it is a question of removing large masses of rock, as in quarrying stone, or in railway cuttings, the practical miner has always recognized the importance of concentrating his charges in the bottom of his bore-holes. I am a strong believer in "springing" or "chambering" (commonly called shaking) holes, and consider that in the future it will be more largely practiced than at present. By its means a small hole is converted into a larger one, and thereby much labor is saved. Both No. 1 and No. 2 explosives are adapted for springing, but the enormous strength of No. 1 fits it specially for this work. In soft or medium ground many experienced blasters use No. 2 with excellent results.

Every expert at blasting has his own method of doing this work. Nevertheless, I give the way which has afforded me the best results. Pack a small quantity of No. 1 or No. 2 explosive, according to the nature of the ground, firmly in the bottom of the hole, and lower upon it a small primer, being sure that the primer is well in contact with the charge. Pour in dry sand and tamp well; then explode. By this means the hole at the very bottom becomes enlarged and fissured, and a large volume of powder or explosive can now be packed well down where it will do the most good. It is wonderful how much execution powder will do when packed in this way.

Dynamite freezes more easily than water. When frozen it cannot be loaded properly, and is difficult of explosion. It must be thawed. Now, you can set dynamite on fire or burn it up without causing an explosion, but you must never roast, bake or fry it. That is, you must not bury it in embers or hot ashes, nor put it in an oven or kettle or other heated vessel, nor set it up before a fire, or expose it to any strong radiation of heat. Because a cartridge of dynamite may be lit with a match and burned with safety in open air—most always—many people are led to suppose that it can also be roasted before a fire or placed on top of a stove and thawed with safety. When lit with a match only a very small portion of the mass becomes hot, the balance remaining cool. When heated before a fire or exposed to any direct heat the entire mass becomes heated to a dangerous point. The sensitiveness increases very rapidly with the rise of temperature above normal. A temperature of 360° will surely cause an explosion. A cartridge laid on top of a stove, or in the oven, might easily become so hot as to explode without any shock.

It is best to keep dynamite, during cold weather, where it will not freeze at all, in a dry, warm cellar or deep mine.

There are safe ways to thaw dynamite. The Rundle thawer, where the cartridges are placed in tubes surrounded with hot water, is safe, but I do not recommend using a miner's lamp in connection with it. Another good way is to keep the dynamite in a small house containing radiators heated by exhaust steam. The cartridges should not be permitted to touch the radiators, but should be placed on shelves some distance from them.

Sir F. Abel has pointed out that when frozen nitro-glycerine preparations are subjected to the rapid application of great heat (as, for example, by the burning of a portion of a mass of the explosive substance itself), a detonation is much more readily brought about with the frozen material than if it be in its normal condition. The following is offered as the most probable explanation: When a mass of dynamite, as in these cartridges, is exposed to sufficient cold to cause the nitro-glycerine to freeze, it does not become uniformly hardened throughout, partly because of the slight variations in the proportion of the nitro-glycerine in different portions of the mixture composing the cartridge, and partly because, unless the exposure to cold be prolonged, the external portions of the cartridges will be more thoroughly frozen than the internal. It may thus happen that portions of only partially frozen or still unfrozen dynamite may be more or less completely

inclosed in hard crusts or strong envelopes of perfectly frozen and comparatively very cold dynamite. On exposure of such cartridges to a fierce heat very rapidly applied, as would result from the burning of a considerable quantity of the material, some portion of one or other of the cartridges would be likely to be much more rapidly raised to the igniting or exploding point than the remaining more perfectly frozen part, in which it is partly or completely embedded. If the ignition of this portion be brought about, the envelope of hard, frozen dynamite by which it is still more or less completely surrounded and strongly confined will operate like the metal envelope of a detonator in developing the initial pressure essential for the sudden raising of the more readily inflammable portion of the dynamite to the temperature necessary for the sudden transformation of the nitro-glycerine into gas, and will thus bring about the detonation of a portion of the cartridge, which will act as the initiative detonator to the remainder of the dynamite.

These explanations point to the danger of assuming that, because dynamite in the frozen state is less sensitive to the effects of a blow or initiative detonation than the thawed material, it may therefore be submitted without special care to the action of heat, for the purpose of thawing it. The necessity for imparting injunctions to working miners to use the warm-water apparatus for thawing out the cartridges is apparent, and it is gratifying to know that the number of accidents from this source is diminishing.

Precautions: Never attempt to thaw frozen dynamite by roasting, toasting or baking it. Never put it in heated vessels or on boilers, or before fires or heated metals.

Never put a cap into a charge or primer until you are ready to use it. After it is made never let a primer leave your hands until it is in the hole.

Keep the caps away from the dynamite. Never let them come near each other, except when they are to be used.

Never allow smoking or other fire near the powder or explosive, as it burns rapidly, especially when loose, and may fire caps incautiously left near by, and thus bring on an explosion.

Never use a metallic rammer.

Do not get nitro-glycerine on your fingers. It will be absorbed by the skin and give you a headache.

Invariably prepare your primer at a distance from your explosive.

As premature explosions may also take place by incautious handling of the electric apparatus, it is well to follow the directions given below.

Mobray, in his account of the Hoosac tunnel, refers to two fatal accidents which occurred through handling the wires under certain conditions. Premature explosion was caused in each case by the victims, who wore rubber boots, becoming charged with electricity due to the use of highly compressed air employed for the ventilation. The following are the cautions he recommends: "Let a blaster, before he handles these wires, invariably grasp some metal in moistened contact with the earth, or place both hands against the moist walls of the tunnel. Before taking the leading wires to the electric fuse wires let the bare ends of the leading and return wires be brought first in contact with themselves, and then in contact with the moist surface of the tunnel; and before inserting the primed cartridge, let him unite both of the uncovered naked wires and touch with them a metal surface having good ground connection. Above all, do not ventilate by allowing a free blast of air through a rubber connecting pipe until after the electric connections have been made and the blast fired."

Although dynamite is not exploded by an electric spark, but simply burns away when a current of electricity is passed through it, it ought to be adopted as a general rule to keep explosives at a distance from any electrical machine capable of generating strong currents. When tamping charges having electric fuses embedded in them press gently with the tamping rod, and do not give forced blows.

* Read before the Lake Superior Mining Institute at Marquette, Mich., condensed.

Never attempt to pull out a primer holding an electric fuse by trying to drag it out by the wires; an explosion may happen.

In tamping a charge, grains of powder or explosive lying upon the sides of the hole, and sometimes forming a train to the charge at the bottom, undergo a great amount of friction through the coarse tamping material, which may cause ignition and premature explosion of the charge; therefore, tamp with care, use only slight pressure, and do not resort to any violent motion of the wooden ramrod.

Miners very often carry dynamite cartridges in their pockets, especially in winter, when the warmth of the body keeps the compound in a soft condition. I caution miners not to have matches at the same time in their pockets, and not to smoke their pipes and forgetfully stick the still burning pipe in the same pocket. Laughable as this caution may appear, experience has shown that it is not out of place. The miner has generally an idea that dynamite is harmless, and, accordingly, he often treats it with the utmost recklessness.

A bad habit continually practiced by a great many miners is that of making a hole in the side of a cartridge, placing the cap and fuse in and bending back the fuse. The sharp bend in the fuse is sometimes sufficient to cause a break in the train of powder, resulting in a misfire. In case there are other cartridges placed above the primer, fire may flash through the break and set fire to the cartridge, and a portion of the charge would be lost before the explosion took place.

A great many miners adopt a similar bad practice with electrical fuses; that is, they put the cap in obliquely, as with fuse, bend the wire sharply over and secure cap by a half hitch, or, to make it worse, by two half hitches. So much force is used in making this half hitch that the sulphur filling in the electrical fuse is invariably broken, sometimes disarranging the wires in the cap and even breaking the fine platinum wire, or "bridge." In any event the cement is so broken as to leave free passage into the cap of any water which may be contained in the hole.

The platinum bridge is very small and delicate—it must be, in order to be capable of being heated red hot by the very small current of electricity which is used to fire the fuses, and any unusual strain on the wires may break the bridge, thus breaking the circuit and causing a failure of the shot.

Furthermore, the sharp bending of the wires—it is about the same as a storekeeper uses to break string—often strips the insulation from the copper wires. This would very likely leave the bare wires touching, causing a short circuit and the failure of that particular cap. The stripped wires, even if they did not touch, would offer an opportunity for a short circuit through any moisture present, which would rob that particular cap of part of the current of electricity, while the next cap might get the full current. The result would be that the first cap would miss.

In firing blasts with common fuse the cartridge containing the cap is often placed in the middle; or even at the bottom, of the charge, with the idea of insuring a more thorough explosion. While there may be some reason for firing a charge of black powder in this manner, there is no good reason for such practice when firing dynamite, for the explosion of dynamite is so quick that there is no appreciable difference in the results, whether the cap is placed in the top or the middle of the charge.

IRON ORE IN SWEDISH LAPLAND.—It is reported that iron ore has been discovered in large quantities at a place called Hantajarvi, near Uleaborg, and not far from the Russian boundary. Explorations are now in progress.

The iron ore from the Tuollavaara field is now being tested in several Swedish furnaces. These deposits are near Kiiruna. The ore is said to contain about 66 per cent iron and 0.011 phosphorus.

AN AFRICAN NIAGARA.

Among the picturesque feats of modern engineering promised for the near future is the harnessing of the energy of the celebrated Victoria Falls of the Zambesi. This noble waterfall represents a greater source of power than even Niagara. The total height of the latter is between 158 and 167 ft.; at the Victoria Falls the drop is between 400 and 420 ft. At Niagara the power running to waste is computed at 7,000,000 h. p., while the falls of the Zambesi during the wet season are reckoned to represent 35,000,000 h. p. Even during the dry season the Victoria Falls represent a stupendous source of energy. Herewith we give an illustration of the great leap of the Zambesi. Surveys have been made, and on the completion of the railway, now only 70 miles distant, further investigations will be carried out. Long electric transmissions of power are contemplated, and, judging from experience in other regions, it is expected that a line 300 miles long will be put into effect with success. This would reach such well-known mining districts as the Wankie coal-field, the Gwelo, Bula-

quated, containing hand-jigs, sluices, Cornish buddles, etc., but the work done is first rate and the tailings are kept very low. Costs compare with more progressive districts where high-class machinery is in use. The boys and women who work in the mills get only a few cents in pay. Living is cheap, therefore men are to be seen washing the old dumps, getting out the little lead in them much as if it were gold. All the old dumps have been handled over several times, and the new ones are too clean to invite treatment.

THE NEW BROWN ALASKA SMELTER.

BY OUR SPECIAL CORRESPONDENT.

We have heretofore referred to the smelting works which are being erected for the Brown Alaska Company at Hadley, on Prince of Wales Island, under charge of Mr. Paul Johnson, whose record as a smelter is well known. The intention is to have the works ready for operation by the end of 1903. The first work done was to put in a saw-mill, with a capacity of 50,000 ft. of lumber a day, and while



VICTORIA FALLS, ZAMBESI RIVER, SOUTH AFRICA.

wayo, Selukwe, Lomagunda and other gold-fields, besides several copper districts which are now attracting attention. It should undoubtedly hasten the industrial development of British South Africa.

LINARES, IN SPAIN.

The Linares district in the province of Jaen, Spain, illustrates the longevity and productiveness of mining when at its best. The three principal companies in that district have been in operation for over thirty years, and their record is as follows:

	Capital.	Total Dividends.	Time.
Linares	£45,000	£425,412	46 years
Fortuna	50,000	301,562	36 "
Alamillos	70,000	165,229	31 "

This is a splendid story, and is part of the heritage of the old mining engineering firm of John Taylor & Sons.

The veins are all in gray granite, characterized by a very marked cleavage; the workings are very extensive, although the deepest shaft is only 260 fathoms (or 1,560 ft.), but there are several shafts 180 fathoms, 200 fathoms and 220 fathoms deep. Labor is plentiful and good, especially the miners; they are paid 3.50 pesetas, equal to 70c. at par, but at the present rate of exchange it is about 60c. only; boys work in the mines, but only get a few cents, hence one of the reasons for dividends. The lead contains only 9 to 10 oz. silver per ton, like that of the Missouri region. The mills or dressing floors are anti-

the timber required for the buildings was being cut, the grading of the site for the work was done. The contract for the blast furnace and the steam boiler plant was let to Moran Brothers, of Seattle, Wash., and the same concern sold the smelter company a 350-ton barge, in which the plant and material will be conveyed to the site of the work. The furnace will be 44 by 160 in. at the tuyere line, and will have a daily capacity of 450 tons of ore. Hot blast will be used, the air being heated in a special furnace. The blast will be furnished by a No. 8 Connersville blower, run by a direct connected Reynolds-Corliss steam engine of 150 h. p. The furnace will be housed in a steel frame building, which is of sufficient size to accommodate also a copper converter, which it is proposed to install later, whenever it may be advantageous to put it in. The furnace will be charged by mechanical feeders, of which will be two each one-half the length of the furnace, and arranged to distribute the charge as shall be found to the best advantage. There will be three boilers, each rated at 150 h. p. The slag will not be granulated, but will be dumped hot, and two locomotives have been ordered to draw the slag trucks away from the furnace. Each of these trucks will weigh about 4 tons, and will carry about 5 tons of slag to the dump. A sample mill with the necessary appliances will also be put in. The works will be lighted by electricity, the equipment including a 250-light dynamo.

The coke used in smelting will be brought from Ladysmith, Vancouver Island, and the company will

provide a 3,000-ton barge to carry this fuel. It is estimated that the coke will cost about \$6 a ton delivered at the works.

The copper ore will be obtained chiefly from the Mamie mine, owned by the company, which is a short distance from the smelter. The ore is chiefly magnetite, with chalcopyrite and some iron pyrite. The ore-body, so far as opened, shows to be about 41 ft. in width, averaging about 6 per cent copper and \$1 in gold and silver. There is a streak in the ore-body which runs up to 7 or 8 per cent copper. The Mountain Andrews mine, an adjoining property owned by a Scotch steel manufacturer, is under contract to supply the smelter with a minimum of 100 tons of ore per day, averaging 4 per cent copper. This mine has been worked about three years, and an air-compressor is now being put in to increase the facilities. It is also proposed to obtain some ore from the Cracker Jack, another mine in the same district, the ore in which is quartz carrying good gold values. It is proposed to ship from 75 to 100 tons of this ore daily to the smelter.

BY-PRODUCT COKING PLANT AT A YORKSHIRE COLLIERY.

The Yorkshire Coal and Iron Company, Limited, have just replaced the beehive ovens at their Tingley Colliery by a battery of 40 regenerative ovens, constructed by the Otto-Huigenstock Coke Oven Company, of London, and these are described as follows by the London *Colliery Guardian*. In these ovens, slack from the Tingley Colliery will be utilized to make coke for use in the blast furnace at Ardsley.

It is expected that the 40 new ovens will carbonize 220 tons per 24 hours, and instead of the 50 per cent of coke yielded by the beehive ovens, it is estimated that they will yield 75 to 78 per cent of coke. The slack as it comes from the pit is tipped into a Kuhn compressing machine and by electricity is pressed into a cake weighing about 8½ tons. One cake is automatically charged into each oven, the same machine pushing the mass of coke out of the oven on the other side through the quencher, and down a slope into trucks.

The gas is collected over the ovens, drawn by an exhauster through coolers, then pushed through tar separators on the Audouin system, and through scrubbers, which take out the ammonia. About 65 per cent of the gas thus obtained is conducted back to the ovens, where it is burned in Bunsen burners for the purpose of heating the ovens. Thence the gas is conducted to a range of Lancashire boilers. The remaining 35 to 40 per cent of the gas produced by the ovens is utilized by two large engines, specially built to consume it. These engines, which are of 250 indicated horse power each, have been built by the firm of Cockerill, of Seraing, Belgium. Their cylinders are 28 in. bore by 40 in. stroke, and they are fitted with magnetic ignition on the Bosch system. The engines are coupled up to two dynamos generating a 3-phase current, which will be utilized in the pits for haulage, lighting and other purposes. The tar that is obtained from the gas will be sold as it is recovered, and two stills are put in for dealing with the ammonia-laden liquor from the scrubbers. The ammonia will be separated from the water in the stills, and sent through sulphuric acid to form sulphate of ammonia, which now fetches about \$60 a ton. The Tingley coal contains 3 to 4 per cent of tar, and yields from 1.2 to 1.5 per cent of sulphate of ammonia.

COPPER PROTECTION FOR STEEL PROPELLER BLADES.—The protection of steel propeller blades by means of a thin sheet of brass or copper has been successfully accomplished by John Lyall, superintending engineer for Cayza, Irvine & Co., of England. Several steamships with propellers thus protected have shown improved speed and decreased coal consumption. It is to be hoped that this new use for copper will find extensive application.

THE BRIQUETTE INDUSTRY IN FRANCE.—II.

By ED. LOZÉ.

Plant.—The briquette industry requires a plant of a very interesting nature, notably for crushing and drying the coal, crushing and melting the coal-tar, handling, proportioning and mixing it, heating the paste, charging, compressing, etc. When the factory is not supplied with slack (fine coal), a coal crusher and compressor are necessary; a crusher for the dry coal-tar or boilers for melting; apparatus for proportioning; mixers and heating apparatus; presses, conveyors, etc., for transporting the materials, and loading or storing the briquettes. A machine is also necessary for motive power, usually a steam engine which supplies the heating apparatus.

Crushing serves a double purpose, in reducing lumps and assuring a proper mixture. Cylindrical crushers, which crush very evenly, are used for this operation. Carr's crusher, acting by shock, crushes only the grains whose reduction is necessary.

Cleaning the coal and eliminating foreign matters are generally effected by washing. The water remaining after the operation should be driven off by evaporating machines, drying machines or ovens. Several kinds of evaporating machines are highly spoken of; one of the most used is the Hanrez machine. Drying machines may be flat, cylindrical or shaped like towers. Drying ovens may be of various designs, vertical or horizontal, movable or not. Crushing the coal-tar is effected by a nut-crusher, used with an improved heating apparatus which does away with pulverizing the coal-tar.

The batteries of vats for melting the coal-tar are of different shapes. The melted coal-tar is distributed by pumps into the proportioning apparatus. The vats, if placed at the top of the workshop, dispense with the need of elevating the coal-tar; this goes from the melting vat to the mixer by steam hoist.

The proportioning requires minute care. Proportioning by hand, which is the most precise method, can only be performed in small factories. For others, various means are recommended, according to whether the works use dry or melted coal-tar (cars and buckets, valved hoppers), overshot wheel, or articulated overshot wheel, bucket chains of unequal size, spiral conveyors at various speeds, cylindrical distributors with compartments, or, again, swing floors, as in the Bietrix installations, etc.

The mixers are vertical or horizontal. The former are composed of a sheet-iron cylinder, with steam lagging and worms. The latter of a semi-cylindrical trough, with or without steam lagging, and a conveyor.

The principal ovens are the Marsais and Le Couffinhal, made by the Bietrix company.

As to the presses, they are of various kinds, as follows, by Messrs. Colomer and Lordier:

(1) Tangential presses (David, Jarbot, Verpilloux and Fland).

(2) Presses with closed moulds or stamping presses, including: Steam pressure—(a) Direct pressure from one side only, perpendicular (Mazeline, Stevens). (b) Indirect pressure from one side only, either perpendicular (T. Middleton, Bietrix), or horizontal (Durand and Marais, Dupney and fils), or, again, pressure from both sides, perpendicular (Hanrez, Couffinhal), or horizontal (Yeadon, R. Middleton). This class includes also hydraulic pressure, from one side only and perpendicular (Revollier, Mazeline), or from both sides and horizontal (Roux-Veillon).

(3) Presses with open moulds, or cutting presses, with horizontal, steam pressure (Evrard, Bourriez).

(4) Presses for perforated briquettes.

(5) Presses for egg-shaped balls (Fouquemberg, Robert, Zimmerman-Hanrez, Hutteman and Spicker, Mulheim and Zimmermann).

Several other presses are worthy of mention, such as the Yeadon, the first press which worked by double compression; the duplex of Blanzay, similar to the Couffinhal improved; the Crozet; the Henry, of the Paris-Lyon-Mediterranean Company.

Conditions Required of Briquettes.—Briquettes are

made in various forms or styles, known as marine type, railway type, egg type, etc. Their shape is often that of a rectangular parallelepiped or of a cylinder. The weight varies from 17½ lb. to 22 lb. (8 to 10 kg.). For domestic requirements, small balls or eggs of much less weight are often used.

The conditions generally required of briquettes are the following:

Good agglomeration; they should be whole, not cracked or damaged; dry, hard, sonorous, homogeneous, compact, finely and closely grained, not very hygrometrical, and giving off little smell.

Easy to light; with a bright, clear flame, not crushing in the grates or disaggregating in the fire; with a gray, light smoke, not clinking on the grate bars.

Good preservation; in stacks, or in bad weather, they ought not to break, crush or become reduced. The breakage in transit should not exceed 5 per cent.

For big contracts, the origin of the slack, prohibition of foreign matters (stones, shale, pyrite, etc.), recent extraction of the coal and washing, are stipulated. Dry coal-tar is generally the binder. This coal-tar, after melting in closed vessels, ought to leave 40 to 45 per cent of its weight to add to the coal. The proportion of coal-tar introduced should be 8 per cent; some railways (South of France) accept 5 to 8 per cent.

Trials of cohesion are effected by means of a fairly simple apparatus, a closed sheet-iron cylinder, with horizontal outer axle, and three inside partitions at equal distance. The French Navy requires a cohesion of 52 per cent; for torpedo boats 58 per cent. Elsewhere less than 40 per cent is refused.

Trials of incineration are practiced on briquettes reduced to powder; the content in cinders should not exceed a given amount, usually 7.5 per cent. The railway maximum is often 6 per cent of cinders, and when under this maximum an increase in price is frequently stipulated. The volatile matters usually required are 16 per cent.

Other tests are made, such as the determination of the average calorific value (Tompson's calorimeter), the presence of sulphur to a maximum of 1.2; per cent; homogeneity of delivery; state of desiccation; softening by heat at 60° C.; density 1.13 and 1.21, sometimes 1.5; transformation into non-friable coke; power of evaporation, approximately that of coal of good quality for steaming purposes.

Cost Price.—The dependence existing between the price of coal and coal-tar and the total cost price of briquettes is easily understood. This price is equally dependent on the primary cost of plant, on the installation of the works and on the price of labor.

It is estimated that a well-equipped factory capable of producing 220 tons of briquettes in 24 hours, and including the houses of employees, loading apparatus, road, locomotive and 4 cars, costs 700,000 francs (\$140,000).

In a factory in the North of France, producing 250 metric tons per day and furnished with two Bietrix presses and ovens, the cost of labor and materials is calculated as follows, given in cents:

<i>Labor.</i>	
Superintendence	\$0.008
Working of cars	0.006
Discharging coal-tar	0.010
Discharging coal	0.012
Crushing	0.034
Manufacture	0.042
Loading the briquettes	0.016
Various expenses	0.012
Stokers	0.020
Total labor	\$0.160
<i>Materials.</i>	
Oils and grease	\$0.018
Various matters	0.014
Maintenance of the machines	0.020
Coal for machines and ovens	0.062
Total materials	\$0.114
Total	\$0.274

In the same region, for a factory using four Revollier hydraulic presses, producing 250 metric tons per shift, with dry coal-tar and steam heat, the cost is estimated at \$0.212 for labor and \$0.230 for material, a total of \$0.442.

Again, in the same region, with strong Bourriez presses, labor varies between 12 and 13 cents per metric ton. At a factory in the Vard, with a Veillon press, drying by cylindrical oven, steam heat and dry coal-tar, the cost is estimated, for a production of 2,400, tons per month, at \$0.200 for labor and \$0.206 for materials, a total of \$0.406.

Supposing coal is at \$2 and coal-tar at \$8 per ton, delivered, the detail of the cost price of a metric ton of briquettes would be as follows:

Coal	\$1.84
Coal-tar, 8 to 10 per cent.....	0.80
Labor and materials.....	0.34
Redemption and depreciation.....	0.06
Total cost	\$3.00

These figures must necessarily vary with the prices of materials and the rates of transportation.

THE CHARCOAL IRON INDUSTRY OF THE UPPER PENINSULA OF MICHIGAN.

From a carefully prepared paper read at the meeting of the Lake Superior Mining Institute by Mr. William G. Mather, president of the Cleveland-Cliffs Iron Company, we take the following interesting historical and statistical notes:

If we go back to the census of 1840, we will find that the State of Michigan is there credited with 15 so-called blast furnaces, but doubtless most of these plants were little more than forges or bloomeries; and if we also pass by the Jackson Mining Company's forge at Carp River, commenced in the latter part of 1847, and finished in the early part of 1848, and the Marquette Iron Company's forge at Marquette, put in operation in 1850, and the Collins Iron Company's forge at Dead River, about three miles northwest of Marquette, finished in 1855, and one or two other small forges, we are brought immediately to the first regular blast furnace built in Michigan, namely, that belonging to the Pioneer Iron Co. at the present site of the city of Negaunee. This was commenced in June, 1857, and finished in February, 1858, and another stack added in the same year. Pioneer furnace No. 1 was put in blast April 18, 1858, and Pioneer furnace No. 2, May 20, 1859. They burned down and were rebuilt in 1877, and since that time were regularly active until June, 1893, in which year the last iron was made in this old historic plant. The same company continued its operations in new furnaces—Pioneer furnace at Gladstone, put in operation April 16, 1896, and Pioneer furnace No. 2 at Marquette, put into blast April 15, 1903, and is now also operating Carp furnace at Marquette, which was built in 1873.

In June, 1845, the Jackson Mining Company was organized at Jackson, Mich., and in the summer of the same year secured possession of the now celebrated Jackson Iron Mountain. The ore secured therefrom was tested in a forge with a charcoal fire in 1847. A forge on Carp river, near the Jackson mountain, was finished in 1848, and the first lot of blooms made at this forge from Lake Superior iron ore was sold to the late E. B. Ward, and from it was made the walking-beam of the sidewheel steamer *Ocean*. It is true that about the same time some Lake Superior ore was shipped to the furnaces in the Shenango Valley of Pennsylvania, and there tested with coke, but at the same time Lake Superior men should not forget that much of the development of the Peninsula has been due to its iron ore coupled with its charcoal. The site of the old Jackson forge is an historic spot and worthy of being commemorated by a monument. The old charcoal furnaces, whose remains now survive only to indicate the primitiveness of the industry and energy of its promoters as late as less than 50 years ago, should be objects of interest.

One can wander into wild portions of this country to-day with the feeling, perhaps, that but few have penetrated to that particular place before, and suddenly come upon a battery of old ruined kilns, log houses, embankments and roadways, the latter having served the purpose of a tramway for transporting the charcoal and wood, and one is surprised to find in a

trackless wild these evidences of an old industry which has for many years been extinct in that place, although the country itself has only been settled by white men for a little over 50 years. . . .

It does not seem unnatural that Michigan should be the charcoal iron producing section of the United States, owing to its vast forests of hardwood being in close proximity to its iron ores, and the State has been the largest producer of any in the Union, commencing with the year 1873, Ohio having been in 1872 the first producer, with 95,672 net tons, as against Michigan's product of 86,840 net tons.

Although the production of charcoal iron in the country as a whole has declined since its high-water mark in 1890, and will in the future still further decline rather than increase, yet Michigan, and particularly the Upper Peninsula, is likely to hold its own, at least during the next ten years. I base this opinion upon the fact that the largest producers in the State have of recent years very greatly strengthened themselves by acquisition of large solid blocks of hardwood timber lands and by the construction of their own charcoal-making plants, thus putting themselves in a position of running more steadily at a higher rate of production than they could in the past, when they had to depend upon more uncertain sources of fuel supply.

The only country in the world which really holds its own in charcoal iron production is Sweden, now the largest producer. As its iron industry depends entirely upon this kind of fuel, of which there is still a very large quantity remaining in that country, it will doubtless continue to remain the first producing charcoal iron country in the world. Sweden, however, does not depend to such an extent as we do in this country upon marketing its charcoal iron for castings, but, on the contrary, the charcoal iron makers there are manufacturing a largely increasing percentage of their product into high quality steel.

One cannot help being struck with the influence of charcoal iron production upon the forests of a country. For example, assuming that it has required 2½ cords of wood for every ton of charcoal iron made, we find for the product of Michigan up to the end of 1902, namely, 4,631,475 tons (gross) of charcoal iron, there was used 11,578,688 cords of wood, and if we assume that on the average there has been cut 35 cords to the acre, there will have been cut for this purpose alone 330,810 acres of solid woodland. Probably 2½ cords to the ton is not far out of the way, as the average number of bushels to the cord has not much exceeded 40, and this would allow 100 bushels of charcoal to the ton of iron. At the present time the average number of bushels consumed per ton of iron in Michigan is probably about 90, but in years gone by the amount necessary for a ton of iron was generally in excess of 100 bushels. A bushel in Michigan equals 20 lb.

It must be realized that to supply modern charcoal furnace plants such as that operated by the Pioneer Iron Company requires about 650 cords of wood per day, or 216,000 cords a year, namely, 7,000 acres. To do this requires the service of 650 men in the woods, to say nothing of transporting the same on the railroad. In order that this wood may make charcoal and by-products to the best advantage, it must be dry, and should therefore be seasoned for about one year. This necessitates keeping something like 200,000 cords of wood on hand in the woods all the time. It is too bulky to be loaded on cars and transported to the furnace to remain in the yard at that place for drying, as the cost of re-handling it would be altogether too great. It must therefore remain in the woods, subject to the danger of fire and adding tremendously to the anxiety and care of the manager. It is very much harder to run such a furnace than one using coke, for in the latter the manager gets his supply of fuel daily by rail, without a thought as to its production or manufacture. In modern times, although the magnitude of this fuel operation is very great, yet the manager has the advantage in most instances of better railroad facilities and organization than did his predecessors.

CORRUGATED IRON BUILDINGS.

Corrugated sheet iron is one of the most useful, and, under many conditions, one of the cheapest of materials for buildings for metallurgical purposes, particularly for roofs. The linear rigidity imparted to light sheets by the process of corrugation makes them self supporting and gives strength to the light and comparatively inexpensive framing on which they may be used. The framing may be either of timber or steel. The essential parts of such a building are merely the posts, girts, wall plates, trusses and purlins, on the last of which the corrugated sheets are laid directly.

Corrugated sheet iron is sold either as galvanized or painted. The former is the more expensive, but also the more durable; it is, however, quite unsuitable for buildings intended to contain furnaces which will develop sulphurous fumes, since the latter will quickly corrode the zinc with which the iron is coated and the galvanic action set up between the remaining zinc and the uncoated iron hastens the destruction of the latter. With any kind of corrugated sheet iron the durability depends upon the thoroughness with which the iron is protected. On this account galvanized sheets are sometimes painted, though commonly used without any other protection than is afforded by the coating of zinc. Ordinary corrugated iron receives one coat of paint at the rolling mill, the paint usually employed being red oxide of iron, thoroughly ground in pure linseed oil, with enough dryer mixed in to give it proper drying qualities. This first coat of paint is applied by machine, and is likely to be imperfect, wherefore the sheets should be painted again after putting them on the building. For this purpose other paints than ferric oxide may be used advantageously, such, for example, as graphite or silica-graphite. Corrugated iron sheets may be obtained from the rolling mills painted with graphite or other special paints at an additional cost over the ordinary sheets.

Corrugated sheet iron is sold either by the pound or by the "square" of 100 sq. ft. In calculating the latter the full width and length of the sheets, after being corrugated, is counted; no allowance is made for end or side-laps. The approximate weight in pounds per 100 sq. ft. of corrugated sheet iron, with 2½-in. corrugations, of various thickness, per United States standard gauge, is given in the following table:

Gauge, No.....	28	27	26	24	22	20	18	16
Painted, lb.....	70	76	82	110	140	166	220	275
Galvanized, lb.....	87	93	99	127	157	183	237	292

Standard corrugated iron sheets, with 2½-in. corrugations, are 26 in. wide, and will lay 24 in. wide, with a side-lap of one corrugation. They are made in lengths of 6, 7, 8, 9 and 10 ft. When sufficient time (usually about two weeks) is given, sheets may be rolled to special intermediate lengths, but if sheets have to be cut, the next larger length is charged for; thus, an order for sheets 8 ft. 8 in. long would be charged at the price of 9-ft. sheets. The dimensions of sheets of standard sizes and the surface that they will lay is given in the following table:

Length, ft.....	6	7	8	9	10
Width, in.....	26	26	26	26	26
Area, sq. ft.....	13	13½	17½	19½	21½
Will lay, sq. ft.....	12	14	16	18	20

The figures in the last line of the above table make no allowance for end-laps, and in estimating must be diminished by the proportion of the latter to the length of the sheets. On siding a 1-in. or 2-in. end-lap is sufficient, but on roofing it varies from 3 to 6 in., according to the pitch of the roof.

In laying corrugated iron a nail should be put in at every other corrugation, at the end-laps and about every 6 in. on the side-laps, nailing through the ridges of the corrugations and not through the furrows. Nails of 1 in., 1¼ in. and 2¼-in. lengths are employed; certain patent barbed roofing nails, which cannot work out, the necks being barbed, may be recommended. In order to make a perfectly tight roof the sheets should have a side-lap of one

and a half corrugations, whereby water would have to flood up under two full corrugations before it could do any damage. A side-lap of two corrugations is sometimes used, but is no better than a lap of one and a half. In sidings a lap of one corrugation is amply sufficient.

When a corrugated iron roof is to be laid on boards nailed to the rafters, it is advisable to lay water-proof paper between the iron and the boards, especially in buildings where steam or vapor comes in contact with the roof. The paper makes the building warmer and prevents dripping from the roof. Good water-proof paper may be bought at 20c. to 25c. per 100 sq. ft.

If there are valleys in the roof, form a lining from plain sheet iron or steel, painted on both sides, from 18 to 24 in. wide, fit it in the valley, and cut corrugated iron to correspond, lapping the latter from 4 to 6 in. over the valley lining. To cover the comb of the roof, metal ridge caps, usually in lengths of 8 ft., may be obtained. There are made with corrugations to fit into those of the roof sheets, thus making a tight and well-finished roof. Metal corner-boards, casings for window sills, and louver slats are also articles of regular manufacture.

The distance between purlins that is to be spanned by corrugated iron sheets laid directly upon them is determined by the transverse strength of the iron and the load to be sustained. In the parts of the United States where the snowfall is likely to be heavy, roofs are generally made capable of supporting 30 to 50 lb. per square foot, allowing for snow and wind pressure. According to William Kent ("Mechanical Engineer's Pocket-Book," p. 181), it was found by actual trial that No. 20 corrugated iron, spanning 6 ft., began to give a permanent deflection under a load of 30 lb. per square foot, and collapsed under 60 lb. The distance between centers of purlins should not, therefore, exceed 6 ft. for a load of 30 lb. per square foot, and preferably should be less than that. Jones & Laughlin give the following safe loads for standard corrugated sheets supported by purlins 3, 4, 5, 6 and 7 ft. apart:

B. W. G.	3 ft. Lb.	4 ft. Lb.	5 ft. Lb.	6 ft. Lb.	7 ft. Lb.
No. 16.....	135	76	49	34	25
No. 18.....	102	57	37	25	18
No. 20.....	73	41	26	18	14
No. 22.....	58	33	21	14	10
No. 24.....	46	26	16	11	8
No. 26.....	38	21	13	9	6

The above figures give a factor of safety of 4. Corrugated iron sheets are the stiffer, the larger the corrugations. The transverse strength of corrugated iron is computed by the formula, $W = 99/900 \text{ TBD} \div L$, in which W is the breaking weight in pounds, T the thickness of the sheet in inches, B the breadth of the sheet in inches, D the depth of the corrugations in inches, and L the unsupported length in inches.

The cost of an iron and steel building depends chiefly upon the total weight of the material required in its construction. This will correspond approximately to the area of ground covered, and the latter is a convenient basis for rough estimates. Generally speaking, the complete cost of a one-story iron building, such as would be suitable for a furnace shed, storage house, etc., is 40c. to 60c. per square foot of ground covered. A building 309 by 42 ft., weighing 10.5 lb. per square foot, cost 44.65c. per square foot. Other buildings, weighing 15 lb. per sq. foot, cost 57.5c. and 60c. These costs did not include the footings or pavements of the floors. They figure out to 4c. to 4.25c. per pound, and were done at a time when steel was high (1900 and 1901).

ZINC PRODUCTION IN UPPER SILESIA.—In the first quarter of 1903, the zinc mines of Upper Silesia produced 51,702 metric tons of calamine and 82,763 tons of blende against 47,425 and 83,263 respectively in the last quarter of 1902, and 54,393 and 91,138 in the corresponding quarter of 1902. The production of spelter in the first quarter of 1903 was 28,751 tons against 29,719 tons in the last quarter of 1902, and 28,698 tons in the first quarter of 1902.

THE GROWTH OF MT. PELÉE.

Professor Angelo Heilprin has recently contributed the following description of the ascending obelisk of the Montagne Pelée:

Not the least remarkable of the many extraordinary conditions that have been associated with the recent eruptions of the Martinique volcano is the extrusion of the giant tower of rock, a veritable obelisk, which to-day dominates the mountain, and which has given to it an added height of 800 to 900 ft. Pelée is no longer 4,200 or 4,428 ft. in elevation, but upward of 5,000 ft. On May 31 last, before it lost 180 ft. of its summit, it reached exactly 5,000 ft. This tower of rock, the nature of which was first properly made known by Professor Lacroix, issues directly, and to all intents and purposes vertically, from the summit of the new cone of the volcano (of whatever precise nature this cone may be) which had been built up in the ancient crater-basin (the *Etang Sec*) to a height of 1,600 ft. or more, and virtually plugs it. Where it is implanted, it has a thickness of some 300 to 350 ft. From certain points of view the obelisk seems to maintain for most of its height (800 ft. or more) a fairly uniform tapering surface, with a termination in a needle summit, a true *aiguille*. It is gently curved or arched toward the southwest, or in the direction of Saint Pierre, and on this face it is cavernous or openly slaggy, showing where successive and repeated explosions had carried away portions of the substance. On the opposite side, or toward the east-northeast, the surface appears solid, is smoothed and even polished in part, and shows longitudinal parallel grooves and striae, very much like glacial markings. On this side it shows plainly the marks of hard attrition, the effect of rubbing upon the encasing rock—the mold, in fact, that determined a portion of the exit-channel.

The constitution of this extruded "cork" is undeniably lava—a lava whose viscosity or rapid solidification did not permit it to flow over, but which under the giant stress of the volcano simply moved upward, solid from base to summit, and receiving accretions to its mass only from below. The most cursory examination of the relations existing would immediately point to this form of growth and development, but the carefully conducted angle-measurements and observations of contour made by the representatives at two stations of the French Scientific Commission leave no possibility of doubt in the matter, and they further furnish us with data touching the rate of growth. Thus, in eight days preceding June 7 this growth was, as we are informed by M. Giraud, 10 meters; and in the four days preceding June 15 (a period within the time of my recent visit to the volcano) it measured 6 meters. The consideration of the depth to which this giant monument descends solid into the volcano would be interesting were there any way of reaching the problem, but for the present there would seem to be none such.

On June 13 last, in company with M. Guinoiseau—one of the observers of the French Commission—I made the ascent of Pelée, and from the immediate crater-rim took a series of photographs of Pelée's singular process, probably the most impressive piece of nature that I had ever seen. The volcano, by comparison with what it had been before, had "slumbered down to peace," but yet it was too active to permit us to descend into the crater-hollow, 300 to 350 ft. in depth, that still surrounded the new cone. Steam and sulphur-puffs were issuing everywhere, and avalanches of rock were repeatedly being disengaged from the obelisk. Pelée was still "ugly," and the night before, the southwest base of its crown or plug was glowing with fire—with the liquid lava that was rising in rift-passages. Two days later I noted a feeble line of steam issuing from the absolute apex of the summit, suggesting a continuous passage or channel extending from base to summit. On March 26 a discharge of incandescent balls was observed also to take place from the same position.

UTILIZING BLAST-FURNACE GASES.—According to London *Engineering*, the blowing engine

driven by blast-furnace gas, which was built for the Clay Cross Company at Chesterfield, England, by the Blast Furnace Power Syndicate, Limited, several months ago, has since been in constant work furnishing blast for the furnaces, with excellent results. The apparatus supplied includes a cleaning plant for removing dust, etc., from the gas. The syndicate is building a similar plant for the Yorkshire Iron Company's works at Ardsley.

QUEENSLAND COAL.—An extended test of Queensland coal is being made in some of the British naval vessels on the Australian station. Considerable importance is attached to the result of these tests.

PRODUCTION OF CAST-STEEL, FREE FROM BLOW-HOLES.—M. Meslans, of Paris, France, has patented the addition to the fluid steel of an alloy of aluminum with a metal of the alkali earth group, or with lithium (German patent 143-499, January 18, 1903.) Aluminum alone does not act upon the nitrogen and hydrogen in the fluid metal. The metals of the alkaline earths and lithium possess that property, but they are too dear for use alone. An alloy of aluminum and calcium gives the effect of each element, so that carbon monoxide and also nitrogen and hydrogen can be removed.

CHROMIUM-TUNGSTEN CARBIDE.—Henri Moissan and A. Kuznetzow at the meeting of the French Académie des Sciences, August 3, 1903, described a double carbide of chromium and tungsten which they have produced in various ways. One method consisted in smelting a mixture of 10 g. of chromium sesquioxide with 45 g. of tungsten trioxide, and 30 g. of petroleum coke in carbon boats with 400 amperes and 75 volts of current. Another method consisted in smelting a mixture of 10 g. of metallic chromium and 7.5 g. of tungsten with an addition of about 0.2 g. of carbon in the presence of a great excess (150 g.) of copper. The new carbide, which corresponds to the formula $W_2C_3Cr_2C_2$, is a hard, gray crystalline substance of metallic luster, and 8.41 specific gravity. It is not attacked by acids or any of the ordinary reagents. The discoverers think that the addition of tungsten to chrome steel will perhaps lead to the formation of this new substance and may result in steels of new and special properties.

ABSTRACTS OF OFFICIAL REPORTS.

American Smelting and Refining Company.

The report of this company covers the year ending April 30, 1903, and shows a very favorable result from the year's operations. The gross earnings were: From sale of metals, \$82,985,442; miscellaneous, \$103,836; total, \$83,089,278. Expenses were \$73,685,567, or 88.7 per cent of the receipts, leaving net earnings of \$9,403,711. The total metal contents of ores bought were as follows:

Gold, oz.....	1,025,132
Silver, oz.....	63,389,438
Lead, lb.....	492,960,350
Copper, lb.....	47,919,666

The fuel consumed in the company's plants included 544,790 tons coal, 433,431 tons coke and 3,523,904 gals. fuel oil. The total tonnage moved for the company was 4,434,484 tons; this was equal to 183,834 carloads, being an average of 503 cars per day. The total tonnage moved by water for the company was 250,000 tons.

The report of President Edward W. Nash says: "As set forth in the detailed statement, the net earnings for the year aggregated the sum of \$7,576,785. These figures show a gratifying comparison with the previous year's operations, the increase being \$2,715-

166. From the net earnings of the year \$655,683 was appropriated for extraordinary improvement expenditures, leaving a balance of \$6,921,103, which, under ordinary circumstances, would be applicable for dividends or surplus account.

"From this balance, however, your directors have appropriated the sum of \$1,500,000, crediting that amount to the metal stock account. The company does not speculate in metals, selling the same as soon as ready for market, and your directors, wishing to be conservative, adopted the policy of building up a metal reserve account to absorb all fluctuations in the market value of metals in process of treatment. This was done for the purpose of leaving the regular profits of the company, arising from the treatment charges on ore and bullion, unimpaired at all times.

The income account for the year compares with that of the previous year as follows:

	1902.	1903.	Changes.
Earnings	\$7,038,682	\$9,403,711	I. \$2,365,029
Repairs and betterments	791,306	770,854	D. 20,452
Int., taxes & gen. exp.	1,385,757	1,056,071	D. 329,686
Extraordinary improvements & metal stock account	1,300,000	2,155,683	I. 855,683
Total charges	\$3,477,063	\$3,982,608	I. \$505,545
Net balance	\$3,561,619	\$5,421,103	I. \$1,859,484
Dividends, pref. stock.	3,500,000	3,500,000	.....
Surplus	\$61,619	\$1,921,103	I. \$1,859,484
Surp. from prev. year.	2,890,349	2,951,968	I. 61,619
Total surplus.....	\$2,951,968	\$4,873,071	I. \$1,921,103

Dividends paid were 7 per cent on the \$50,000,000 preferred stock. The surplus for 1903 was equal to 3.84 per cent on the common stock. The balance sheet, as of April 30, 1903, is as follows:

Common stock	\$50,000,000
Preferred stock	50,000,000
Bonds of subsidiary companies.....	965,000
Net current liabilities.....	1,177,760
Unearned treatment charges.....	2,315,531
Undivided surplus	4,873,071
Total liabilities	\$109,331,362
Property accounts	\$86,845,671
Investment accounts	1,028,597
Metal stock (gold, silver, lead and copper).....	18,010,687
Material, fuel and flux.....	1,107,253
Cash	2,339,154
Total assets	\$109,331,362

"Preferred stock dividends Nos. 12 to 15, inclusive, aggregating 7 per cent, or \$3,500,000, were declared and paid, and the surplus for the year, \$1,921,103, was carried to the income account, making the total undivided surplus April 30, 1903, \$4,873,071.

"During the year the new plant at Murray, near Salt Lake City, Utah, has been completed; new blast furnaces and other important new construction work completed and partially completed at Durango and Leadville, Colo.; Perth Amboy, N. J., and Aguas Calientes, Mexico; extraordinary improvements made at a number of the other plants, and the physical condition of the property of the company at all plants fully maintained.

"The investments of the company consist of ownership of stock in the United States Zinc Company, owning and operating a zinc ore smelting plant at Pueblo, Colo.; in the Carbon Coal and Coke Company, owning valuable coal lands in Colorado and interests in mining and limerock quarry properties. In previous reports these investments have been considered a current asset and have not appeared on the balance sheet as a separate item.

"With the exception of a small tonnage of copper, and pig lead in bond for export, the company had no refined metals on hand April 30, 1903, the inventory showing the entire metal stock to be in ores, in bullion, or in process of treatment.

"This company has issued no bonds, but in acquiring some of its property assumed certain outstanding bonds. The bonds so assumed, the amount of same since purchased and canceled and the amount still outstanding are as follows: Consolidated Kansas City, \$1,000,000; Omaha & Grant, \$1,133,000; Pueblo Smelting Company, \$199,000; total \$2,332,000. Of these the following have been purchased and canceled: Consolidated Kansas City, \$1,000,000; Omaha & Grant, \$350,000; Pueblo, \$8,000. This makes a total purchased and cancelled of \$1,367,000, leaving \$965,000 outstanding.

"At the beginning of the fiscal year, May 1, 1902, the company had outstanding notes payable aggregating \$3,799,000. These notes have all been paid during the year, and the company now has no floating indebtedness; but, on the contrary, has cash on hand, on call and in banks, \$2,339,154. The net current liabilities of the company, aggregating \$1,177,760, as shown on the balance sheet, consist entirely of accounts payable not due for ores and supplies in transit, April pay-roll, accrued taxes and bond interest.

"The policy of your board of directors has been to centralize the operations at the most advantageous points, thus reducing administration expenses and obtaining more economical work. In pursuing this policy it has been found advisable during the past two years to close down a number of plants. Of such closed plants some are held in reserve, others of small capacity or of unfavorable location have been dismantled.

"At the close of the year there were in operation smelting plants with a capacity of 3,720,000 tons per annum, refining plants with a capacity of 340,000 tons of lead bullion and 36,000 tons of copper bullion per annum. There were held in reserve—fully equipped and in good repair, ready to operate on short notice in an emergency—smelting plants with a capacity of 650,000 tons per annum and refining plants with a capacity of 125,000 tons of lead bullion per annum.

"Two causes have contributed toward the successful results of the business of the year: First, the completion of the plans for the concentration of operations, under which the same tonnage is handled with better supervision and reduced administration and operating expenses; and, second, the intelligent and efficient co-operation of the company's officers and employees, to whom the board desires to acknowledge its appreciation."

Mount Morgan Gold Mining Company, Queensland.

The report of this company for the year ending May 31, 1903, shows total receipts as follows: Balance brought forward, £78,995; gold account, (143,584 oz.), £566,401; copper (106 tons), £2,673; rents, etc., £1,044; total, £649,113. Charges were: Working and general expenses, £317,308; dividend duties and royalty, £20,477; total, £337,785, leaving a balance of £311,328. From this, dividends amounting to £275,000 were paid, leaving a balance of £36,328 forward to current year.

Manager G. A. Richard says: "The total amount of all ore treated during the year was 262,919 tons, being 29,966 tons more than was treated last year, and 154,021 tons more than the average per annum treated since the formation of the company. A total of 51.84 per cent of ore put through during the year consisted of the more refractory ore from the lower levels of the mine, which was put through the mundic works. This is the first year in which the amount of this kind of ore has exceeded the oxidized ore; last year the proportion being 43.60 per cent mundic and 56.40 per cent oxidized; and from the commencement of operations in 1886 to the present, 21.15 per cent has been mundic and 78.85 per cent oxidized.

"The increase in the amount of ore was due to the extra amount put through the mundic works, which, as forecasted in my last report, averaged over 10,000 tons a month for the year. This is 32 per cent over its output for last year, which is somewhat over its estimate when construction was undertaken.

"The total amount of gold produced during the year was 143,584 oz., being 4,044 oz. less than was produced last year and 11,274 oz. less than the average production up to date. Of the total gold produced since the formation of the company 79.2 per cent was won from oxidized ore and 20.8 per cent from mundic ore. The total gold won to date amounts to slightly over 80 tons weight.

"The average grade of all ores during the year was 11.69 dwt., equal to 46.51s., which is a decrease in value of 6.43s. per ton on last year's and a decrease of 70.49s. on the general average of all ore put through since the formation of the company.

"The grade of the mundic ore during the year was 10.62 dwt., equal to 42.17s., being 14.18s. less than the average for the previous year. The grade of oxidized ore was 12.52 dwt., equal to 49.73s., being 8.12s. more than the average for the previous year.

"The value of the ore varies between pretty wide limits from time to time and in different portions of the mine, and it has been found advisable to mine and treat pretty large quantities of a grade that leaves barely any profit, as this insures the winning of ore of better grade that would be otherwise missed. This policy has been very successful during the last six or eight years in opening up better grade ore and reducing the cost of prospecting. Of late, a very small reduction of cost renders a comparatively large amount of ore of lower grade available, and economy is consequently of the greatest importance, as a small increase of cost would narrow the scope of operations and a small decrease would widen it very considerably.

"The cost of treating the oxidized ore during the year amounted to 11.69s., and that for treating the mundic ore 15.18s., the average for all ores being 13.51s. per ton. The cost of mining mundic ore per ton amounts to 11.74s. and for mining oxidized ore 3.03s. The total cost of both mining and treating the sulphide ores was 26.93s. and the total for mining and treating oxidized ores was 14.73s. For all ores the total cost of mining and treating amounted to 21.02s. per ton. This does not include a few shillings for general expenses, which are not available at this moment.

"The only additions to the reduction works made during the year consist of some more canals for the precipitation of copper from the waste liquors at the Mundic works and a Glover tower, which has been added to the sulphuric acid works for the purpose of increasing its capacity. No additions to the capacities of the present works are contemplated for the ensuing year, but various improvements of details are under consideration. A new assay office will need to be erected during the ensuing year, as the present one has been outgrown and is otherwise defective. The possibilities of making some profit out of poor ore that will have to be removed in the extension of the open cut was referred to in the last annual report. So far the experiments have not succeeded. The principal difficulty is the small proportion of gold in this ore, consequently a very cheap treatment and a comparatively small outlay for plant is necessary. In addition to this the water supply is inadequate for the present works, except when good seasons prevail, which would necessitate intermittent work. The mining of this ore would also have to be intermittent, in order to fit in with the winning of other ore and removal of other burden.

"Water Supply.—The new dam has not been filled since its completion in December, 1900. At present it contains about 15,000,000 gallons, which is about one-twentieth of what it is capable of holding. All the other dams are nearly full, the total amount of water being about equal to any previous supply and sufficient to last until well into next wet season.

"Smelter.—Up to the present a considerable amount of by-products have been shipped to smelting works in the South, the quantity not being sufficient to render the erection of even a small furnace advisable. These by-products have been increasing of late and recently some ore has been discovered in the mine sufficiently rich in copper to necessitate smelting. Only a small smelter will be installed, as it will be sufficient to work up all the by-products and prove the extent of the copper ore. A considerable number of smallish copper lodes exist in the district within easy access of the railway, and it will probably be advisable to purchase ores from such of these as will enable a suitable smelting mixture being obtained when mixed from that from this mine. There is a prospect of this kind of ore being of some importance in the future, as a drive at the 750 ft. level passed a considerable distance through what varied in value from 15s. to 40s. in copper contents and about 16s. in gold, smaller values being found else-

where and copper increasing toward the western side and deeper levels.

"The following table will enable the position attained this year as regards grades, costs, etc., to be compared with previous years. During the period covered increasing amounts of refractory ore have been treated which has been more difficult to treat on account of its hardness and amount of pyrites it contains; it is also harder to mine on account of the necessity of timbering the mine and the employment of machine drills and explosives. (In this table the figures are reduced to United States currency for purposes of comparison):

Years—	Costs Per Ton.				Yield Per Ton.
	Treatment.	Mining.	General.	Total.	
1893.....	\$10.036	\$3.198	\$1.046	\$14.280	\$37.00
1894.....	7.970	3.414	1.692	13.076	35.00
1895.....	5.720	2.116	2.826	10.662	28.84
1896.....	6.786	2.148	3.604	12.538	29.60
1897.....	5.436	2.048	4.606	12.090	29.16
1898.....	4.876	1.870	3.010	9.756	20.32
1899.....	4.102	1.710	3.004	8.816	15.48
1900.....	3.840	1.532	2.388	7.760	15.04
1901.....	4.050	1.668	1.552	7.270	15.48
1902.....	3.388	1.752	1.214	6.354	13.24
1903.....	3.416	1.828	0.548	5.792	11.64

"From this it will be seen that in the period covered the value of the ore has fallen from £7 14s. 2d. to £2 8s. 6d, the cost of treatment has been reduced by two-thirds, the cost of mining has also been considerably reduced, the total cost not having increased in any one year since 1893. The very extensive outlay on new plants has been more than paid for out of what has been saved as they were being constructed. Also the average value of the ores for the last five years is less per ton than the cost of mining, treating, etc., was at the beginning of the period. The amount of ore mined and treated has also been increased by about four times. As the cost per ton of ore has been lowered the margins for further economies have been narrowed, but on the other hand the field for saving has widened on account of large tonnage now being handled. The results achieved have been principally due to the improvements embodied in the large production works, etc., railway communication; but now improvements must be looked for more in the direction of improving a great number of details, administrative economies and mine developments."

BOOKS RECEIVED.

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

Directory of the Scranton Engineers' Club; with Charter and Constitution. Scranton, Pa.; published by the Club. Pages, 106.

Die Entwicklung der Deutschen Mosaikindustrie. By Dr. Adolph Frank. Berlin, Germany; Leonhard Simon. Pamphlet, 10 pages.

Les Mesures Prophylactiques Prises, ou a Prendre, contre l'Ankylostomose. By Victor Watteyne. Brussels, Belgium; P. Weissenbruch. Pages, 44.

Ontario, Report of the Bureau of Mines, 1902. Thomas W. Gibson, Director. Toronto, Ont.; Public Printer. Pages, 352; with maps and illustrations.

British Columbia, Report of the Minister of Mines, 1902. William Fleet Robertson, Provincial Metallurgist. Victoria, B. C.; Public Printer. Pages, 320; illustrated.

Tangential Water-wheel Efficiencies. By George J. Henry, Jr. San Francisco; reported from *Transactions of the Pacific Coast Electric Transmission Association.* Pages, 44; illustrated.

Register of Mines and Minerals of Sierra County, California. Lewis E. Aubury, State Mineralogist, San Francisco; issued by the State Mining Bureau. Pages, 16; with map.

Ausgewählte Methoden der Analytischen Chemie. Volume II. By Dr. A. Classen, assisted by H. Cloeren Braunschweig, Germany; Frederick Vieweg & Sohn. Pages, 832; with two spectrum tables and 133 illustrations. Price (in New York), \$7.

The Journal of the Iron & Steel Institute, Volume LXIII, No. 1. Edited by Bennett H. Brough, Secretary. London; E. & F. N. Spon, Limited. New York; Spon & Chamberlain. Pages, 828; illustrated.

Die Entwicklung des Niederrheinisch-Westfälischen Steinkohlen-Bergbaues VI. Wetterwirtschaft. Prepared under Joint Direction of the Verein für Bergbaerlichen Interessen im Oberbergamtsbezirk Dortmund; the Westfälischen Berggewerk-Schaftskasse and the Rheinisch-Westfälischen Kohlen-syndikat. Berlin, Germany; Julius Springer. Pages, 588; with 25 tables and 225 illustrations in the text.

BOOKS REVIEWED.

Chemical Analyses of Igneous Rocks Published from 1884 to 1900, with a Critical Discussion of the Character and Use of Analyses. By Henry Stephens Washington. *Professional Paper No. 14;* United States Geological Survey. Washington; Government Printing Office, 1903. Pages 435.

As indicated by the title, the book is a compilation of chemical analyses of igneous rocks prefaced by a discussion of analytical methods and the principles of rock classification. Since the last installment of Roth's *Tabellen* there has been no attempt to collect and publish a comprehensive list of rock analyses, although students of petrography have come to rely more and more upon chemical character for a solution of the various problems encountered in this branch of geology. The present work includes nearly 3,000 analyses of rocks from all parts of the world, representing a reasonably complete tabulation of the material that has appeared in print during the period it covers. An interesting feature which should be commended is the attempt made to give a concise and systematic expression of the quality of each analysis according to its relative degree of accuracy and completeness. Such a procedure might give some ground for criticism if it were not carried out with unbiased judgment, as evidently has been done in this case. Another feature to which more serious objection may be raised is the arrangement of the analyses according to the classification recently proposed by Messrs. Cross, Idelings, Pirsson and Washington—a classification that undoubtedly possesses certain advantages over the system in vogue, but which must await further investigation and discussion before it can enter into general use. Until this result is attained—and it is a matter of many years, even taking the more hopeful view of the situation—the arrangement will be a detriment upon the value of the work as a book of reference.

The Manufacture and Properties of Iron and Steel. By Harry Huse Campbell. New York and London; THE ENGINEERING AND MINING JOURNAL. Pages, 912; with maps, illustrations and tables. Price, \$5.

The author of this book has modestly called it a second edition of his work on structural and open-hearth steel, which appeared some years ago. This statement, however, does not by any means cover the fact, since the present work is entirely a new book. It is true that the second part embraces the ground covered by the so-called first edition, but that part has been entirely re-written and new chapters have been added. Taken in its present form, it is a complete book which covers the principles of the art of making steel in a way which no other volume, with which the writer is familiar, can be said to do. There are, of course, treatises on iron and steel making by Ledebur, Howe and others, which go more into the abstruser chemistry of the art; but these do not cover the practical working and technology as Mr. Campbell has done. It is a book written for engineers and others who desire to understand the principles of the art, its different subdivisions, and the reasons for the preference given to certain processes.

The history of the iron and steel trade has been a notable case of the "survival of the fittest." The blast furnace, while receiving many improvements in detail, has survived in its general form as the producer of pig iron; the puddling furnace, which for generations furnished the chief method of refining pig iron, and which had in the earlier days of the trade superseded the Catalan forge, has declined from the day Sir Henry Bessemer invented his steel converter; while the bessemer converter, in its turn, is gradually giving way to the open-hearth furnace. Whether this will be the ultimate development is more than any man can now safely predict. Mr. Campbell has taken the art in its present stage, and has described it clearly and plainly in language and with illustrations than can be understood without difficulty by any engineer. While he gives many details and drawings of furnaces and apparatus, he has wisely confined himself rather to the main principles of metallurgy; for, as he well says, the constant improvement in the details of manufacture soon make drawings and accounts of special apparatus antiquated, while the fundamental principles remain the same from year to year, and their value knows no depreciation. There are still many small economies to effect in the art; there will be constant cheapening in manufacture, as the cost of supply and transportation is lowered by progress in engineering skill; there are important improvements that are in plain view; and there may be still more radical changes not yet foreseen.

The book is divided into three parts. The first is devoted to the main principles of iron metallurgy. This describes, in succession, the making of pig iron; the making of wrought iron; crucible steel; the acid and the basic bessemer processes; the acid and the basic open-hearth processes; the influence of working on steel; methods of testing and applying specifications; the making of steel castings, and finally, the inspection of finished steel. This part is a general introduction, prefacing the detailed descriptions which follow later.

Part II treats in detail of the different processes which are outlined in Part I. In the opening chapter Mr. Campbell refers with some feeling to the "errancy of scientific records;" that is, the difficulty in obtaining comparative data, the variations in chemical work, and the other obstacles which the investigator meets when he attempts to secure positive information.

The second chapter refers to the blast furnace, its gradual growth, the materials upon which it works, the fuels with which it works, and its present development. The third chapter treats somewhat briefly of wrought iron and the puddling process. The fourth chapter enters upon the main topic of the book by defining steel. It refers to the numerous definitions and differentiations, which have been proposed, and especially to the numerous refinements and sub-definitions suggested by German metallurgists. The latter would introduce a great variety of terms to describe different grades of steel; but it is to be noted that the numerous terms suggested by them have failed to come into general use, even in their own country; and where they have even been used for a time, they have been dropped by general consent. Mr. Campbell's own definition is a very simple one, and is as follows:

"1. By the term wrought iron is meant the product of the puddling furnace, or the sinking fire.

"2. By the term steel is meant the product of the cementation process, or the malleable compounds of iron made in the crucible, the converter, or the open-hearth furnace."

In succeeding chapters Mr. Campbell then takes up high carbon steel, the acid bessemer process, the basic bessemer process, and the open-hearth furnace. A chapter is then devoted to fuel in its relation to the production of steel. Chapters follow on the acid open-hearth process, the basic open-hearth process, and on special methods of manufacture, and the costs of manufacture. The remainder of the second part, comprising nine chapters, relates to the influence of

hot working, and of heat treatment, rolling, etc., on steel; the influence of carbon, manganese, phosphorus and other elements on the properties of steel; the classification of structural steel; welding and steel castings.

Part III is devoted to the iron and steel industries of different countries. It opens with a chapter on the controlling factors in industrial competition, and then takes up in succession, the United States, Great Britain, Germany, France, Russia, Austria, Belgium, Sweden, Spain, Italy and Canada. These descriptions of the industry in separate countries, and of the different districts of provinces, as the author well says, "are not intended as complete investigations. It would be impossible, for instance, to describe the American districts so fully that every engineer and metallurgist of our country would find all the information he might wish, or even find a record of all that he already knows. It would also be impossible to tell an English engineer much about those parts of his own country with which he is acquainted. It may be possible, however, to give some facts for the benefit of travelers; to clear the way for a foreigner visiting America, or an American visiting other lands. It is for this purpose only that these articles have been written, and their end will be accomplished if they furnish certain fundamental facts on which to base such a journey."

An appendix contains notes on various matters, including the value of certain factors in metallurgy, the content of metallic iron in iron compounds, and reactions in open-hearth furnaces. Included in the book are many illustrations showing, not so much details, as general forms and types of apparatus; and a large number of useful tables, giving condensed information with regard to statistical and other matters. An excellent index concludes the volume.

I have heretofore referred to the author's very modest claim, but I must here repeat my conviction that there is no book, yet published, which gives so complete a view of the metallurgy of iron and steel in a form which can be understood by the average engineer and practical steel maker. The author has done us all a great service, which, for my part, I am glad to acknowledge here.—C. T.

CORRESPONDENCE.

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

The Geological Survey and Good Faith.

Sir.—Probably you also are in receipt of a circular letter purporting to prove bad faith on the part of a well-known member of the United States Geological Survey, and reflecting upon the honor and integrity of the entire department "as at present organized."

Referring to the Lake Superior division of the Survey, which has been at work in this region for the past twenty years on all the iron ranges and dealing with all the iron-ore interests, I have yet to hear of a single case of broken faith. I feel it a duty to bear testimony to the effect that the various members of this division of the Survey have always been, and are, held in the highest esteem and honor, both officially and personally, by all the various mining interests in this region.

The charges in this circular against the entire Survey are most serious, and the attention of the proper officials should be called to them.

The reports of the Survey are invaluable to the mining interests of the country when based on observed facts; but to obtain the facts from the mining men the integrity of the geologists must be above suspicion. Inevitably a stigma will now rest on the department, but every effort should be made to warrant a restoration of confidence in the Survey.

V. S. HILLYER.

Ishpeming, Mich., Sept. 2, 1903.

THE SPRING PLACER MACHINE.

Sir.—Messrs. H. T. Spring & Brother, of the Spring Mining, Concentrating and Manufacturing Company, of Philadelphia, Pa., recently put up one of their placer gold saving machines at this place. On August 29 a run was made, the gravel was screened through a 1/2-in. mesh screw, ready for the hopper, the machine started, and screened material put into the hopper. All parts of the plant did their work well. I watched the discharge of the material into the pans, and, as the material was reduced, saw the gold in the bottom of the pans following the black sand back and forth at every revolution of the pan. I watched the whole operation closely, thinking, of course, that some of the gold would go over the rim of the pans, but none was detected. After the run was made all the tailings were hand-panned to ascertain if there had been any loss of gold, but to my surprise not a particle was found. This run was made on the Edwards gold mine, in Haralson County, Georgia, of three yards gravel. The result was 9 dwt. 12 gr. gold, of small nuggets, coarse and fine gold, also flour-gold. Each machine has 16 pans,



SPRING PLACER MACHINE.

and can work 40 yards screened gravel in 24 hours. They will put 10 more machines at once on this same property. In 30 years' experience as a gold miner, I have worked many gold-saving devices, all of which had losses of from 20 to 60 per cent of gold. It is nothing more than panning on a large scale. Each pan does the work of 10 men panning. Each section of the machine has 16 pans, and as many sections can be added as wanted to increase the output.

The accompanying engraving is from a photograph showing the machine as put up and ready for operation.

CHAS. F. DURR.

Buchanan, Ga., Sept. 7.

The United States Geological Survey and Mine Litigation at Butte.

Sir.—As the Associated Press has given currency to the charges made by Mr. G. H. Robinson, witness for Mr. F. A. Heinze, in a mining lawsuit at Butte, Mont., it becomes necessary, in the absence of the director and the chief geologist, for me to say that the charge of broken faith made against the Survey and myself, as its representative, is unfounded. A telegram received from the director on May 3, 1900, stated "Survey report will not be published pending present litigation." His interpretation of this is shown in the following paragraph quoted from a letter prepared by the Survey in reply to one received from Mr. Heinze:

"You are under a misapprehension if you suppose that the agreement referred to involved the suppression of the report on the Butte mines as long as any litigation whatever is pending. The telegram expressly stated that the report would not be published pending present litigation, by which was meant cases then on trial. At the time that the bulletin was pub-

lished we understood that these cases had already been closed.

"It is our universal practice to abstain, when so requested, from making public facts observed in a particular mine, when visiting it under permission from the owner, that may be used to his disadvantage in litigation pending at the time. But we do not understand that this precludes us from stating general conclusions with regard to the general geological structure of a district deduced from our observations in the district, even if our construction may not accord with the one that its owner happens to have adopted. We only refrain from stating what was observed in his particular property as a result of his permission to inspect it.

"There is no prospect of the immediate publication of the final Butte report under any contingency."

Last winter the director requested each geologist to prepare a statement of the recent mining work done by him. In response to this order I furnished a short sketch of the geological features of Butte, Mont., omitting all reference to individual properties, and, so far as I could, to any geological facts involved in litigation. This very general sketch was published by the Bureau, with brief sketches of other mining districts, in a bulletin entitled "Contributions to Economic Geology, Bulletin No. 213."

After its publication Mr. Heinze wrote the director in reference to it, but made no charge of broken faith. Subsequently, while on the witness stand, his employee made a bitter personal attack on the writer, in the endeavor to refute the facts presented by his opponents in a mining lawsuit.

WALTER HARVEY WEED,

United States Geologist.

Washington, D. C., Aug. 31, 1903.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALY REPORTED.

LIABILITY OF STOCKHOLDERS OF MINING COMPANY IN MONTANA.—Under the laws of Montana (Compiled Statutes 1887, division 5, section 457), providing that the stockholders of every company incorporated under the act shall be liable to the creditors of the company to the amount of the unpaid stock held by them, etc., the liability of the stockholders arises after execution of a judgment has been returned unsatisfied, and the statute of limitations does not begin to run against the stockholders until such time.—*King v. Poney Gold Mining Company* (72 *Pacific Reporter*, 309); Supreme Court of Montana.

WHEN EXISTENCE OF CUSTOM IN MINING DISTRICT MAY BE SHOWN.—A coal mine driver was injured by an overhanging rock, past which his mules went safely. He had been in the mine three hours and had passed the point three times, but had not had his attention called to the rock. The pit boss had told him the entry was about the same height all through. The path at this point had been excavated about a foot. It was held that the mere fact that the mule was not injured did not conclusively demonstrate the driver's negligence. In such a case evidence of a custom in the mining district respecting the height and width of the entries is admissible.—*Hamilton v. Mendota Coal Mining Company* (94 *Northwestern Reporter*, 282); Supreme Court of Iowa.

WHEN INSTRUCTION AS TO ASSUMPTION OF RISK IS PROPER.—In an action by an experienced coal miner, who was employed to timber a mine and look out for and remedy dangers from caving, for injuries sustained by the falling of coal and dirt; where it was shown that he had discovered the dangerous situation and continued to work there after he had requested and been promised assistance, an instruction that if the dangers and defects were so obvious and threatening that a reasonably prudent man would have avoided them, such miner was guilty of contributory negligence and assumed the risk of injury, is proper.—*Roccia v. Black Diamond Coal Mining Company* (121 *Federal Reporter*, 451); United States Court of Appeals.

LODE CLAIMS AND EXTRA-LATERAL RIGHTS.—Under the laws of the United States (United States Compiled Statutes, 1901, p. 1425, sec. 2322) providing that the owners of all lode mining claims shall have the exclusive right to all the lodes and ledges throughout their entire depth, the dip of apex of which lies inside the surface lines of such claim extending downward vertically, although such lodes may so far depart from a perpendicular as to extend outside the vertical side-lines, and that the right to possession of such outside parts of veins shall be confined to such portions as lie between the vertical planes drawn downward through the end-lines of the location, etc., the owner of such exterior parts of such veins or ledges has extra-lateral rights to the secondary veins apexing within the surface lines of his location, although such secondary veins do not apex within the same segment of the claim in which the apex of the discovery veins exists; and while the end-lines of the location must constitute the end-lines of all veins apexing within the surface boundaries, and may be the boundary plane of such extra-lateral rights, yet the boundary planes of these veins, though they must be drawn parallel to the end-lines, need not be co-extensive.—*Ajax Gold Mining Company v. Hilky Gold Mining Company (72 Pacific Reporter, 447)*; Supreme Court of Colorado.

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.

Operation of Oil Wells.—What is the smallest oil well that can be profitably operated?—J. A.

Answer.—This is a question which cannot be answered definitely; naturally the minimum oil well that can be operated profitably will depend upon conditions, which are variable. The cost of drilling the well and operating it, the royalty due to the land owner (commonly 10 to 16 2-3 per cent) and the value of the oil are determining factors. Assuming oil to be worth \$1 per barrel, a single well yielding 10 barrels per day is generally about as small a one as can be operated successfully, but the conditions are materially improved where there is a group of wells which can be connected to the same engine and attended by one man.

Natural Gas Wells.—Why is it that two natural gas wells, showing the same rock pressure, give widely differing volumes of gas? The flow of gas through a pipe of a certain diameter being determined by the pressure, should not the same pressure give the same volume?—J. A.

Answer.—The rock pressure is not the only factor in determining the volume of a well. The latter is gauged from the "open-flow" pressure; that is, the pressure indicated when the well is flowing freely. Two wells of the same rock pressure may show very different open-flow pressures, and consequently volumes. This is due to the character of the sand in which the gas is stored. A dense sand will not let the gas out so freely as a more porous one, and therefore will give a lower open-flow pressure and discharge a smaller volume. If a cylinder charged with gas under pressure were tapped by a 1-in. hole at each end, the same quantity would flow out through each, but the conditions of an accumulation of natural gas in a deep stratum of sandstone are different.

Management of Forehearths.—Why does matte cool so quickly in the forehearth of a matte smelting furnace, and especially around the tap-hole? What is the remedy for this rapid cooling?—H. A. M.

Answer.—The chill of matte in a forehearth is due to loss of heat by radiation. When the temperature

of a molten matte in any part of the forehearth falls below its melting point, it freezes. Naturally this begins around the sides of the vessel, and especially around the tap-hole, where the wall is likely to be thinner and the conditions of manipulation tend toward a more rapid abstraction of heat. The freezing of the matte around the sides of the vessel will take place rapidly until approximately a balance is established between the heat radiated and the quantity introduced by the molten matte and slag from the furnace, minus what is carried away by the matte and slag tapped off. The building up of the forehearth in this manner will continue until its free volume is so reduced that it is advisable to substitute a new forehearth. At Butte, Montana, the large circular forehearths, 14 ft. in diameter and 56 in. high, constructed with a 9-in. brick lining and a 9-in. backing of brasque, hold about 60 tons of matte when new. They have to be replaced after about three months' use. Smaller forehearths will not last so long. It may be necessary to make a change every three weeks, or even in less time. Much depends on the size of the smelting furnace, the amount of the matte fall, and the character of the matte. With a large furnace, producing a large quantity of low-grade, very fusible matte, the forehearth will keep open a comparatively long time. In treating zinky ores, a mushy matte will be produced, and it having a high melting point, a great deal of trouble in the forehearth may be expected. The most difficult conditions for the management of the forehearth are a small furnace, run to effect a high degree of concentration, and producing only a small quantity of matte, which may be of a relatively infusible composition. Trouble with the tap-hole is likely to be due to the formation of accretions therein. This will make it difficult to introduce the bar for the next tap. After matte has been tapped, and the flow has been stopped with clay, the bar should be driven in carefully until the point has just penetrated the clay and entered the forehearth. By further driving in the bar with light blows of a hammer from time to time, its point is kept about even with the inner surface of the gradually increasing chill, so that the latter is easily penetrated by a few solid blows when the next tap is required. The position of the matte tap with respect to the hot molten material flowing in from the furnace is important. If the matte has a tendency to chill rapidly and is scanty or of a high melting point, the tapping place in the forehearth should be so located that the breast will receive the maximum heating effect from the inflowing material.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

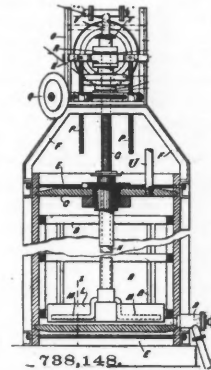
The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared:

Week Ending September 8, 1903.

- 738,153. **WOOD DISTILLING APPARATUS.**—Carl W. Bilfinger, Fayetteville, N. C. A wood distilling apparatus comprising, in combination, a retort, means for heating the retort, a tar outlet leading from the base of the retort, a condenser, a condenser pipe connecting the retort and a condensing coil at their upper ends, said pipe being approximately U-shaped, an outlet branch at the lowest point of said pipe, a receiver for the liquid of condensation discharging from said branch, a pipe connected with the lower end of the condensing coil and having a vent branch pipe, a liquid trap and valved outlets beyond said trap, and a liquid conducting pipe at each of said valved outlets.
- 738,161. **AUTOMATIC GOVERNOR FOR FLUID COMPRESSORS.**—Niels A. Christensen, Milwaukee, Wis. An automatic governor device for fluid compressors comprising a casing having a check valved main passage between the compressor and reservoir with a branch or vent passage from said main passage on the compressor side of the check-valve to atmosphere, a vent-valve in said casing governing such vent passage, said casing also hav-

ing a chamber or cylinder, a movable abutment in such chamber to operate the vent-valve, and exposed to excess reservoir-pressure when automatically admitted, automatic means located in said casing for releasing such admitted pressure, a second casing secured to the first casing and having a port-provided end forming a removable cylinder-head for said cylinder, said second casing having a chamber communicating with a branch passage in the first casing leading from the main passage on the reservoir side of the check-valve, and a fluid-pressure actuated valve located in the chamber of such second casing and governing said port.

- 738,148. **APPARATUS FOR EXTRACTION OF PRECIOUS METALS FROM THEIR ORES.**—Jose B. de Alzugaray and William A. Mercer, London, England, assignors to the Baxeres Gold Extraction Company, Limited, London, England. Apparatus for treating ores, consisting of a closed containing vessel or vat provided with fixed

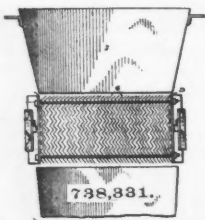


internal blades or wings, a rotating hollow spindle provided with ball bearings and having hollow blades or beaters set at an angle, means for raising and lowering the spindle in the vat, gearing for rotating the spindle, and means connected with the vat for supporting the gearing and steadying the spindle.

- 738,200. **PROCESS OF MAKING ARTIFICIAL STONES.**—Franz Jurschina, Stockholm, Sweden.—A process of making artificial stone, which consists in mixing a silicate of an alkaline metal with clay to form a homogeneous mass, and then stirring this mixture into one of cement and sand, molding, drying and firing the product.
- 738,236. **WATER SEALED REVERSING-VALVE FOR REGENERATIVE FURNACES.**—Hugh Prentice and Frank J. Deemer, Cleveland, Ohio. In a reversing-valve, the combination with an upper gas-inlet including a depending flange, of a vertical casing having a water-space throughout its height and provided with an upper trough in which the flange is immersed, an interior transverse partition, a base containing flue-openings for communicating with the plurality of regenerating-chambers and the discharge respectively, said base containing a sealing-trough for said valve-casing, and means for rotating said casing and its partition.
- 738,239. **PROCESS OF MAKING ZINC AND CHROMIUM HYDRATES.**—Isaiah L. Roberts, Brooklyn, N. Y., assignor to the Roberts Battery Company. The process of obtaining zinc and chromium hydrates from a solution of their sulphates, which consists in adding calcium chloride to the solution, adding to the resulting chlorides an insoluble carbonate to precipitate the hydrate of one of the metals, separating such precipitate, then adding calcium hydrate to the remaining chloride to precipitate the other hydrate, as set forth.
- 738,262. **MINE-CURTAIN RAISER.**—John Wack, Canton, Ohio, assignor of one-half to William L. Davis, Canton, Ohio. In combination, a curtain-raiser, a curtain hung on the frame, an adjacent rocking frame comprising a rock-shaft, rock posts on the shaft, curtain-arms pivoted to the rock-posts above and attached to the curtain below, toggle-levers pivoted respectively with the curtain-arms to the rock-posts and to the curtain-frame, the toggle-joints being tied to the curtain-arms, a weight on the rocking frame located to bear with the curtain when the same is lowered and partly counterbalance it when raised, and means for oscillating the rocking frame whereby the curtain is raised and lowered.
- 738,291. **GOLD-SAVING DEVICE.**—Philip H. Carlyon, Olympia, Wash. In combination with a closed vessel having a rounded bottom, an inlet-pipe extending into said vessel and discharging against the bottom to one side of the center thereof, screens suspended in said vessel, and an exit-pipe extending from the vessel at that side thereof adjacent to the inlet.
- 738,303. **PROCESS OF MANUFACTURING GAS.**—Herbert S. Elworthy, London, England, assignor of one-half to Ernest Henry Williamson, London, England. The manufacture of gas for illuminating, heating or power purposes by producing water-gas by passing steam over ignited carbonaceous fuel, blending therewith a quantity of hydrogen sufficient substantially to convert the carbon contained in the carbon monoxide present in said gas into methane, and to convert the oxygen liberated from said oxide of carbon into water, and then passing such mixture of water-

gas and hydrogen over nickel in the metallic state at a suitable temperature to effect the required reaction.

- 738,306. **AERIAL WIRE-ROPE TRAMWAY.** Christopher T. Finlayson, Denver, Colo. In an aerial wire-rope tramway, a track comprising a stationary rope and a track of metal or other suitable material interposed in said rope track, and a traction or running rope placed above said track and arranged and adapted to operate on either side and to cross above it.
- 738,307. **FRICITION-GRIP FOR WIRE-ROPE TRAMWAYS.**—Christopher T. Finlayson, Denver, Colo. In a friction-grip for wire-rope tramways, a suitable supporting-casing having a fixed jaw thereon, trunnions on opposite sides of said casing placed substantially parallel with said fixed jaw and a supporting-base provided with suitable trunnion-supporting boxes pivotally attached to said trunnions and adapted to be connected to suitable parts of the carrying device of a wire-rope tramway such as the trolley, or bucket, or carrier-pendant.
- 738,308. **DUMPING DEVICE FOR AERIAL TRAMWAYS.**—Christopher T. Finlayson, Denver, Colo. In a bucket-dumping device for wire-rope tramways, an operative tramway, a tiltable pendant bucket or carrier, a flexible member connected at one end to said bucket or carrier and provided at its opposite end with an enlarged head member arranged to normally rest against the side of said pendant and to project laterally from it, and means including guide-rails for engaging and actuating said head member and said flexible member to dump said bucket.
- 738,309. **AUTOMATIC BUCKET-LOADER FOR AERIAL WIRE-ROPE TRAMWAYS.**—Christopher T. Finlayson, Denver, Colo. In an automatic bucket-loader for wire-rope tramways, the combination with the terminals and the continuously running pendant-buckets of an operative tramway, of a loading-station, a bucket-loading hopper mounted on tracks at said station, an arm slidably mounted on said hopper, a spring between said arm and said hopper and a projection on said pendant of said bucket, adapted to strike said arm and to move said hopper through the medium of said spring, a predetermined distance on said tracks, means for returning said hopper to said loading-station and means for discharging the contents of said hopper into said bucket.
- 738,310. **LOCK-CLIP FOR CONNECTING BUCKETS TO TRACTION-ROPE OF AERIAL WIRE-ROPE TRAMWAYS.** Christopher T. Finlayson, Denver, Colo. In a clip for alternately connecting and releasing buckets to and from the traction-rope of wire-rope tramways, the combination with the rope and the trolley of the clip-plate secured to said rope at one end, an enlarged head end on the free end of said clip, the socket secured to said bucket and adapted to receive the enlarged end of said clip, the yoke rotatably mounted on said socket and means for operating said yoke to lock and unlock said clip from said socket.
- 738,326. **MINING SULPHUR.**—Pattillo Higgins, Beaumont, Texas. In apparatus for mining sulphur, a heater for liquefying the mineral arranged in a well in communication with the mineral bearing stratum, an elevator for the liquefied mineral located in a well within the zone of the aforesaid heater, and means for supplying hot air to the heater and elevator.
- 738,327. **DRILL AND REAMER FOR DEEP WELLS.**—Pattillo Higgins, Beaumont, Texas. A drill for deep wells comprising a drill-body circular in cross-section and having vertical channels in its sides, an annular cutter at the lower end of the drill-body, and a drill-point detachably fitted to the lower end of the drill-body and of a diameter approximating the drill-body.
- 738,329. **DEVICE FOR TREATING SLIMES.**—William E. Holderman, Marysvale, Utah. In a device for treating slimes having a liquid-tight case, a discharge-pipe provided with a valve in its bottom, an inclined floor in said case, spaced bars on said floor and the sides of the case, a filtering fabric covering said bars, and overlapping the upper edge of the tank, a molding to hold the fabric in operative position and pipes provided with stoppers leading from the filter out through said case.
- 738,331. **ORE SEPARATOR.**—Conrad F. Lancaster, East Liverpool, Ohio. An ore-separator, comprising in combination with a magnet, a separator-box, magnetizable corru-

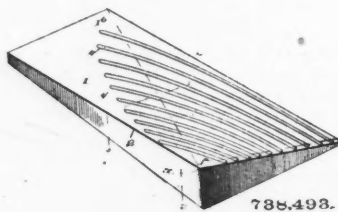


gated plates supported therein, adapted to be excited by the magnet, and a feeder for feeding the material between said plates.

- 738,353. **PORTABLE RIG FOR PULLING OIL-WELLS.**—Frank W. Pennell, Ann Arbor, Mich., assignor of two-thirds to Roderick Morrison, Gibsonburg, Ohio, and Thomas C. Pennell, Lima, Ohio. In a portable pulling-rig for oil-wells, the tapering side sections provided with a pulley at their upper ends and joined together at their lower

ends to form a broad support for the rig, wheels mounted upon the side sections near the lower ends, adapted to support the side sections when lowered and to be raised from the ground when the sections are elevated, and the brace-rods carried over the supports for the wheels and secured at the ends to the side sections.

- 738,355. **CHANNELING TOOL.**—Arthur D. Puerner and Thompson G. Heine, Butte, Mont. A channeling-tool having a holder provided on opposite sides with a plurality of angularly-disposed gage devices, and a cutter-bit secured to the holder and having angularly-disposed cutting edges, said cutting-bit lying between the gage devices on opposite sides of the holder.
- 738,388. **MANUFACTURE OF CEMENT.**—William A. O. Wuth, Pittsburg, Pa., assignor to International Cement Company. A process of forming cement which consists in treating limestone with a salt which will evolve oxygen at a high temperature, grinding the same, thereafter mixing the same with powdered blast-furnace slag and then burning the mixture.
- 738,389. **MANUFACTURE OF CEMENT.**—William A. O. Wuth, Pittsburg, Pa., assignor to International Cement Company.—A process of forming cement which consists in grinding and mixing together in a dry state blast-furnace slag, a lime-bearing agent and a salt which will evolve oxygen at a high temperature, and then burning the mixture.
- 738,408. **MACHINE FOR WASHING AND CLEANING GRAVEL, IN GOLD-MINING.**—James G. Camp, Sacramento, Cal. The combination of a horizontally arranged cylinder divided by sectional transversely-arranged retaining plates into a receiving section having tumbler blades longitudinally arranged therein, a plain unobstructed scouring section, a foraminous separating section and a discharging section, with a feed spout leading into the receiving section, and means revolving said cylinder on its axis.
- 738,416. **DRILLING ENGINE.**—John B. Damas, Sonora, Cal. The combination in a reciprocating engine and the cylinder thereof, of a double-headed piston having a central section of less diameter than the ends, a valve slidable upon a valve-seat, said valve having a D-port in the under side at the front end and a B-port in the under side of the rear end, a centrally-disposed chamber between the cylinder and valve-chamber, a lever pivoted within said chamber having the lower ends projecting into the cylinder so as to be alternately tilted by the movement of the piston, a socket in the valve-face with which the upper end of the lever engages to reciprocate the valve, a single port connecting the front end of the valve-chamber with the front end of the cylinder, and two separate ports entering the rear end of the cylinder, one of said ports serving to admit steam and the other to exhaust the steam upon the return stroke of the piston.
- 738,420. **GAS-GENERATOR.**—William C. Dillon, Los Angeles, Cal., assignor of one-half to Edward Lloyd, Los Angeles, Cal. In a gas-generator, the combination with a boiler, of a cylinder therein spaced from the walls of the boiler, an oil-tank, a pipe leading from the oil-tank through the boiler to the cylinder, pipes leading from the cylinder through the boiler, a gas-tank connected to the last-named pipes, a water-supply pipe to the boiler, a steam-pipe leading from the boiler and means for heating the boiler.
- 738,561. **COMPOSITE PEAT BLOCK.**—William A. Milne, Brown's Corners, Canada. A composite peat block comprising a core and shell, the shell being formed of pulverized peat having less moisture than the core.
- 738,493. **CONCENTRATOR-TABLE.**—Richard T. Schraubstadter, St. Louis, Mo., assignor to Frederic W. Ritter, Jr., Washington, D. C. A concentrator-table having a warped

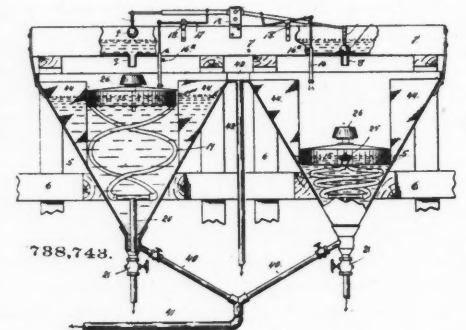


surface and provided with riffles arranged on lines formed by the intersection of horizontal planes with the warped surface of the table and means for reciprocating said table.

- 738,571. **MINER'S CANDLESTICK.**—Rasmus P. Rasmussen, Integral, Cal. The combination in a miner's candlestick of a pointed arm having a ring formed near its outer end, an interior concentric ring pivoted at opposite sides, a candle-holder having its upper end pivoted transversely to the ring pivots whereby a universal movement is effected, said holder having an open slot at one side and a cam-lever fulcrumed on the side of the holder and normally extending below the same, and a radial contact-piece with which one end of the lever engages whereby the holder may be opened to receive the candle.
- 738,576. **HYDRAULIC AIR-COMPRESSOR.**—Joel H. Shedd, Providence, R. I., assignor to Walter C. Carr, New York, N. Y. In a hydraulic air-compressor, a series of horizontal air-bars communicating at their ends with a submerged chamber and means for throttling the air after it

enters the air-bars from the air-chamber to secure its more even distribution throughout the length thereof.

- 738,589. **DUPLEX PUMPING ENGINE.**—Euclid P. Worden, Milwaukee, Wis., assignor to Fred M. Prescott Steam Pump Company, Milwaukee, Wis. In a vertical duplex pumping-engine in which the engine-cylinders are arranged above and in line with the pump-cylinders, the upper heads of which are removable, the combination of cross-heads to which the piston-rods are attached, a walking beam connecting said cross-heads, and guides for said cross-heads attached at their lower ends to opposite sides of the pump-cylinders outside and independently of their removable heads.
- 738,656. **PROCESS OF DESULPHURIZING CRUDE PETROLEUM.**—Arthur W. Burwell and Layton O. Sherman, Cleveland, Ohio; said Burwell assignor to said Sherman.—A process of desulphurizing crude petroleum, which consists in distilling the petroleum, and passing the oil-vapors in contact with oxides of iron and an alkaline-earth metal, both of said oxides being entirely free from water.
- 738,733. **REDUCING ALUMINUM BY HYDROCARBONS.**—Arvid Reuterdaahl, Providence, R. I. A method of reducing powdered alumina and setting free the aluminum therein, consisting in mixing with the powdered alumina a suitable liquid hydrocarbon so as to produce a paste-like compound, then subjecting the same to adequate heat in a closed vessel or retort and simultaneously passing through the mass a current of hydrocarbon gas, and finally removing the metallic aluminum.
- 738,743. **ORE SIZER, OR CLASSIFIER.**—Willis B. Gilmore, Idaho Springs, Colo. In a sizing or settling apparatus, the combination of two settling-tanks and a pulp-supply tank mounted above the settling-tanks, a float located in each settling-tank, a flexible conduit connected with the float at one extremity, its other extremity being in commu-



nication with the outlet from the tank, means connected with the supply-tank and controlled by the floats of the settling-tanks whereby there is a discharge of pulp from the supply to the settling-tanks alternately, a receptacle movably mounted on each float and arranged to receive the discharge from the supply-tank, and a suitable connection between the receptacle of each float and the flexible conduit, whereby the discharge through the said conduit is regulated and controlled.

GREAT BRITAIN.

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

Week Ending August 29, 1903.

- 22,294 of 1902. **USE OF ALUMINUM OXIDE IN PURIFYING METALS.**—H. Goldschmidt and W. Mathesius, Essen, Germany. The use of a mixture of an oxide of a metal and metallic aluminum for purifying molten metal and producing homogeneous castings.
- 23,046 of 1902. **HANDLING METAL PLATES.**—R. Thomas & Co., and J. Lewis, Llanelli. Improved apparatus for handling plates in the pickling and cleaning tanks prior to tinning.
- 23,756 of 1902. **ZINC FURNACE.**—Trollhattans Company, Stockholm, Sweden. A zinc distilling furnace, in which the charge is fed down a sloping surface exposed to the heat of an electric arc, the zinc being distilled off and the remainder of the charge being melted and run off at the bottom.
- 25,217 of 1902. **ROASTING FURNACE.**—T. D. Merton, Melbourne, Australia. A roasting furnace consisting of a series of hearths, one above the other, with horizontally rotating rabbling arms, the charge being roasted evenly, and a pure sulphurous acid gas being obtained, suitable for making sulphuric acid.
- 9,605 of 1903. **COKE OVEN.**—F. Pallenberg, Dortmund, Germany. Arranging the heating chambers of underfired coke-ovens in such a way as to be always accessible for cleaning.
- 10,659 of 1903. **BRIQUETTING FINE ORES.**—J. Loewenthal and B. Lippert, Madgeburg, Germany. Making briquettes of fine ores by first cleaning and then mixing with carbon and magnesite.

PERSONAL.

Mr. Carl Henrich has returned from Guanajuato, Mex.

Mr. Edgar G. Tuttle, of Philadelphia, is in New York.

Mr. T. Trafford Wynne has returned to London, from Brazil.

Mr. T. H. Stryker, of Rome, N. Y., has been at Central City, Colo.

Mr. J. D. Audley Smith is in New York, having returned from Alaska.

Col. E. A. Wall has returned to Salt Lake City from a trip to California.

Mr. W. A. Carlyle, mineral manager of the Rio Tinto mine, is at Montreal.

Mr. H. L. Twite has been appointed manager of the Loveden mine, in Cardigan, Eng.

Mr. Geo. W. Maynard has returned from an examination of iron mines in Cuba.

Sir Vincente Ferrara, of the Compania Minera, of Monterey, Mex., is in New York.

Mr. A. B. Frenzel, of Denver, returned there recently from a trip to New Mexico.

Dr. Joseph Hyde Pratt has returned to New York City, after visiting North Carolina.

Mr. Bernard MacDonald, of Spokane, is examining mines in the Cornucopia district, Ore.

Mr. G. E. Kedzie is manager of the Mina Grande de la Paz at Rodeo, in Durango, Mex.

Mr. Wm. Griffith has been to Coolgardie, W. A., to report on the Associated Northern Blocks.

Mr. J. D. Hubbard, of Chicago, Ill., has been at the Odea-Dempsey mines of Mojave county, Ariz.

Mr. H. J. Westover, mechanical engineer, is now with the Engineering Company of America.

Col. W. F. Sutherland passed through New York on his way from London to Juneau, Alaska.

Mr. William Thompson, manager of the Kootenay mines has returned to Rossland from Mexico.

Mr. Allan MacLean, of London, Eng., has returned to Rossland, B. C., from a two weeks' trip to Mexico.

Mr. Jas. W. Malcolmson, of El Paso, Tex., has gone to the Black mountain district of New Mexico.

Mr. William Magenau, who has been examining mines in Oaxaca, Mex., is expected in Omaha, Neb.

Mr. N. Cochran, of Rossland, B. C., is superintendent of the Mountain Lion mine, near Republic, Wash.

Mr. W. H. Armstrong, from Sydney, N. S. W., passed through New York recently en route to London.

Mr. Benjamin S. Revett has returned from the Coeur d'Alene district and is now at Breckinridge, Colo.

Mr. J. Kirby, general superintendent of the Daly-West mines at Park City, Utah, is visiting Seattle, Wash.

Mr. Berry, of Berry Bros., of Detroit, Mich., owners of the Golden Smelter, was at Central City, Colo., recently.

Mr. Patrick J. Donahue, of the Western Exploration Company, has gone to the Wood river, Idaho, district.

Mr. E. G. Whitten has resigned as president of the Pennsylvania & Indiana Coal Company, of Washington, Pa.

Prof. R. H. Richards, of the Boston Institute of Technology, passed through Denver last week on his way east.

Mr. John E. Phillips, of Denver, has returned to the West on business for the Engineering Company of America.

Mr. Courtenay De Kalb has nearly completed his professional labors at the Exposed Treasure mine, near Mojave, Cal.

Mr. Edward H. Liveing has returned from western Australia by the steamer *China*, reaching London on September 14.

Mr. Ross E. Brown has been appointed trustee of the California State Mining Bureau to succeed Mr. W. C. Ralston.

Mr. H. H. Cohen, of London, Eng., arrived in El Paso recently from Chihuahua, Mex., on his way to Los Angeles, Cal.

Capt. Thomas Roberts has left the Queen mine, near Negaunee, Mich., to assume charge of some of the works at the Breitung mines.

Dr. Jacob May, president of the Mineral Hill Mining Company, left Whatcom, Wash, recently for his home at Bridgeport, Conn.

Mr. T. P. Rigney is now general superintendent of the Summit Placer Mining Company's properties and mill at Soldier Summit, Utah.

Mr. Alexander B. Moffit, of Philipsburg, Mont., has been appointed superintendent of the Ontario Mining Company, at Park City, Utah.

Mr. Richard A. Vardon, of the firm of Bainbridge, Seymour & Company, has just returned to London from an inspection on the Ivory coast.

Mr. W. J. Murphy, general manager of the American Gold Fields Company, after spending a month in southern Oregon, has returned to Chicago.

Mr. Ernest A. Haggott, manager of the Arizona Blue Bell Copper Company, Mayer, Ariz., is on a visit to eastern points, including New York City.

Mr. Leonard D. Sivyver, of Spokane, has established a branch office at Los Angeles, Cal. Mr. Sivyver is now examining mines near Kingman, Ariz.

Mr. M. P. Kirk, of El Paso, Tex., returned recently from Chihuahua, Mex., where he has been examining the Magistral copper property near Minaca.

Mr. H. W. Fullarton, superintendent of the Telluride Reduction Company's plant at Colorado City, Colo., has been succeeded by Mr. C. D. Grove.

Capt. Walpole Roland, of Port Arthur, Ont., is engaged in mining in the Lake of the Woods district. His address for a while will be Appleton, Wis.

Mr. Walter De Varila, manager of the American Gold Fields Company, has resigned to take charge of the Golden Treasure mine, near Kingman, Ariz.

Mr. Marshall D. Draper, superintendent of the Town Topics Gold Mining Company, left Central City, Colo. recently, to examine mining property.

Col. E. J. Seits, of Philadelphia, has returned to Salt Lake City, Utah, from San Francisco, where he placed orders for machinery for his Mexican mines.

Mr. Herman Nieter, representing the Engineering Company of America, is making a trip to Cleveland, Chicago and intermediate points in the central West.

Mr. T. H. Leggett has resigned as consulting engineer for Neumann & Company, of the Consolidated Main Reef gold mines, at Johannesburg, South Africa.

Mr. Henry F. Key has resigned the superintendency of the Adventure stamp-mill in Ontonagon county, Mich. Mr. Roy Dunstan, of Hancock, succeeds Mr. Key.

Dr. Victor Goldschmidt, professor of mineralogy at the University of Heidelberg, passed through Helena last week, returning from Alaska. He will visit the Yellowstone park.

Mr. G. N. Howell, of Velardeña, Durango, Mex., stopped in Chihuahua recently to look after mining interests in the Santa Eulalia district before coming to the United States.

Mr. Chas. Von H. Kalkmann has been appointed manager of the Consolidation, Fairmont and Somerset coal companies, at Baltimore, to succeed Mr. H. C. Thomas, acting manager.

Mr. C. V. Petraeus, formerly consulting metallurgist of the Lanyon Zinc Company, is now chief metallurgist with the said company, and will have his headquarters at Iola, Kans.

Mr. Thomas Coate has resigned as superintendent of the Butler-Liberal Company near Salt Lake City, Utah. He will be succeeded by superintendent Williams of the Belmont, Park City.

Mr. Philip L. Foster, consulting engineer to the Exploration Company, Limited, has become a director of the El Oro Mining and Railway Company, of which he was formerly general manager.

Mr. W. McA. Johnson, formerly connected with the Orford Copper Company, is now assistant metallurgist of the Lanyon Zinc Company, and will be located at No. 3 works and rolling mill at La-Harpe.

Capt. James Piper, mining captain at the Negaunee mine of the United States Steel Corporation, has accepted the position of superintendent and manager of the Mitchell Development Company of Arizona.

Mr. Frank Blackwell, superintendent of the Northwestern Development Syndicate's property, in the Lardeau district of British Columbia, has returned to Houghton, Mich. The mine closed down last month.

Mr. J. E. Spurr, of the United States Geological Survey, has finished his field studies of the Tonopah and Silver Peak mining districts, in Nevada, and has returned to Washington, where he will prepare his reports.

Mr. C. E. Knapp, secretary of the North American Copper Company at Grand Encampment, Wyo., has resigned to accept a more important position with an English mining concern. Mr. Knapp will reside in London.

Mr. Pierre Bouery, manager of La Grange Hydraulic Gold Company, of California, was in New York recently and sailed last week for Paris. He has examined iron ore-land in Dent county, Mo., for French interests.

Mr. E. L. Booth, second vice-president of the North Western Fuel Company, Chicago, was in the East recently visiting the mines of the Fairmont-Con-

solidation-Somerset companies in West Virginia, Maryland and Pennsylvania.

Mr. E. J. Davis, commissioner of the Crown lands for the Ontario government, and Mr. Charles C. Van Norman, of Toronto, accompanied by Mr. William Blakemore, former superintendent of the Crow's Nest Pass Railroad, have been at the coal fields on the north fork of the Kettle river in British Columbia.

OBITUARY.

T. S. Lowry, a large shareholder in and a director of several Cornish mines, died at Camborne, Cornwall, on August 10.

Stanley Pearce, the eldest son of Mr. Gilbert Pearce, and a nephew of Dr. Richard Pearce, of Denver, died recently on the west coast of Africa, at the age of 35.

Robert de Wendel, president of the Comite des Forges, of France, and for many years head of the famous works of Hayance, was killed August 30, by being thrown from his carriage. M. de Wendel was one of the most prominent iron masters of France, and was known for his progressive tendencies, having introduced many improvements in the works of which he was head.

INDUSTRIAL NOTES.

The Bridgeport Crucible Company, of Bridgeport, Conn., is reported shipping its specialties to Australia.

The W. S. Tyler Company, of Cleveland, O., manufacturing wire cloth, is enlarging its plant by two new buildings.

The Turner Brass Works, of Chicago, Ill., reports an excellent demand from assayers and mine officers for its gasoline crucible furnace.

The Harrington & King Perforating Company, of Chicago, has taken some substantial contracts in hand for its specialties for shipment to Mexico.

The Jeffrey Manufacturing Company, of Columbus, O., is reported figuring on a substantial lot of machinery for shipment to New South Wales.

The plant of the Utah Light and Power Company, of Salt Lake City, has just been equipped with Burt exhaust heads by the Burt Manufacturing Company, of Akron, O.

The Magnolia Metal Company has moved back to its factory at 113-115 Bank street, New York City, which has been rebuilt after being destroyed by fire about a year ago.

The Anaconda Mining Company, of Butte, Mont., recently placed an order for Grothwell acid-proof compound for the top works at the mines. The compound is made by A. Grothwell, of San Francisco, Cal.

The General Electric Company, Schenectady, N. Y., have received an order for electric equipment for the Iselin shops of the Burmah railway, in India. The equipment includes power and lighting and also fans.

The Cleveland Electric Illuminating Company, of Cleveland, O., has sent a duplicate order for a 200-gal. Cross oil filter, with automatic water separating device, to the Burt Manufacturing Company, of Akron, Ohio.

Contracts have been awarded for the equipment of a coal mine opened by the West Penn Coal Company at West Apollo, Pa. Trestle approach and car haul will be built by the G. L. Bollinger Company, of Pittsburg, and the tippie equipment by Kenny & Company, Scottdale, Pa.

The Southwark Foundry and Machine Company of Philadelphia is completing some large blowing engines for Bolekow, Vaughan & Company, of Middlesboro, Eng. It is said that the Southwark company has arranged with an English firm of engineers to build Southwark blowing engines in England.

The South Bend White Coal Company was recently incorporated with a capital stock of \$25,000. The company is organized for the purpose of manufacturing and selling machinery incident to mining. John W. Talbott, Wilbur Ward and Charles Dowell, all of South Bend, Ind., are directors.

The Westinghouse interests have secured a contract for the electrical equipment of the Northeastern Marine Engineering Company's engine works at Sunderland, Eng. The polyphase system will be installed, several motors and auxiliary apparatus having been ordered. Power will be derived from the Sunderland corporation electrical plant.

The machine tools installed at the new shops of the Rock Island Railway Company at Moline, Ill., are to be electrically driven. The contracts for the equipment have been placed with the Crocker-Wheeler Company and the General Electric Company. The last purchase, made recently from the Crocker-Wheeler

Company, consisted of 30 motors, aggregating 400 h. p.

It has been reported that certain Canadians have secured the rights to the Rutheborg process of manufacturing steel by electricity and may erect a large plant on the Welland river at Chippewa, depending upon power from the new Canadian Niagara Power Company. Dr. Haanel, superintendent of mines, recently returned to Ottawa from Lockport, N. Y., where he inspected the new process.

Pursuant to an order of the New York Supreme Court, the properties of the National Salt Company were sold at public auction on September 15. F. P. McDermott, of Jersey City, and N. S. Beardslee, of Warsaw, receivers of the National Salt Company, conducted the sale. The properties were sold to S. D. Halliday, of Ithaca, for \$377,500. It is believed that he represented E. L. Fuller, of Scranton, president of the International Salt Company.

The American Emery Wheel Company, of Providence, R. I., is to erect an addition to its plant which will almost double its capacity. The new building will be of brick, two stories, and 34 by 116 ft. A brick engine and boiler house, 26 by 27 ft., will also be built. New machinery and fixtures for the manufacture of emery and corundum wheels will be installed. This addition is the third since the erection of the company's main building in 1898.

The Baldwin Locomotive Works recently secured orders from the Atlantic Coast Line for 7 locomotives; from the Union Pacific Railroad, for 10 passenger locomotives, and from the Mexican National Railway for 5 passenger and 5 freight locomotives. The company's new shops are well under way. Some of the equipment of the new shop includes an 80-ft. turntable, and one 100 and two 25-ton cranes, the former to be of a radial type. Baldwin-Westinghouse electric locomotives have been furnished the Dawson Fuel Company, Dawson, N. M.; National Mining Company, Sygan, Pa., and the Zenith Coal and Coke Company, North Fork, Pa.

Wm. B. Scaife & Sons Company, of Pittsburg, Pa., sole manufacturers of Scaife and We-Fu-Go water softening and purifying systems, will be represented in the future in Philadelphia by Mr. Duncan W. Patterson, with offices in the Harrison building, corner 15th and Market streets in place of Mr. Frierstine, whose offices were in the Bourse building. Mr. Patterson has been handling the Bachman system of water purification for the past two years, has made a number of installations at some of the large iron works and furnaces, and is thoroughly familiar with water purification. He will have charge of all of the water work of Wm. B. Scaife & Sons Company in eastern Pennsylvania, southern New Jersey, Delaware, Maryland and Virginia in their water purifying department.

TRADE CATALOGUES.

The Edson Manufacturing Company, of Boston, Mass., continues to issue printed matter calling attention to its diaphragm pumps for use in shallow mines and for prospecting work generally.

A little folder sent out by the C. W. Hunt Company, of West New Brighton, N. Y., describes and gives prices of the company's steel coal tubs, and of its side catch contractor's tub for hauling gravel, stone, clay, concrete, etc.

"Atmospheric Condensation" is the name of a 14-page pamphlet published by Arthur Pennell, of St. Louis, Mo. The pamphlet discusses the advantages of using saturated air as a cooling agent in surface condensers, and gives details of construction and the results obtained at plants where such condensers have been installed.

Catalogue No. 36, published by the Newton Machine Tool Works, of Philadelphia, Pa., is an attractive pamphlet of 236 pages describing the company's milling, planing, boring, slotting and drilling machines; also the company's cold saw cutting-off machines. The company's tools are for railway and general machine shop equipment, etc. They are made in a great variety of styles and sizes to suit all classes of work. The company states that it designs and builds electrically driven tools of every description.

An illustrated pamphlet of 98 pages, sent out by the Dayton Globe Iron Works Company, of Dayton, O., manufacturing pulp mill machinery, gearing and power transmission machinery, describes the Improved New American turbine. The company calls attention to the fact that the first American turbines were made in 1859, and many of these early wheels are still in active service. As a result of long experiments the company has adopted a single solid or continuous cast runner and uses this in the Improved New American turbine, which turbine is now in use in this and foreign countries where high standard rather than low first cost is considered. These turbines can be installed vertically, horizontally or inverted. They are provided with wicket or cylinder gates and are made in a variety of styles and sizes for different purposes

and varying heads of water. Tables showing horse-powers for turbines of 16 to 66 in. in diameter under heads of 3 to 100 ft. are given, as are illustrations of some plants installed by the company, including that furnished for the Boston & Montana Consolidated Copper and Silver Mining Company, of Great Falls, Mont. (the turbines being 57 in. in diameter and developing 3,945 h. p. under a head of 50 ft.), and the plant of the Northern Aluminum Company at Shawinigan Falls, Quebec, these wheels being of 1,600 h. p. each. The pamphlet gives results of tests made on the company's turbines, also directions for measuring water power, constructing head races, wheel pits and tail races and setting wheels.

SPECIAL CORRESPONDENCE.

Denver. Sept. 12.

(From Our Special Correspondent.)

The pyritic smelter at Golden, built, under the supervision of Prof. Carpenter, by the Perry Brothers, of Detroit, for the treatment of low-grade ores from Gilpin and Clear Creek counties, closed down yesterday, it is said, for an indefinite period. No reasons are made public.

The presence of the troops in the Cripple Creek district has insured order there, and many miners are returning to work. The militia, with main camp near Goldfield, are well distributed, while cavalry patrol the entire district night and day. There has been some friction between the military and the local authorities. Robertson, the sheriff of Teller county, belonged to one of the local unions, and appears to lean to the union side at present. He opposed the coming of the militia.

The employees of the La Bella Power and Light Company walked out on September 10 when the company began to furnish compressed air to the Golden Cycle mine which had resumed operations. A fresh set of men were employed, but shortly after the night shift went to work, it was discovered that the water supply for the large boilers was cut off so the machinery had to be stopped and practically the whole Cripple Creek district was without light. The water supply is furnished by the town of Goldfield and the water commissioner, who is a prominent union man, had shut it off. The water supply is now guarded by troops. During the past week there has been a steady increase in the number of miners and mill men reporting for work. The total number of men at work last night was estimated 464, on 12 mines and at the Taylor & Brunton, Eagle and Rio Grande samplers and the La Bella Power Company.

At Telluride, San Miguel county, miners continue to leave the district owing to the strike. The Tomboy, Smuggler Union and Liberty Bell mines continue work with reduced forces, mainly to keep the properties in order. All the properties at Ophir are in operation, but to-night the local miners' union will consider the counter proposal as to the mills of the managers of the Ophir Consolidated and the Carribeau. The Butterfly-Terrible Company, as a member of the San Juan Mine Owners' Association, will abide the action of the Association.

At a meeting on September 9 of the Ouray miners' Union it is said that only six men out of 300 men present voted to strike. The 100 men employed at the Virginus-Revenue are said to have been notified that if the mine is tied up by a strike, it will be permanently closed.

The miners' union at Silverton a few days ago decided by a large majority not to strike in violation of the existing agreement between the miners and the mine-owners.

President Moyer and other socialist leaders of the Western Federation of Miners are now touring southwestern Colorado to stir up further strife. Under the power conferred on them at the last annual convention, if president Moyer and the executive committee order a strike in any district, irrespective of whether the local miners have any grievance or otherwise, it is supposed to be the duty of the miners to obey the order.

At Idaho Springs, Clear Creek county, the power of the local miners' union has been absolutely crushed and all mines are running with full forces. The Durango smelter continues in operation.

South Dakota. Sept. 12.

(From Our Special Correspondent.)

The annual session of the American Mining congress was held at Deadwood and Lead this week. There were present 200 delegates, members and visitors from outside of the state. The address of welcome was delivered by Governor C. N. Herreid, of South Dakota, on behalf of the state, and response was made by J. H. Richards, president of the congress. The sessions alternated between Deadwood and Lead. Among those who read papers before the body on Tuesday were Edward F. Brown, Denver, on "Min-

ing Statistics"; Dr. J. E. Todd, state geologist for South Dakota, "The Geology of South Dakota"; Nelson H. Darton, of the United States Geological Survey, "The Geology of the Black Hills," and Dr. J. D. Irving, of the United States Geological Survey, "Ore Deposits of the Northern Black Hills." Dr. Irving was not present and his paper was read by Dr. E. R. Buckley, of Rolla, Mo., second vice-president of the congress. Leslie M. Shaw, secretary of the treasury, delivered an address on "The Mining Industry and its Relation to American Finances."

Wednesday, George E. Roberts, director of the mint, read a paper on "The Supply of Gold"; John Blatchford, of Terry, South Dakota, a paper on "Ore Deposits of the Northern Black Hills"; a paper from Dr. F. R. Carpenter on "Pyritic Smelting" was submitted and ordered printed, but was not read. C. W. Merrill, superintendent of the cyanide plant of the Homestake Company at Lead, read a paper on "The Metallurgy of the Homestake Ore." Dr. C. C. O'Hara, professor of geology at the State School of Mines at Rapid City, South Dakota, a paper on "Geology and Mineralogy of the Black Hills." An address was delivered by Hon. John L. Webster, of Omaha, on "The Money Metals and Their Influences upon Civilization."

Thursday the visitors at the congress were permitted to inspect the Homestake mine. They were lowered to the 700-ft. level at the Star hoist and were then conducted throughout the stopes and drifts nearly a mile underground, to the Highland hoist, where they were raised to the surface. Over 1,000 persons visited the mine. It was the first time in the history of the Homestake Company that visitors were permitted to explore the underground workings. On the same day excursions were run to various parts of the Black Hills.

Friday papers were read by E. W. Parker, of Washington, D. C., on "Coal." Dr. A. H. Elftman, of Silverton, Colo., "The Gold Ores of San Juan County"; C. L. Bartlett, of Cleveland, Ohio, "The Mechanical Drying of Clays"; C. L. Dignowity, of Boulder, Colo., "The Revelation of Gold Mining and the Chemical Treatment of Low-grade Ores for North Carolina."

During the session a representation from Portland, Ore., was present working in the interests of that city for the 1904 session of the congress. St. Louis and Minneapolis have also been represented.

BY TELEGRAPH.

The American Mining Congress at its closing session at Deadwood selected Portland, Ore., as the meeting place next year. Mr. J. H. Richards, of Idaho, was re-elected president. The other officers elected were: Thos. Ewing, California, first vice-president; R. C. Patterson, Omaha, Neb., second vice-president; Col. John T. Grayson, Portland, Ore., third vice-president; Irwin Mahon, Carlisle, Pa., was re-elected secretary. The re-elected other directors are E. F. Brown, Aspen, Colo.; E. R. Buckley, Rolla, Mo.; J. A. Holmes, St. Louis, Mo.; James Lynch, Butte, Mont., and John Gray, Terraville, S. D.

San Francisco. Sept. 9.

(From Our Special Correspondent.)

When mine-owners in any county go before the State Board of Equalization to protest about taxes, and when they read the annual record of bullion production of the same county as prepared by the statistician of the United States Mint at San Francisco, they talk differently. It is always charged against the Mint that its figures of output of the county are too low. The assessors and other officials of the different counties are just now appearing before the State Board of Equalization. They all make about the same protests against the raising of the county assessments. The assessor of Lassen county, for example, confessed there was only one good mine in the county, the Golden Eagle of the Lassen Mining Company at Hayden Hill, and even that company had been so bothered by strikers that the owners came near quitting altogether. Shasta county officials objected to a raise because the miners' strikes had closed down the Mountain Copper and Bully Hill companies for some months, and neither company had any ore out at the time the assessment was made. The equalizers reduced the personal property assessments of the big companies, but increased the valuation of their real estate and added about \$500,000 to the county assessment notwithstanding the protest. Amador, one of the Mother Lode counties, with many big producing mines, made a vigorous protest against raising its assessment, officials saying that mining was on the decline. The Kennedy mine had paid no dividend for four years, yet was assessed at \$155,000, as against \$114,000 the previous year. The Argonaut had been idle, yet was assessed at \$60,000. The miners' strikes in that region had affected all the mines; matters are in an unsettled condition, and many houses are vacant in the mining towns.

The Calaveras county officials said that the mining industry was not as prosperous as in former years. Attention was called to the fact, however, that the

Melones Mining Company, assessed at \$116,000, had a mortgage of \$400,000. The Royal Consolidated Mines at Hodson, assessed at \$200,000, had a mortgage of over \$200,000. In this county gravel ground is assessed at \$2.50 per acre, quartz locations, \$100 per claim; patented ground not developed, \$10 per acre; patented quartz claims undeveloped, at from \$500 to \$5,000. Sierra county officials confessed that the mines as a whole were not now paying and that there was but one stamp mill running. Mining property had increased the assessment roll by \$267,000 since 1897, but this should now be reduced. Mariposa, another Mother Lode county which depends on mining and stock raising, claimed that the assessments on these industries were much too high. The assessor and board of supervisors of Tuolumne county claimed that the mines are not yielding as much as they did a few years since and that several have closed down. Yet the papers of this county are always the first to dispute the Mint statistics of bullion product. Sutter county contended that land values had greatly decreased by reason of the evil results of hydraulic mining, that county being the natural dumping ground for the debris from the Yuba, Bear, Feather and Sacramento rivers. Over \$1,500,000 had been expended by the county in litigation with hydraulic miners and property owners are paying a \$2 levee tax. This in spite of the fact that no mines worked by hydraulic process are allowed to work without impounding their debris. Yuba county officials said the county had lost over 1,000 population in the past few years owing to the closing down of mines by officials of Sutter and other neighboring counties. Thus one county claims loss because the mines are running and the other claims loss because the mines are not allowed to run.

These are a few examples of what these counties think of their respective mining industries when the assessor comes around. What they will say when the Mint figures of bullion product for the year are published remains to be seen.

The old Omega property at Omega, Nevada county, has been bought by a Chicago company, represented by Joseph Underwood, and will be turned into a drift mine. It has been worked extensively by hydraulic mining. W. H. Wilson will be manager, with J. B. Tully as superintendent. There are 500 acres of gold-bearing ground with ditches, flumes and water rights.

The South Yuba Water Company, owner of large water rights in Nevada county, has acquired the water rights in Placer county heretofore owned by the Pioneer Pulp Company and the Towle Brothers Water Company. The property includes the large lakes in Lake and Six Mile valleys, the lake near Alta station and the water rights and canals from the North Fork of the American river, Canyon creek and Little Bear river. Additional works will be constructed to increase the capacity of the plants. The South Yuba is one of the largest water companies in the state.

Alameda county has finally decided to build 14 miles of good road from Livermore to the quicksilver and magnesite mines up in the corner of the county where the counties of Alameda, Santa Clara Stanislaus and San Joaquin join. Stanislaus is also to build a road. It is nearest to Livermore and if the grade and road are good it is probable that Livermore will get the wished for trade with the mines.

San Luis Potosi, Mex. Sept. 8.

(From Our Special Correspondent.)

The deal for the volcano of Popocatepetl is regarded as closed. Capt. Charles Holt came from New York and it is said, finally adjusted matters with Gen. Sanchez y Ochos, and paid \$25,000, Mexican, to bind the contract. The sale includes the sulphur deposits, a large tract of ground for residences, etc., a right of way for a railroad, and certain water rights, on the neighboring mountain of Ixtaccihuatl, for light and power purposes. By the transfer Gen. Sanchez is to get \$50,000 gold by September 30 and 250,000 shares of a company to be formed with a capital of \$5,000,000 gold to develop the sulphur deposits, establish a summer resort and build a railroad.

Down in Guerrero, though, lack of railroad facilities enables only very good properties or very large mines to pay, at Chilpancingo La Plata Mining Company is working with 400 men, and will employ more at the end of the rainy season. La Maria mine, of Atzacala, district of Cocula, one of the very few shipping mines of the state, has three tunnels on the vein, and is producing a very high grade silver and lead carbonate ore. The Mina Grande, of San Nicolas del Oro, is being developed by 100 men under the management of H. H. Miller; and the Guerrero de Oro is to be opened up by New York men.

At Pachuca, in Hidalgo, the stock for the new smelter has all been subscribed. The plant will be of 250 tons capacity at first. Most of the fluxing ore is expected to come from Zimapan, to which camp a railroad will be built. The output of the Pachuca mines will be increased, because of the cheaper rates. At San Jose del Oro Colorado people are after a gold-copper property.

In Oaxaca a new company has been organized, the Tlalcolula Mining Company, with Ernesto Gutierrez president and capitalized at \$150,000, Mexican, to continue work on El Placer and Dolores y Anexas, 12 miles east of Oaxaca, where are large bodies of free milling ore. A 10-stamp mill will be erected. It is understood that a \$1,000,000 company has been organized in New York to erect a customs smelter in Oaxaca.

In Saltillo, Coahuila, Francisco Viramontes is at the head of a movement to organize a company with a capital of \$2,000,000, Mexican, to be known as the Mazipil Mining and Smelting Company, which will purchase the properties it has under option, consisting of mines in the Portrero district and the old 60-ton Casas Coloradas smelter of Mazipil, the capacity of which will be increased to 300 tons. The company will also build a railroad from a point on the San Pedro branch of the Coahuila & Zacatecas railroad to the smelter site. Senor Viramontes is being aided by J. Fuentes Vargas and others in the city of Mexico.

In Durango the Guggenheim Exploration Company is said to be negotiating for La Descubridora and to have taken an option on the property at \$8,000,000, Mexican. A New York company is seeking a concession for a railroad 30 or 40 miles to the mine, from Conejos station on the Mexican Central, to be known as the Durango Central. A Detroit company, capitalized at \$1,000,000 gold, has been organized to work a number of old gold and silver mines at Yerba Buena, on Rio Nazas, with Charles Fowler as manager. The Carmen Copper Company, near San Juan de Heredia, is erecting new buildings, is shipping ore, and has opened a large body of low grade, concentrating ore for treatment of which a mill has been ordered.

Exchange on New York during the week went as low as 214, but ran up again, closing Saturday at 218½.

For some reason the mining stock market during the week was remarkably dull, and all the stocks suffered accordingly. Victoria brought only \$420; Aldebaran, \$150; Bessie, \$40; Dos Estrellas, \$3,425, and sold down to \$3,125; Old Abe went at \$60; Noche Buena, \$53; Luz de Borda, \$175 and \$180; Santa Rosa, \$45; La Union, \$140; Antares, \$60; Progreso, \$45; Chihuahua, \$53; Nacionale, \$25; Vascos, \$30; Angustias and Providencia, both of state of Guanajuato, \$120 and \$122 respectively; Barreno, \$40; La Paz, Matehuala, \$720; Trinidad, Charcas, \$110; Santa Gertrudis, \$90, and Soledad, Oaxaca, \$38.

London. Sept. 5.

(From Our Special Correspondent.)

It is a proverbial saying that metal mining in the British Islands is choked and throttled by the demands of the ground landlord. Though this is a trite question, it may be interesting to give the recent history of Dolcoath as an example of this unfortunate state of affairs. The owner of the land, Mr. Basset, receives one-fifteenth of the gross receipts from the sale of the ore. Since the reorganization of the company in 1895, his total receipts have been no less than £54,000, a princely income for doing nothing. During the same time the dividends distributed have been £100,000, though it should be remembered that large sums have been charged to capital account, and not to revenue. At the present time the landlord's dues of some £8,000 or £9,000 a year form practically the margin between the success or non-success of the company; so the directors and leading shareholders are doing their utmost to induce Mr. Basset to relax his grip on them. He has shown some disposition to meet their views, but it is probable that the reduction he may consent to will not be a drastic one, and that his proposal will be to reduce his share from one-fifteenth to one-twentieth. Under the circumstances the smallest mercies will be thankfully received. The report of the company for the half-year ended June 30th, showed a divisible profit of £8,700, but the directors and shareholders considered it best to keep this amount in hand, as the additional capital raised in 1895 for development and new plant is nearly exhausted, and many expenses of this character have yet to be met. But for an unfortunate fire in one of the shafts, during January, which caused a temporary cessation of winning, the record for the half-year would have been a fairly good one, for both the average contents and the price obtained were higher than during the previous few half-years. The ore crushed amounted to 47,899 tons, the black tin sold was 863 tons, the average price £80 3s. 6d., as compared with 52,295 tons, 893 tons, £72 8s. 4d., respectively, during the previous half-year. The total receipts were £69,762 and the working cost £49,031. After deducting £4,616 as lord's dues and making allowance for depreciation of plant, there remains a balance available for dividend of £7,927; but, as already mentioned, this balance is being carried forward. During the half-year £11,000 has been spent out of capital, on new plant, shaft sinking and development, so that if the account had been made up in the way advocated by myself there would have been no profit available for

dividend. In the near future, when there is no longer any capital for expenditure, all the costs will have to be charged to profit and loss, so that, unless a new discovery is made, there is little likelihood of a dividend. In considering the future of the company it is certain that the operations will be continued in spite of an absence of dividends. The chief shareholders are interested in the prosperity of the district as landlords, merchants, or bankers, while others are interested in the obtaining of supplies of tin. So, as long as the mine pays its expenses, its development will be continued.

The other Cornish tin mining company in which many of the Dolcoath people are interested, the Carn Brea & Tincroft Mines, Limited, has had a more prosperous time this last half-year than it has enjoyed for three years. Though the ore crushed is slightly lower than during the previous half year, having decreased from 25,154 tons to 23,980 tons and the black tin sold decreased from 294 tons to 287 tons, yet the price obtained advanced from £67 to £74, and the quantity of black tin per ton advanced from 26.25 to 26.85 lb. The total receipts were £21,334 as against £19,819, and the loss of £2,619 of the previous half-year has been changed with a profit of £1,680. Since the company was formed in 1900, the only time until the present that a profit was made on mining was during the first six months. As in the case of Dolcoath, a large amount of money has been spent on developments which are charged to capital account, so the above mentioned profits are on the "mining" operations only.

Some six months ago (in the issue of March 7) I mentioned the unworthy maneuvers adopted by Mr. Eugene Goldschmid for the purpose of removing Mr. J. H. Collins from the board of the Central Chile Copper Company. Mr. Collins was doing his best to see that the business of the company was conducted properly, and was a thorn in the side of Goldschmid, who desired to capture the control of the company for his own private ends. Mr. Goldschmid continues his extraordinary line of conduct, and his imprudence is indeed colossal. He has just issued the report of the company for the year 1902, without consulting his colleagues on the board, Mr. Green and Mr. Fuld, and at the meeting of shareholders held on September 3, rushed the whole of the business through by the support of his clerk and the proxies he had, by some means or other, obtained, in face of the opposition of all the shareholders present and of his two co-directors. In his report he announced that it was Mr. Green's time to retire from the board by rotation, although he had no justification of any sort for such a statement, and at the meeting, by means of his clerk and his proxies, opposed the re-election of Mr. Green, and moved the appointment of Mr. B. C. Hinman in his place. Mr. Collins in view of the extraordinary conduct of Mr. Goldschmid moved the adjournment of the meeting, but Mr. Goldschmid opposed the motion arbitrarily and announced that the business of the meeting was concluded, in spite of the fact that all shareholders present supported Mr. Collins. This ruling of Mr. Goldschmid is to be contested, and Mr. Green announces that he is going to continue to attend board meetings, so the company will have a lively time of it. Mr. Goldschmid's object in "collaring" the company is to introduce a certain refining process and charge the company a heavy royalty for the privilege of using the process. As the process is still practically untried, it will not be the company, but Mr. Goldschmid that will reap the benefit.

Perth, W. A. Aug. 3.

(From Our Special Correspondent.)

The gold yield of this state for July was 212,501.5 oz., the highest on record.

Kalgoorlie.—The Great Boulder, at a depth of 1,750 ft. vertical, the lowest depth yet attained on this field, has cut the ore body found while prospecting with the diamond drill at the 1,700 ft. level. The total width is 30 ft., and assays average 28 dwt. per ton. This is undoubtedly the most important find made for some months. The lode is dipping towards the main shaft. The development work in this mine now exceeds 66,000 ft. (11 miles) and the total gold output to date nearly 24 tons (avoirdupois).

On Oroya north block of the Oroya-Brownhill at No. 6 level a fine body of telluride ore shows averaging 19 ft. wide, which has been followed for 116 ft. The average value is about 4 oz. per ton. On No. 9 level the same ore body has been proved 140 ft., and is 35 ft. wide, and worth over 5 oz. per ton, while similar ore is being obtained from a winze in a line with the tenth level. The ore reserves in the various leases are now estimated at nearly 250,000 tons of high grade, the bulk averaging over 3 oz. per ton.

The Oroya-Brownhill is making progress on the additions to its reduction plant and 50 stamps will soon be at work. The Lake View Consols has had some delay in sinking the main shaft, owing to water at the 1,400 ft. level, but sinking is again under way and cross-cutting at the 1,400 ft. level has been resumed. In the Associated mine a new body of ore has been struck, but details are not yet at hand.

The diamond drill is at work in all parts of the field, and recent developments in the Gear mines give an impetus to outside prospecting.

Mr. Lidgley has arrived here with his new electrical ore finder and starts work on the Hampton Plains estate at once; his operations will, of course, be closely watched, but mining men are very skeptical as to any good results.

North of Kalgoolie.—The Cosmopolitan at Kookynie continues to be a puzzle. The mine is under the management of Bewick, Moreing & Company. Without any known reason the market price of shares recently fell sharply. The mine appears to be developing satisfactorily.

Menzies.—The Queensland Menzie, owing to the very hard character of the stone, has decided to replace the old stamps for new ones of 1,250 lb. Development in the mine continues satisfactory, and the output should shortly be much increased.

Murrin.—The Tinto copper mine is opening up well, ore from the 250 ft. level assays over 1 oz. of gold, 19 oz. silver, and about 17 per cent of copper per ton.

Southern Cross District.—This district promises to come to the front again. It has been regarded as a low grade one, but some recent finds are giving rich returns.

A party of miners have found a big formation about 5 miles from Township and have followed the outcrop for some distance. Gold is seen freely, and the ore is estimated to run about 3 oz. per ton.

The copper districts near Geraldton on the Midland railway promise to become great producers before long. Mr. Rae, on behalf of the Mount Lyell Company, has taken over a large property at Arrino. He is much astonished at the prospects. The lode is clearly traced for one-half a mile, is 300 ft. wide and estimated to contain 7 per cent of copper. The metal is in the form of carbonates. It is intended to treat the ore by lixiviation. When the company starts operations this property will no doubt be heard more of.

Some important amendments in the mining laws are proposed to be made in Parliament this session, and ministers are doing a good deal to assist prospectors as well as companies to carry on their operations.

If Mr. Frecheville's report on the "banket" and other formations on the Pilbarra fields are favorable, it is believed that the well-known South African magnates, Messrs. Werner, Beit & Company, will invest in that district.

In the month ending July 15 7,000 tons of ore were treated by the Westralia Mount Morgans, yielding 5,182 oz., or an average of .745 oz. per ton. It is the intention to erect a small smelter as the mine is now yielding ore carrying a value of 15s. to 40s. per ton, besides 16s. in gold. Considerable diamond drilling is in progress.

Sydney, N. S. W. August 4.

(From Our Special Correspondent.)

New South Wales.—Pumping arrangements are completed at Silverton, and water trains are now running from there to Broken Hill. The rain at Broken Hill for July amounted to 14 points.

The directors of the Broken Hill Proprietary Company state in their half-yearly report that the Huntington-Herberlein process is giving satisfaction, the plant treating nearly 2,500 tons weekly. The smelting furnaces have treated over 100,000 tons, resulting in 32,029 tons of lead, and 2,419,367 oz. fine silver; £20,000 have been spent on development work, which is equal to 1s. 4d. per ton of ore raised. A net profit of £57,661 was made during the half year, out of which £48,000 have been paid in dividends; 7,611 tons of oxidized ore and 279,773 tons of sulphides were mined. The Barrier branch of the Amalgamated Miners' Association has cited a case under the Industrial Arbitration Act of 1901, which, if successful, will mean an increased cost in working to the company of over £60,000 per annum, greatly reducing the small margin of profit.

A start has been made with the erection of the Crowl creek copper furnaces. The mine appears to be opening out satisfactorily.

Queensland.—The gold production of Gympie for July was 17,135 oz. from 17,849 tons; the dividends amounted to £26,283, while the calls totalled £9,744. The gold yield for the past seven months is nearly 10,000 oz. better than the first seven months of last year, which was a record year.

The New Ravenswood mine, at Ravenswood, made a clear profit of £26,000 during the first half of the year and paid 7s. 6d. per share in dividends, though it treated only between 4,000 and 5,000 tons during that period. The returns averaged 3 ozs. per ton, exclusive of the tailings, that assayed 8½ dwt. per ton.

Tasmania.—The Mount Bischoff Tin Mining Company's report for the half-year ending June 31 shows that during that period £35,037 5s. were earned and £27,000 paid in dividends. The total dividends paid

amount to £1,890,000, or £157 10s. per share, and the company still has a credit balance of £48,896 14s. in hand. The average percentage of the ore treated during the past half-year was 1.3 per cent, the concentrates smelted were 599 tons, yielding 411 tons of white tin. The cost of mining, crushing and dressing one ton of ore was 6s. 1.3d. Besides, 1,626½ tons of custom concentrates were smelted.

Victoria.—About two months ago the New Chum Railway mine, Bendigo, struck a little coarse gold at 3,876 ft. Lately the Victoria quartz mine, also on the New Chum line, has cut gold-bearing stone at a depth of 3,814 ft., the deepest point at which gold has been found in Australasia. Developments are not sufficiently advanced to prove whether the formation is payable or not.

GENERAL MINING NEWS.

Mineral Oil Exports.—In August and the eight months this year the United States reported the following exports, in gals.:

	August.	Eight months.
Crude	10,554,940	78,715,509
Naphtha	1,021,992	6,231,091
Illuminating	58,767,388	424,709,291
Lubricating and paraffin	6,567,469	61,652,502
Residuum	767,424	5,449,068
Total	77,679,213	576,758,151
Total, 1902	88,105,443	692,675,267

The total decrease this year is equivalent to nearly 17 per cent, or 115,917,116 gals. The heaviest falling off was in illuminating oil, amounting to 86,255,930 gals.

Some foreign material continues to be offered here, but the demand for it is less than for some time past, and sales can be made only on substantial concessions. The German houses especially seem hardly to have realized this, although they may do so later.

ALASKA.

(From Our Special Correspondent.)

The traffic this season to Nome has been greater than at first supposed. The passenger traffic is said to have been double that of 1902. Freight shipments have aggregated 80,000 tons, including lumber, coal and oil. A steamer sailed from San Francisco this week with 23,000 bbls. of California fuel oil for use on the steamers on the Yukon river. This is the same steamer's second voyage to Nome and St. Michael this season with an oil cargo. All the river steamers will use oil in the future.

A ditch is being dug from near the head of Nome river to Dexter creek. Six miles were dug this season. It is 18 ft. wide and is expected to deliver all the water needed to the claims at Nome.

A rich strike of gold is reported from near Juneau, but details are lacking.

The Wild Goose Company has about 200 men at work on its various claims on Ophir creek, Golovin bay district. No. 15 is this season, as in the past, the best producer. The claim was bought originally by Charles D. Lane, of the Wild Goose Company, for \$20,000, and has already yielded over \$1,000,000.

ARIZONA.

COCHISE COUNTY.

Copper Glance.—The new pumping plant has been installed.

GRAHAM COUNTY.

Arizona Copper Company.—The output for August was 1,300 short tons of copper.

PIMA COUNTY.

(From Our Special Correspondent.)

Arizona Gold and Copper Mining Company.—A 50-ton concentrating plant has been completed on this property in the Santa Rita mountains. The smelter is at Patagonia.

Oceanic.—This gold mine in the Arivaca district is now worked by Dr. J. H. Brower, of New York. Fifteen tons are put through the mill daily, and the product is satisfactory.

Old Liberty.—Since the departure of Mr. Wemple, Mrs. May Clarke has resumed the management of this property from which Mr. Clarke shipped large amounts of high-grade silver-lead ore. The deepest shaft, about 150 ft., is now being unwatered, preparatory to drifting. The mine is near the old Cerro Colorado.

Prosperity.—This claim, formerly known as the Matchless, is now worked by Luke J. Corda and his brother, and is producing fine silver-lead ore from the 300-ft. level.

Twin Buttes.—This group of copper claims, owned by Baxter, Irish & Ellis, has been transferred to the Twin Buttes Mining and Smelting Company. The original owners have a large interest and will continue to manage the mines. It is understood that Milwaukee capital has been secured for opening and

working the property. Operations will begin in September.

SANTA CRUZ COUNTY.

(From Our Special Correspondent.)

Arizona Hydraulic Company.—This company, organized to work placers about one mile south of the Sorrel Top and Tres Amigos mines, has a fine dam, impounding a great quantity of water. It is proposed to work the gravel by sluicing.

Jennie C.—This mine is yielding some fine silver-lead ore. A. C. Lamb, of Old Glory, is manager.

Montana.—This extensive mine of argentiferous lead ore mixed in with massive zinc ore remains unworked since the operations of the late George Cheyney, who built the cement dam which holds back a fine body of water intended to be used in concentrating the ore. The vein is a large one, with massive cappings surmounting a hill. It is opened by a long tunnel, and by winzes below this tunnel, to drifts 35 and 72 ft. deeper where there are large ore bodies which at the present cost of transportation will hardly pay to work. Portions of the lode show gold, also copper sulphides. The property is reported under bond to the parties working the McDonald group.

Old Glory.—This mine, near the McDonald property, and similar in occurrence of the ore, is being reopened and worked. Some 40 men are employed about the mine and mill. Six new standard concentrating tables are being set up.

Sierritas Mining Company.—The Old Oro Blanco mine has been acquired by New York and Philadelphia men, who have organized under this company. A new hoist and pump have been placed upon the shaft, which is now 215 ft. deep, and is being sunk and levels driven not only for ore but for water. There is a large amount of ore out on the bank. L. Pierce, of New York, is superintendent.

Sorrel Top Gold Mine and Milling Company.—New York and Pittsburg men have formed this company to acquire the old Sorrel Top gold mine and the Tres Amigos mine. These mines have been idle several years, but the new owners are making preparations for work. The veins (near the contact of Paleozoic strata with granite) are well defined and are opened chiefly by tunnels and winzes. The Tres Amigos was opened largely by the late Mr. McMasters. The main tunnel is 700 ft. long. There are many cross-cuts, showing a wide vein. It is claimed that an ore-body 20 ft. thick will average \$7 per ton, of which \$4 can be saved on the plates and the balance by cyaniding. An Elpass mill is now building for this company at Los Angeles, Cal.

Warsaw.—This property, a mile or two from the Sorrel Top, remains idle. The ore is massive pyrites and is opened by tunnel.

YAVAPAI COUNTY.

McCabe.—This mine is being overhauled and new mill machinery installed.

Treadwell.—This company has rebuilt its track from the smelter to the Hackberry mine. A trial run of the oil-burning smelter was made recently and the furnace closed for further improvements.

CALIFORNIA.

AMADOR COUNTY.

Argonaut Mining Company.—This mine at Jackson, W. F. Detert, manager, has been idle a long time owing to litigation with the Kenedy Mining Company, adjoining. Supplies are now being sent to put the property in shape to start up again.

Fremont Consolidated Mining Company.—At the Gower mine at Amador City, Arthur Goodall, manager, the new hoist will shortly be completed. The new mill is expected to be ready by October.

CALAVERAS COUNTY.

Collyer.—Raymond & White, of San Francisco, have leased this mine at Telegraph City, have retimbered the shaft, and are hoisting out the water.

Golden Leaf.—The Mobley Brothers have been working this mine at Telegraph City for 8 years and will start their mill shortly.

Napolcon.—Williams Brothers have retimbered the shaft of this mine at Telegraph City 11 miles from Milton and are now running cross-cuts.

Shepard.—At this mine at the Mountain ranch, the developments in the gravel channel are very satisfactory.

South Bank.—A company has recently been organized by Harry Clary, of Stockton, to work this claim on Indian creek near the old Calaveras group.

Union Copper Mining Company.—In the mine at Copperopolis, G. McM. Ross, manager, a vein of ore 9 ft. wide is reported on the 900-ft. level. Twenty men are at work.

EL DORADO COUNTY.

Rescue Mining Company.—This company at Rescue, F. Anable, superintendent, has decided to put up a 10-stamp mill.

KERN COUNTY.

Lida Mining Company.—This company at Rosamond, E. M. Hamilton, superintendent, has 16 ft. of ore in the cross-cut at a depth of 325 ft. The mine is a producer.

Yellow Aster Mining Company.—The mine at Randsburg, which has been closed some time, has started with non-union miners. Superintendent E. H. Barton says no discrimination will be made between union and non-union miners.

LAKE COUNTY.

New Phoenix Mining Company.—This is a new quicksilver mine near the Sonoma county line, John Walters, superintendent. The company owns four contiguous claims and is developing them.

MARIPOSA COUNTY.

Pinon Blanco.—Captain A. H. Ward, owner of this and other claims in Mariposa county, will open up this property near Coulterville. He already has 12 men at work.

Virginia.—This company near Coulterville will soon open its mine.

NEVADA COUNTY.

Central.—Men are employed at this gravel mine on Washington ridge running a tunnel to tap the channel.

Delno.—The old Boomerang mine at Meadow Lake has been re-located under this name by W. G. Lansing.

East Orleans.—At this mine on Gold Flat, owned by Geo. Levinsky, good ore is being taken out. The ledge averages 15 in. in the drifts.

Gaston Ridge Mining Company.—This company at Gaston, L. R. Poundstone, superintendent, is installing an extensive electric plant on Poorman's creek half a mile from the mine. The power will be used for pumping. The tunnel on the river is now in 2,500 ft., and a shaft has been sunk from the tunnel 300 ft.

Gold Blossom.—This mine near Grass Valley has been sold to C. A. Mau, of San Francisco; F. C. Eldred, of Toledo, O., and J. E. Poindexter, of Grass Valley. Work will begin at once.

Hartley.—This property at Meadow Lake is being examined with a view to purchase.

Jenny Lind.—In this mine near Grass Valley, Chas. Stock, superintendent, the main ledge has been struck, showing free gold.

PLACER COUNTY.

Cash Rock.—At this mine near Forest hill some large machinery will be installed.

Dutch Flat District.—E. Malloes and others have obtained underground rights from certain property owners at Dutch flat and are to drift out the ground. This section has been a gold producer for many years, but the ground immediately under the town has not been mined before.

PLUMAS COUNTY.

Franklin Hill District.—Several companies are developing properties in the Franklin hill region, and the San Jose Company, James McMann, superintendent, will soon have a 5-stamp mill crushing ore. The Ross mine is under bond to John Thomas, of Oakland, Alameda county, and will be worked by drifting.

Granite Basin Mines.—The project of the Bay Counties Power Company to run a power line to the Basin will be of great benefit to the mines of See & Jolly, Hall, Pettit and others.

Red Slide.—This company intends running a tunnel on the property at the head of Poorman's creek.

SAN BERNARDINO COUNTY.

Ivanhoe.—This mine at Dale, J. J. Ellerman, superintendent, has been sold. A road is being built to haul in machinery and a pumping plant is to be installed at Ferguson's well to furnish water.

O. K. Mining Company.—In this mine at Dale, Jos. Ingersoll, superintendent, an 18-in. vein has been struck on the 100-ft. level north. There is also ore on the 300-ft. levels north and south.

SAN LUIS OBISPO COUNTY.

It is reported that gold prospects have been found on the Santa Maria river, which forms the boundary between this county and Santa Barbara county.

SHASTA COUNTY.

Afterthought.—It is reported that a good strike has been made in this mine at Furnaceville. It is a copper property now under bond.

SISKIYOU COUNTY.

Blue Ledge.—It is reported that this copper property on Joe creek has been bonded to the Mountain Copper Company of Keswick, Shasta county. There are 300 claims located in this district.

Carlock & Morrison.—This mine at Quartz valley is being worked by a large force.

Golden Eagle.—A shaft is being sunk on this mine at Indian creek by Mr. Brokaw and associates.

Helena Gold Mining Company.—At this mine near Callahans, J. McKeen, superintendent, work has been resumed after a short idleness. Tunnel No. 1 is being extended. A. D. Chidsly, of Easton, Pa., is president of the company.

TRINITY COUNTY.

Many mines in this county are now shipping ores to the smelters at Keswick, Shasta county.

Enterprise.—This mine at North Fork, Mark Manley, superintendent, is now under bond to Geo. R. Goodin, of Boston, Mass. A 10-stamp mill has been purchased.

Fairview.—This mine at Minersville, Joseph Porter, superintendent, is to have a cyanide plant.

Last Chance Mining Company.—This company has again assumed control of the Paulsen gravel mines on the Trinity river and work will be resumed. Water will be carried across the Trinity river to the Union Hill and that claim will be worked.

New River District.—Wm. R. Beall reports the mining outlook of this section as favorable; several rich ledges having lately been found.

TULARE COUNTY.

Lucky Four.—Some of the ore from this mine on upper Kern river runs very high in gold. The owners are running a tunnel into the hill and doing other development.

YUBA COUNTY.

New Blue Point.—On the authority of one of the Weissbein Brothers, holding a trust deed to this property, it is affirmed that the mine has been sold to the East St. Louis men who are endeavoring to obtain permission to hydraulic off part of the ground.

COLORADO.

BOULDER COUNTY.

Colorado & Northern Gold Mining Company.—The property of this company near Salida was sold at sheriff's sale September 5, to A. W. Thompson for \$16,000.

Denver Tunnel Company.—The tunnel is steadily going into Chittenden mountain near Eldora. The driving of this tunnel, 8 by 8 ft., will drain the properties on Chittenden mountain and effect a saving of about 40 per cent in the cost of mining.

CHAFFEE COUNTY.

Columbine.—This group of nine claims 7 miles south of Salida has been purchased by the Mascot Mining Company and will be developed at once.

GUNNISON COUNTY.

Augusta.—A rich strike is reported in this mine above Crested Butte. Ten feet of ore 1,350 ft. down is said to average \$60 to \$70 per ton. The company has been driving a tunnel for over two years to cut this vein which was done at 2,900 ft. A concentrating plant of 100 tons daily capacity will be erected. The mine has been shipping from the upper workings for years.

Boss.—This group of seven claims in the Bowerman camp is reported sold to Denver men for \$10,000. Five veins are opened and machinery will be placed at once.

Northwest Missouri Mining and Milling Company.—A group of gold claims has been acquired on the Cochetopa river southeast of Gunnison. Missouri capital is back of the enterprise.

Raymond.—This mine is being reopened by the Raymond Consolidated Mines Company, composed largely of Canon City men. It was closed down several years ago because of water which could not be controlled by the machinery at hand. A 60-h.p. pumping plant is being installed and the property will be developed through a 3,200-ft. tunnel.

Woods Gold Mining and Milling Company.—A concentrating plant is being put up below Tin Cup on the east slope of Taylor park. A large vein of low grade gold ore has been opened.

GILPIN COUNTY.

(From Our Special Correspondent.)

East Centennial.—Lessees shipped some smelting ores last week to the sampling works which brought values of 5½ oz. gold to the ton, and are taking out some milling ores which carry average values of 3 oz. gold per cord, with the tailings selling for as high as \$23 to the ton. Colorado Springs men are the owners.

Gilpin.—Omaha, Neb., men are figuring on a lease and bond on this group in the Central district, and have had several tests made by the cyanide process. The property is owned by D. O'Sullivan, of Gilpin. Charles Gearheart, of Boulder, is acting for the eastern men.

Golden Rod Mining and Milling Company.—An air compressor has been purchased. The steam plant is being installed on the Pet lode on Silver creek and the

new shaft building is about completed. Chicago men are interested. A recent shipment to the sampling works gave returns of close to \$60 per ton. John Lillig, Black Hawk, is manager.

Kansas-Burroughs Consolidated Mines Company.—The August shipments were 184 cars or 1,565 tons, the greater going to the stamp mills and concentrator. English parties are interested and R. Sykes, Central City, is manager.

Lost Lode.—On this property in the Moon gulch section, 10 miles north of Central City free gold is reported found in the breast of the tunnel, at over 150 ft. from the tunnel mouth. R. A. Duncan, of Boulder, and Jim Taylor, of Rollinsville, are the owners. It is also reported that they have a deal on with some Illinois parties for a sale.

Mountz Mill.—A new 25-h.p. Bay State engine has been installed in this new mill at the junction of Elk and Pine creeks and also 10 rapid-drop stamps. The plant will run on ores from the Mackey and Sarah Jane mines. L. J. Mountz, Apex, is manager.

SAN JUAN COUNTY.

(From Our Special Correspondent.)

Barstow Mining and Milling Company.—Lumber is being shipped from Silverton, via Red mountain, to the Bobtail and the new mill will soon be in process of erection. The new boarding house for 100 men is nearing completion. The Barstow Company has opened offices in the Hayden block, at Ouray.

Big Colorado.—New buildings are being erected near Silverton, notably an office and dwelling, for manager Bloodgood. Other improvements are contemplated.

Boston-Auburn Mining Company.—A meeting will be held shortly to consider driving a 2,000-ft. tunnel to tap the veins of this company on Tower mountain, near Silverton.

Gladstone Ore. Output.—For the week ending August 31 the output of ore and concentrates from the Gladstone district was 93 carloads.

Gold Prince Mining Company.—A contract has been let for the construction of 3,000 ft. of flume in three sections of 1,000 ft. each to furnish water from various sources. The proposed mill will soon be under construction.

Highland Mary.—The mill near Silverton is closed owing to a scarcity of water, but will resume as soon as the new pipe line is completed.

Horseshoe District.—Wood, Puckett & Olson have made a rich strike on the Ironclad and are sacking ore rapidly for shipment, as snow falls early in this district. New buildings are being erected for an increased force. The Tobacco mine and mill are to resume at once with a full force.

King Solomon.—Work will go on all winter, for the first time in several years.

Pearl.—Haines & Mack, of Denver, have purchased three-fourths of the Pearl, near Silverton, and are driving a new cross-cut parallel to the old tunnel.

Red Buck.—Reilly Brothers have a contract to do a large amount of work on this group, in Mill gulch, near Silverton, and have men busy on preliminary work.

Red Mountain District.—A rich strike of silver ore is reported from the fourth level of the Ledge. The Treasury tunnel has just shipped its first carload of ore. Dodds & Walters will work the Pueblo, in Mill gulch, during the rest of the season under contract for the owners.

Ridgeway.—The last of six \$10,000 payments has just been made by the purchase of this Silverton property. A long tunnel is being driven to cut the veins below the old workings. The purchasers are the Eureka Exploration Company.

Ruby Basin.—Plans are completed for a new mill and manager Henley is in Denver experimenting with various processes. William Feigle will construct the mill.

Silver Queen Tunnel.—Manager Ptolemy, of Silverton, has let a contract for driving the 800-ft. tunnel 250 ft. further to Elmer Hayes et al. The destination of the tunnel is the Nevada Extension vein, at a depth of 900 ft.

Silver Ledge.—This property, near Silverton, has stopped work, pending the installation of a plant to save the zinc values by an electro-magnetic process. The improvements will cost \$15,000.

Sultan Mountain Mining and Milling Company.—This Silverton company will install lock drills and a 10-h.p. gasoline engine as soon as the buildings are completed. The company intends to complete the 600-ft. crosscut and drift 2,000 ft. on the Molus vein.

Thunder.—C. H. Thayer has disposed of a one-twelfth interest in the Thunder and Keystone claims, near Silverton, to his partners for a cash consideration of \$5,000.

Tribby.—Richard Hodge and four associates have

secured the contract for driving the tunnel on this Silverton claim 500 ft. further and have three shifts at work.

SUMMIT COUNTY.

Iron Mask.—Denver parties have a lease and bond upon this group. It shows iron sulphide ore of good grade and with the present treatment charges should pay well. A large plant of machinery is to be placed on the property.

Klondyke.—Work on this tunnel in Fletcher mountain near Kokomo, is encouraging. The men formerly working this tunnel found no ore after expending almost \$100,000.

Monte Cristo.—This property, on Mount Quandary, was sold by H. S. Pesse to the Quandary Mountain Mining and Milling Company for cash. The new company is composed of T. J. Cooper, president; Benton Cannon, vice-president, and Albert Nance, secretary and treasurer. It is a low grade proposition and will be worked on a large scale with a concentrating mill.

TELLER COUNTY—CRIPPLE CREEK.

(From Our Special Correspondent.)

Miners' Strike.—Matters seem to be improving a little, except for several cases of petty lawlessness the district is fairly quiet. Most of the militia are encamped at Goldfield and there are a number of smaller camps at different points around the district, wherever necessary. The troops are under the command of Adjutant-General Sherman Bell and Brigadier General Chase. Of the smaller camps one is at the El Paso mine and another near the Findley. A number of new mines have begun work though not with very large forces. An unprejudiced view of the situation shows that the strikers apparently are fast losing ground, and the bulk of the men in the district will be back at work before long. The strike leaders, however, are issuing very exaggerated reports of the number of men at work, presumably to keep up the spirits of their followers. The secretary of one of the miners' unions in the district has been arrested for drawing a gun on one of the union men who had left strikers' ranks and had gone back to work. Among the mines working are the Portland, El Paso, C. K. & N., Golden Cycle, Strong, Ajax, Findley, Woods properties, Hull City Placer and others. Several of the samplers are working. It is the intention of the mine owners to open the mines with the men that are in the district, if these men will return to work, and if not, they will import men. The drainage tunnel is fully completed and water is running through it. While the active mines are not working full forces, it is understood that more men will be put on as soon as things can be cleaned up.

IDAHO.

BLAINE COUNTY.

Valley Creek.—These mines at Stanley basin are to have an additional 10 stamps, making 20 in all. A force will be at work all winter.

NEZ PERCES COUNTY.

Burcka Mining Company.—The machinery for the smelter is on the ground and the contractors expect to have it blown in within 75 days. The sawmill is turning out 20,000 ft. a day. The company is doing extensive development work. The Little Giant tunnel has cut the Little Giant lead 340 ft. from the surface. There is 12 ft. of ore at the point where struck.

SHOSHONE COUNTY.

Bullion.—A strike is reported in this mine giving 14 per cent copper, \$3.50 gold and \$2 silver. There are nine claims in the group, which is situated about 3 miles from the Monitor. Two shifts of men are working, and drifting continues.

Frisco.—According to a press despatch the miners employed in this mine at Gem walked out on September 10 because of rock falling from slopes and drifts and loud noises, as of explosions, made by the cracking rocks. The trouble seems to be between the 1,800 and 2,000 ft. levels.

Highland Chief.—A 50-ton concentrator is expected to be in operation on this property this winter. The principal stockholders are: C. C. Whitney, of Marshall, Minn.; F. J. Meyst, of Minneapolis, and C. W. Stanton, of Appleton, Minn.

ILLINOIS.

HENRY COUNTY.

(From Our Special Correspondent.)

Western Tube Company.—This company, J. H. Pierce, president, is to sink a second coal shaft near its plant at Kewanee.

MACOUPIN COUNTY.

(From an Occasional Correspondent.)

Consolidated Coal Company.—This company, of St. Louis, Mo., is sinking a new shaft at Staunton. The shaft is about 1½ miles northwest of the old No. 5

mine. A spur will be run from the mine to the Wabash railroad. This mine is to be first class in shift shall be paid the same.

Royal Colliery Company.—This company, two miles west of Virden, is sinking a new shaft. Connections to the main line of the Chicago, Burlington & Quincy railroad will be made by a spur. The hoisting and air and escapement shafts are being sunk.

Superior Coal Company.—This company is sinking a new shaft 2½ miles south of Gillespie. The company will go largely into the coal business and has plans for three different shafts. All the latest improvements will be introduced for mining and handling coal. A town site has been laid out.

SANGAMON COUNTY.

(From an Occasional Correspondent.)

Chicago & Springfield Coal Company.—A new shaft is being sunk on the line of the Chicago & Alton railroad, about two miles north of the State fair grounds by this company. The location for a shaft is a fine one and the company intends to fit the plant up in best style.

Cora Coal and Mining Company.—Plans and specifications are made for a new shaft at Cora, on the line of the Chicago, Peoria & St. Louis railroad. This mine will be about eight miles from Springfield.

Peabody Coal Company.—This company, on the Chicago & Alton railroad, about 1¾ miles south of Sherman, is sinking a new shaft. The company put up a plant for a large output. A steel tower will be erected and all the latest and modern appliances installed to handle a large output at minimum cost.

Tazora Coal Company.—This company has sunk a new mine on the line of the Cincinnati, Hamilton & Dayton railroad, about 2½ miles east of Springfield. The owners intend to make a model mine. The main or hoisting shaft is down and the air and escapement shafts will be started in the near future.

INDIANA.

(From Our Special Correspondent.)

About 40 new coal mines will be ready for operation in the Indiana fields before January 1. The development of the industry in the state is unprecedented. James Epperson, state mine inspector, says that the outlook for business among the coal companies was never brighter. Most of the new companies will operate in Sullivan and Greene counties. In addition to the amounts spent in equipping mines, the purchases and leases will aggregate a great sum. All the way from 6 to 2,600 acres each are held by the new companies. The cost of sinking and equipping a mine with modern machinery approximates \$30,000. Mr. Epperson says the output this year will exceed the 8,000,000 tons produced last year.

CLAY COUNTY.

(From Our Special Correspondent.)

Boyle.—The mining plant now being constructed on the Bunger place, in the southwest corner of this county, will have two tipples, one for hoisting from the upper vein of coal and the other from the lower, both of which will be ironclad, cased with sheet iron to render them fireproof. There will be on the ground a thoroughly equipped machine shop and a commodious bathhouse. These buildings, as also the blacksmith shop, engine house and office, are all substantial brick structures.

GREENE COUNTY.

(From Our Special Correspondent.)

A 7-ft. vein of coal is reported struck on the Bowers farm near Bloomfield at a depth of 225 ft. The find has caused some excitement.

KNOX COUNTY.

(From Our Special Correspondent.)

Indiana Coal Company.—Near Monroe City a vein of coal 58 in. thick is reported discovered by the prospectors for this company. The coal is of fine quality. The company is composed of eastern and local men, who have leased 30,000 acres of coal land in this vicinity. The company's offices are in Vincennes.

SULLIVAN COUNTY.

(From Our Special Correspondent.)

F. M. Rugger has bought 400 acres of coal land in Cass township, 5 miles east of Sullivan. A shaft will be sunk at once.

One hundred miners living at Rosedale and working four miles away at Jessup quit work recently because the Vandalia railroad charges them \$3 a month for riding back and forth each day. The strike cannot be arbitrated under the provisions of the annual contract, as the operators say they have nothing to do with the railroad business.

A question of contract between the miners and the Johnson Company with mines near Linton, has

been settled by John T. Hayes, arbitrator, in favor of the operators. The miners contended that they were entitled to extra pay for work on the night shift. The contract stipulates, however, that all shifts shall be paid the same.

Engleside.—These coal mines, at Dugger, have been purchased by the New Linton Coal and Mining Company, of Indianapolis.

Indianapolis Coal Exchange.—This concern has been reorganized so as to conform more closely with the provisions of the anti-trust laws. Frank M. Dell is president and C. R. Jones secretary. A. E. Bradshaw, W. W. Hubbard, J. A. George and Julius Renicke compose the board of directors. The officials say it will be the purpose of the exchange to stop rate cutting and see that the consumer gets the very best possible treatment from all dealers.

INDIAN TERRITORY.

CHICKASAW NATION.

Keller & Indiana Consolidated Smelting Company.—A smelter and sawmill have been purchased by this concern to be erected at Keller. A water race will be dug one mile long large enough to run a turbine wheel of 150-h.p.

MICHIGAN.

COPPER—HOUGHTON COUNTY.

Tri-Mountain Mining Company.—At the recent meeting of the directors in Boston all the directors resigned, and their places were filled by the directors of the Copper Range Consolidated Mining Company, which recently obtained control of the Tri-Mountain stock. The directors are William A. Paine, Frederic Stanwood, John Gordon, C. A. Snow and J. Henry Brooks. Two additional directors will be elected later. William A. Paine was elected president and Frederic Stanwood secretary and treasurer. They hold similar positions in the Copper Range Company. The question of overdue dividends on Tri-Mountain was referred to the new management.

(From Our Special Correspondent.)

Atlantic.—Exploratory work on section 16 has stopped. A vertical shaft was sunk 60 ft. and cross-cuts run east 1,000 ft. and west 1,850 ft., but no trace of the Baltic amygdaloid lode was found. The openings have been timbered and it is possible that work will be resumed later.

Baltic.—The August output was 470 tons of refined copper.

Calumet & Hecla.—The Hecla & Torch Lake railway, owned by this company, now extends to the new shaft on the Kearsarge lode. The August product was 3,250 tons of refined copper.

Champion.—An assay and experimental office, 35 by 35 ft., has been built at the stamp mill at Freda. R. H. Leach is in charge, Elmer Stultz is assayer and L. S. Burnham is assistant. A contract has been let for the construction of a water system for the mine location. Water will be pumped from Lake Perrault to a reservoir of 200,000 gals. capacity, located 75 ft. above the mine.

Elm River.—No. 1 shaft is down 300 ft. in the foot wall. Three drills are in commission and about 40 men are employed.

Franklin.—Sinking in the new No. 2 shaft is well advanced. It is a 2½ compartment shaft, 7 by 18 1-3 ft., 1,200 ft. south of No. 1 shaft. The tracks of the Mineral Range railroad are being extended to it. A straight face drum duplex cylinder hoist, capable of hoisting from a depth of 1,000 ft., has been installed. A frame shaft house has been purchased from the Arcadian Copper Company and erected at No. 2.

Isle Royale Consolidated.—The output in August was 150 tons of refined copper.

Lake Superior Smelting Company.—A new reverberatory furnace has been built at the Dollar Bay works to refine blocks reduced in the cupola blast furnace. It is 17 by 30 ft. Another furnace for regular smelting and refining will be constructed.

Osceola Consolidated.—The August production was 720 tons of refined copper. Twenty men are employed at the Tamarack Junior branch in exploratory work.

Quincy.—This mine produced 725 tons of refined copper in August.

Rhode Island.—A winze is being sunk below the eighth level of No. 1 shaft, at a depth of 1,000 ft., in a copper shoot. Two drills are in commission, one in the winze and the other in a stope on the Allouez conglomerate.

Tamarack.—The August output was 500 tons of refined copper.

Trimountain.—The August output was 425 tons of refined copper.

Winona.—Rock shipments to the Atlantic stamp mill average 150 tons daily. Stopping is under way south of No. 2 shaft at the second, third, fourth and sixth levels. The lode averages 25 ft. wide.

COPPER—KEWEENAW COUNTY.

(From Our Special Correspondent.)

Allouez.—A survey for the extension of the Mineral Range railroad to the new shaft has been made and the rails will be laid next spring.

Cliff.—Men are cutting roads and test pits are being sunk to locate the outcrop of the Kearsarge amygdaloid.

Miskwabik Development Association.—Exploratory work is progressing rapidly, as the overburden is light. Two crews are engaged in sinking test pits, 4 by 5 ft., every 8 ft. The prospects for finding the lode are encouraging.

Phoenix Consolidated.—A dam has been constructed across the Eagle river, 3,000 ft. from the stamp mill, to impound water for milling. The dam is 90 ft. long and supplies water to the mill through a 1 by 2 ft. launder.

COPPER—ONTONAGON COUNTY.

(From Our Special Correspondent.)

Adventure Consolidated.—The August output was 125 tons of refined copper.

Victoria.—A hydraulic air compression plant is being constructed to supply power for the mine machinery and the stamp mill.

MONTANA.

CARBON COUNTY.

Montana Coal and Coke Company.—This company has resumed coke shipments to the Washoe smelter at the rate of 150 tons per day. General manager H. G. Merry says that the closing of the Washoe smelter materially reduced the output, but the company has been making 100 tons of coke per day, during the suspension until the accumulation has been reduced somewhat the company will operate but 185 of its 255 ovens. The present output will be about 250 tons per day, but this will be shortly increased to 300 tons. The company is shipping coke to the Anaconda, Butte & Boston, Clarke, Heinze, and American Smelting and Refining smelters at a uniform price of \$7 per ton. The company just signed a new agreement for one year with its employees upon the basis of last year's agreement.

PARK COUNTY.

Precious Metal Company.—This company of Helena, it is reported, has secured all the available land and water rights for several miles on the Clarks Fork river near Cooke City.

LEWIS & CLARKE COUNTY.

Farmer.—Work on the mill for this group in Scratch Gravel district, 5 miles from Helena, will begin at once. The shaft is down 200 ft. and the lead at that point is 7 ft. wide.

SILVER BOW COUNTY.

Butte Reduction Company.—Extensive additions and improvements are being made at this plant, the most important work being the construction of the new blister copper furnace building, the foundation of which is in place. The steel superstructure will be in in a short time. It will contain reverberatory furnaces for converting copper matte into blister copper. At first two furnaces will be put up, each having a capacity of about 17 tons of copper matte. The company is handling the product of Senator Clark's East and West Stewart and Original mines.

NEVADA.

NYE COUNTY.

(From Our Special Correspondent.)

The consolidation of some of the more important properties in Tonopah, which has been discussed for some time past, will soon be effected. The name of the new company, which will include the Fraction, Gold Hill, Tonopah City and 11 claims belonging to Cal. Brougher, has not been announced. Philadelphia men are interested to the extent of \$100,000, but Tonopah men hold a controlling interest.

Ray Extension Mining Company.—Messrs. F. L. Ickes and L. W. Rakes, representing Toledo, O., capital, have secured the controlling interest in this company from Judge Ray. The cash consideration is understood to be \$25,000. The property adjoins the Ray & O'Brien Company and is 8 miles northeast of Tonopah. The old shaft 100 ft. deep following the dip of a ledge of high grade ore, has been abandoned and a new working shaft will be sunk. A gasoline hoist has been purchased and will be installed.

Ray Tonopah Mining Company.—Sinking continues and high grade ore is sacked for shipment.

Midway Mining Company.—The management is blocking out ore preparatory to treatment at the reduction plant now going up near the mine. The owners expect to have the mill in operation inside of six weeks.

North Star.—Another important strike is reported, this time in the north crosscut of the 950-ft. level, 80

ft. from the shaft. A station is being cut and a winze will be sunk on the ore to the level below. The ore body promises to be larger, but as yet nothing definite can be determined.

NORTH CAROLINA.

DAVIDSON COUNTY.

Hercules Gold and Copper Company.—The company is finishing a smelting plant of 50 tons daily capacity, purchased from the Allis-Chalmers Company, installing a large compressor and erecting a 10-stamp mill and concentrator. Several thousand tons of ore are on the dump. Fifty men are at work.

(From Our Special Correspondent.)

Rowan.—This copper property is about to resume operations, Mr. A. Merriam, the manager, having just returned from Chicago, Ill.

Salisbury.—This copper mine has crosscut from its main shaft to the vein which is over 15 ft. wide and well mineralized. Parts of it produce the richest copper ore ever found in this county, besides running well in gold.

(From Our Special Correspondent.)

Flint Spring.—This gold mine has been bonded by Benjamin F. Boreham, of Philadelphia, who contemplated extensive operations. He bonded several properties, but is not doing anything at present.

Barringer.—This mine, belonging to the Whitney Company, has the main shaft below the 150-ft. level. The ore shoot is 15 ft. long at the 40-ft. level and 60 ft. long at the 150-ft., where it shows a body of the richest gold ore ever found here.

OREGON.

BAKER COUNTY.

Midway.—The new hoisting plant and sawmill have begun operations. The hoist has a capacity of 2,000 ft. and the sawmill cuts 10,000 ft. per day.

Standard.—At this mine, in the Quartzburg district, a 14-ft. ore body has been opened on the Cleveland drift from the Standard tunnel.

Virginia.—The rotary mill, it is reported, recently installed at this mine, in the Greenhorn district, near Sumpter, is not a success and the company is considering a stamp mill.

GRANT COUNTY.

Blue Channel Placer Mining Company.—This company, it is reported, made final payment for the Armstrong placer mines on Big creek, about three miles north of Susanville. Machinery will be brought in to work the property. J. K. Zimmerman is manager.

JOSEPHINE COUNTY.

St. Helens & Galice Creek Mining Company.—This company, in conjunction with the Galice Creek Mining Company, is putting in immense hydraulic mining equipment on Galice creek, near Galice. A. B. Cousins, of Portland, is general manager of both companies.

LANE COUNTY.

(From Our Special Correspondent.)

Black Butte.—This quicksilver mine is being equipped with an electric power and lighting plant. A dam across Little river, on the company's property, is being constructed. A turbine water wheel, furnishing over 100 h.p. will be installed. The power will be transmitted to all parts of the mine and the buildings and underground workings will be lighted. A number of new buildings have been erected, including a new store building, a machine shop, etc. Recent developments on the 850-ft. level have added large ore reserves to the mine.

Oregon Securities Company.—This company, in Bohemia district, has acquired the Broadway group of three claims adjoining its other holdings. The railroad from Cottage Grove is completed to within 10 miles of the camp and a wagon road has been constructed from the end of the track up Champion canyon to the foot of the mountains.

LINCOLN COUNTY.

Elk Star.—A short time ago these claims, in French gulch, near Elk City, were bonded to John Harris, who has sold them to the Elk Star Gold Mining Company, of Spokane. The price is said to be \$20,000. Among the incorporators of the new company are H. W. Greenburg, G. C. Beck, R. E. Hutchinson, John Harris and G. M. Davis.

PENNSYLVANIA.

ANTHRACITE COAL.

Buck Ridge Coal Company.—This company is erecting a washery on the Philadelphia & Reading tracks near Shamokin and will wash the culm banks and rob the pillars of the old Buck Ridge colliery.

BITUMINOUS COAL.

Knepper, Good & Zimmerman, of Johnstown, Pa., has secured the coal rights under about 3,000 acres of coal land adjoining the Boswell field and will begin development next spring.

Erie Coal and Coke Company.—The Keystone coal works, 10 miles north of Butler, have been sold for \$50,000 to this company, composed of men in Pittsburgh, Somerset and Myersdale. The property is near Hillard station on the Bessemer & Erie Railroad. Most of the coal, about 3,500 acres, is under leases, which the Erie Company has bought. The company will spend \$100,000 on mine equipment and expects to mine 1,000 tons of coal a day by January 1.

Penn Gas Coal Company.—The 50 coke ovens at slope No. 3, south of Irwin, will be fired at once. The new washer is about completed and the ovens will produce about 80 tons of coke daily.

Pennsylvania Coal and Coke Company.—A consolidation of this company with the Webster Coal and Coke Company is reported. The Webster Company owns 14 producing mines, including 4 collieries at Ehrenfeld, 1 at Cresson, 1 at Gallitzin, 2 at Benscreek, 1 at Nan-Y-Glo, 1 at Beaverdale, 2 at Hastings and 2 at Amsbry, all in Cambria county, and employing 5,000 men. The Pennsylvania Coal and Coke Company operates 10 collieries, most of which are at Moss creek, Cambria county, and Bennington and Tunnel hill, Blair county, and employs about 5,000 men. Besides mines, the Webster Company owns several electric light plants, water works, large company stores and other investments. While the same interests have owned and controlled both companies since the first of the year, they were operated separately until now. Operations will be carried on under the name of the Pennsylvania Coal and Coke Company.

Pittsburg Coal Company.—This concern has closed a deal for the purchase of all the coal land holdings of Henry W. Oliver except those in the Blaine Coal Company, Shallenberger Coal Company, and the Second Pool Coal Company, for a sum approximating \$1,000,000. The tract comprises about 4,500 acres, and the purchases give the company practically all of the Pittsburg coal in the first pool outside of that held by the Pittsburg Terminal Railroad and Coal Company. The tract lies near Finleyville.

Providence Coal Company.—This company, which operates a coal mine and coke works at Kelly's station, is to construct 25 new coke ovens and make other improvements to double the output.

UTAH.

BOX ELDER COUNTY.

(From Our Special Correspondent.)

Century.—This Park valley mine has paid a dividend of 1c. a share. This is the first dividend. The company still has a small surplus. Sixteen stamps are dropping in the mill and the mine is said to be looking very well.

JUAB COUNTY.

(From Our Special Correspondent.)

Tintic Ore Shipments.—For the week ending September 4 shipments amounted to 148 cars, as follows: Bullion-Beck, 3; Carisa, 5; Centennial-Eureka, 32; Gemini, 14; Grand Central, 26; Mammoth, 17; May Day, 1; Martha Washington, 2; United Sunbeam, 2; Victor Consolidated, 3; Yankee Consolidated, 9; Black Jack, 7; Dragon Iron, 24; Norris, 4.

PIUTE COUNTY.

Sevier Consolidated.—The offices of this company are in Ogden, and not, as stated last week, in Salt Lake City.

SALT LAKE COUNTY.

(From Our Special Correspondent.)

Bingham Consolidated Smelter.—The shipments of copper bullion during the week ending September 5 amounted to three cars, 181,240 lb.

Continental Mines Company.—A payment of \$30,000 has been made on the option held on the Grizzly and three other groups by manager Henry M. Crowther.

United States Smelter.—Shipments of copper bullion for the week ending September 4 amounted to three cars, 108,245 pounds.

Utah Consolidated Smelter.—Copper bullion shipments aggregated five cars, 301,000 lbs., during the week ending September 5.

SUMMIT COUNTY.

(From Our Special Correspondent.)

American Flag.—The stockholders have re-elected the old directors as follows: T. F. Singiser, president and treasurer; John G. Rhodin, vice-president and general manager; E. B. Palmer, secretary, and R. G. Brooks, of Scranton, Pa. The headquarters are in Salt Lake City.

WASHINGTON.

FERRY COUNTY.

Golden Eagle Mining Company.—An engine and boiler have been delivered at the Peacemaker shaft. The foundations are already in.

Quilp.—A good strike is reported in this mine near Republic, at a depth of 525 ft. E. L. Tate is general manager.

Trade Dollar.—A shipment of ore from the 200-ft. level—2 carloads—has been sent to the Crofton smelter.

Zala M.—Last week 3 carloads of ore were shipped to the Hall mines' smelter.

OKANOGAN COUNTY.

Copper World Gold Mining and Smelting Company.—This company is being formed to handle the Copper World group, 15 claims in all.

Prize Mining Company.—This company, of Seattle, owning 22 claims on Mount Elmeham, nine miles north of Loomis, is to have an electrical chlorination mill, and has secured a water right and 233 acres for a mill site near Palmer lake and will have a capacity of 20 tons per day. The machinery is on the way from Seattle. H. E. Dunham is manager.

STEVENS COUNTY.

St. Crispin.—Henry W. Brooks has put a force of men to work on this mine on Sheep creek. The mine carries gold and copper.

WHATCOM COUNTY.

Excelsior.—The additions to this stamp mill will soon be running. The two Johnson concentrators have been removed to the annex below and four other concentrators put in place. The Standard segregators will remain in their present position and possibly two new concentrators installed near them. Later 620 ft. of slimers will be set up below the concentrating room and below these a concentrator of a type patterned after the mill superintendent's ideas. The crushed ore will then be run over the segregators, the middlings and tailings continuing on to the roll mill, where they will be ground fine enough to pass through a 65-mesh screen, from there being carried successively over the concentrators, the slimers and the single concentrator. The mill superintendent states that he expects to save 90 per cent. of the values when all these auxiliaries are in working order.

WEST VIRGINIA.

BROOKE COUNTY.

Wells Coal Company.—This company's mine on the Pan Handle road between Beach Bottom and Wellsburg, has been purchased by Wheeling and Wellsburg men. The mine is situated on the Ohio river, so that shipments can be made by either rail or water. Alexander Gilchrist, of Wellsburg, is one of the principal owners.

FOREIGN MINING NEWS.

AUSTRALIA.

WESTERN AUSTRALIA.

The gold production of western Australia mines in August is reported at 206,617 oz. bullion. For the eight months ending August 31, the total was 1,640,877 oz. bullion, which compares with 1,407,935 oz. in the corresponding period of 1902; showing an increase of 232,942 oz. The bullion reported this year was equal to 1,390,073 oz. fine gold or \$28,762,779.

CANADA.

ALBERTA.

International Coal and Coke Company.—This company was recently organized by A. C. Flumerfelt, of Victoria, B. C., assistant to president Miner, of the Granby Consolidated Mining Smelting and Power Company. The capital stock is \$3,000,000. The company controls coal land on the Crow's Nest Pass Railway, and is to produce coke. A plant of 2,000 tons daily capacity is to be erected. A. C. Flumerfelt is president; W. G. Graves, Spokane, secretary, and H. N. Galer, of the Granby Company, treasurer.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—The shipments for the week ending September 5 were as follows: Granby mines, to Granby smelter, 1,231 tons; Snowshoe mine, to Sunset smelter, 2,400 tons; Mother lode mine, to Greenwood smelter, 3,520 tons; Sunset to Sunset smelter, 736 tons; Oro Denoro, to Sunset smelter, 759 tons; Emma, to Trail smelter, 330 tons; Athelstan, to Sunset smelter, 225 tons; total for the week, 9,201 tons. Total for the year to date, 402,309 tons. The Granby mines' shipments are greatly reduced, owing to the shut down at the smelter to connect the two new furnaces. The shipments from the Snowshoe and Oro Denoro mines are growing steadily.

Granby Consolidated.—The smelter at Grand Forks, which has been closed for a week to permit of the blowers being connected with the new furnaces, re-

sumed operations September 9, when two furnaces were blown in.

Jackpot and Athelstan.—A syndicate organized by W. N. Hunter, of Greenwood, has purchased the Jackpot fraction, adjoining the Athelstan mine at Wellington for a reported price of \$15,000. The same syndicate is working the Athelstan mine on a bond, and shipping daily 55 tons of ore said to net about \$5.50 per ton.

Oro Denoro.—During the last three or four months, while development has been conducted by hand drilling, this mine has shipped about 3,500 tons of fluxing ore. It is understood that the ore netted about \$1.75 per ton. The 7 drill air compressor plant will be shipped from Rossland, and as the concrete foundations are ready, will be installed at once. An electric plant will also be put in. Twenty men are employed.

BRITISH COLUMBIA—EAST KOOTENAY DISTRICT.

Crow's Nest Pass.—The output of the collieries at Fernie for the week ending September 11 was 16,258 tons: Coal Creek, 6,219 tons; Michel, 5,891; Morrissey, 4,148; average daily output, 3,251 tons; average daily output same week last year, 1,371 tons.

Gold River Mining Company.—This company has secured a water right on Bull river and is constructing a flume 16 ft. wide, 5 ft. deep and 2 miles long. A dam will be constructed at the upper canyon, and the entire flow of water diverted into the flume. The company has secured 5 miles of placer ground on Bull river, which will be worked by hydraulic machinery.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—The shipments for the week ending September 5 were as follows: Le Roi, 4,890; Centre Star, 1,500; War Eagle, 1,050; Kootenay, 340; Le Roi No. 2, 390; Jumbo, 280; Spitzee, 40; total for week, 8,510 tons; for year to date, 258,857 tons. The Le Roi shipped 1,380 tons more than in the preceding week.

Le Roi No. 2.—A contract has been closed by this company with the Greenwood smelter for the treatment of the Josie and the No. 1 mines' output. The mine commenced shipping under the new arrangement September 8. The rate is intimated to be considerably below the figure the company paid to the Northport smelter for the last two years. About 2,000 tons monthly will be shipped.

O. K. and I. X. L.—The O. K. mill started stamping from the I. X. L. mine September 2. The I. X. L. has been leased by George Pringle and William Craven who will mill several thousand tons from the dump.

BRITISH COLUMBIA—VANCOUVER ISLAND.

Wellington and Comox.—The strike at these collieries is officially declared off and the output is expected to reach 5,000 tons of coal per day. The large coking ovens at Comox, which have been closed since the inception of the strike at Cumberland, have resumed operations.

MEXICO.

DURANGO.

Pueoles Mining Company.—This company is employing about 1,800 men. Two 250-h.p. engines are being installed and machinery added to the reduction plant.

MINING STOCKS.

(Full quotations are given on pages 450 and 451.)

New York

Sept. 16.

The stock market has again assumed weakness that rather aggravates speculators. The depressing features are unfavorable crop reports and unstable iron and steel prices, which are reflected in both the railroad and industrial securities. Of the more important stocks showing heavy declines from the normal point United States Steel carried the banner this week. Ordinarily the common shares of the Steel Corporation sell around \$30, but on Tuesday, September 15, broke to \$19½, which is less than one-half what was paid last February. It is hinted that the regular dividend on this stock may be reduced or passed altogether on account of the variable condition of the iron trade. The preferred shares have been sympathetically weak, selling down to \$68 on Tuesday, which compares with \$89.75 reported last January. It is understood that a call has been made upon the so-called bond conversion syndicate for 25 per cent or \$5,000,000 of its cash liability of \$20,000,000. This call was taken to mean that the operations of the syndicate will be wound up on October 1, to which date the duration of the syndicate was extended some time ago; but to-day it is announced that the period for conversion is to be extended for nine months more.

The copper shares have been dealt in rather sparingly, and were generally weaker. Amalgamated receded to \$43.50, and Anaconda to \$18.00. On curb, Greene Consolidated sold down to \$18.25; Tennessee to \$28, United of Montana at \$15.50, White Knob, of Idaho, at \$10, and British Columbia at \$3.

For the first time in a long while Bamberger-De Lamar gold shares appeared on curb on bids of \$8.50 @ \$8.75, at which small sales were made.

Quicksilver preferred, of California, came forward at \$5.25, which is the first sale in over a month.

Colorado gold and silver stocks show the usual room trading, and the Comstocks generally sell "assessment on."

Boston.

Sept. 15.

(From Our Special Correspondent.)

Outside of Copper Range Consolidated, dullness has been the chief characteristic of the dealings in copper shares during the week. Traders are doing very little on the long side and thus far appear to favor the short side from day to day. It is confidently believed, however, that better things can be looked for in the stock market as soon as certain plans which are on the tapis in copper circles have transpired.

Old Dominion Copper had a bad spell last week, touching \$8.12½, with a subsequent rally to \$9.25. The management gives it out that there will be no reorganization nor assessment, but that voluntary subscriptions will be asked for. In just what way this will be done has not yet been determined. There are 50,000 shares of stock in the treasury and if this could be marketed it would solve the problem for the present. Stockholders are now asking the question whether it paid to turn the management over, as happened a year and one-half ago. The present management has met many obstacles and its honesty is not questioned.

Copper Range is off \$10 from a week ago to \$56, although it touched \$54.50. A majority of the Trimountain stock has been turned over to the Copper Range Company and the latter's stock issued. As a result Trimountain stock has been taken from the list. The final public sale of Trimountain was at \$70. In connection with this deal the management calls attention to the fact that no underwriting commissions or bonuses have been paid. There has been talk of a Trimountain floating debt, but this will be assumed by the sellers. It is thought that Copper Range will lead the market when proper conditions arrive.

Dominion Coal dropped \$10 to \$70, closing at \$72.75, and Dominion Iron and Steel broke \$4.50 to \$10.50. The market for both is made from Montreal. A special meeting of the latter company is called for September 25 in Montreal to take action on breaking the lease of the coal company and to ratify the \$1,500,000 bond issue.

Utah Consolidated took a sudden dip to \$24.75, recovering to \$26, which is \$1.87½ below a week ago. No explanation was given, and the drop was on a very small amount of stock. Bingham settled \$1.75 to \$23.75.

Trinity, which gave signs of an upward movement a short time ago, has fallen \$1 to \$6.25. The annual meeting of this company will be in Jersey City October 6. Mohawk is off \$2 to \$40.50; Centennial, \$3.50 to \$16.50; Osceola, \$4 to \$56; Shannon, \$1 to \$9; United States, \$1 to \$19; Winona, \$1.25 to \$7.25, and Wolverine is off to \$67 ex-dividend. Calumet has lost \$20 to \$45. A block of 2,363 shares of Massachusetts Consolidated Mining stock, on which the assessments had not been paid, were sold at auction last week for the money due. The company bid the stock in and will hold it in the treasury.

Colorado Springs.

Sept. 11.

(From Our Special Correspondent.)

The market this week has held its own, and closes with a buying undercurrent in the mines list. A majority of the leading stocks have held firm, or advanced fractionally. The opening of the big drainage tunnel in the Cripple Creek district has apparently had a strengthening effect on shares. Water is now running through the bore and the water level in a number of the mines is receding.

In the mines list C. K. & N. showed considerable strength, advancing from 17 bid a week ago to 18c. to-day. Gold Dollar was fractionally weaker, selling from 4¾ to 4½c. during the week, but was offered at the latter figure to-day. Gould also showed weakness, declining from 2¾ to 2c. Elkton was probably the strongest stock in the list, advancing from 42c. bid a week ago to 45c. to-day, selling at the latter figure. El Paso strengthened slightly, selling from 60c. up to 60½c. Isabella advanced from 12 to 12½c. the first of the week, but sagged to 11¼c. selling orders being responsible for the break. Moon Anchor was quite heavily traded in, advancing from 9¾c. to 10c. Portland was stationary all week at \$1.20 bid. Golden Cycle was active and stronger, advancing from 65½ bid a week ago to 67c. to-day, selling at the latter price. In the prospect list Mary Nevin and New Haven were both popular at a slight advance in price over last week.

Salt Lake City. Sept. 12.

(From Our Special Correspondent.)

This was a week of sensations in the local mining stock market. Some heavy buying was done in Tintic stocks and the principal trading was confined to them. Tetro and Little Chief went up by leaps and bounds. Little Chief a week ago was a drug on the market at any price, while the week closed with sales marked up to 18½c. Tetro had a good start at the beginning of the week, but it landed at 35c. New ore discovered in the mines were the cause of the unusual activity in both cases. Yankee Consolidated has strengthened considerably. The management is hoisting a first class grade of ore and has succeeded in opening up new bodies below the tunnel level. May Day registered some heavy transfers, but the stock weakened on account of rumors of an assessment Star Consolidated closed higher. Outside of Tintic the most active trader was Silver Shield, of Bingham, which also stiffened on account of improved physical conditions. Little was done in Park City stocks, and prices remained about stationary.

San Francisco. Sept. 12.

(From Our Special Correspondent.)

The market was somewhat broken up this week by the Wednesday holiday of Admission Day. Trading on the old Exchange was very quiet, and prices were not especially strong. Some quotations noted are: Ophir, \$1.60@1.75; Consolidated California & Virginia, \$1.40@1.45; Caledonia, 80@90c.; Hale & Norcross, 47@51c.

On the San Francisco & Tonopah Exchange conditions were very similar, and not much business was reported. Prices were, however, generally pretty well maintained in spite of the holiday.

On the Oil Exchange business was almost at a standstill, hardly anything being done through the week. Prices were not strong. One sale of Hanford was recorded at \$134; Kern River sold at \$12; Home was quoted down to 90c.; while Independence sold at 17@18c.

The total sales of stocks on the California Stock & Oil Exchange for August, and the eight months ending with August, were as follows:

	Shares.	Value.
January	287,016	\$255,202
February	322,443	219,358
March	199,908	151,982
April	236,268	115,571
May	401,454	154,386
June	154,720	117,928
July	74,594	71,890
August	181,478	119,231
Total	1,837,884	\$1,185,548

August showed a slight improvement over the July dullness, but was still much below the earlier months of the year.

COAL TRADE REVIEW.

NEW YORK, Sept. 16.

ANTHRACITE.

The anthracite trade continues generally quiet. Weather conditions along the Atlantic seaboard during the week have discouraged any interest in fuel supply among householders, and nowhere has anything happened of late to cause increased activity. The stories of companies restricting output, which have been more or less extensively circulated, rest on little better foundation than the attempt to restrict the output of seam sizes by closing washeries, and in some cases running breakers on short time or closing them here and there to make needed repairs. In the aggregate a large tonnage is still going from the mines, and though business seems dull, it is largely by comparisons made with the abnormal conditions that prevailed until recently as a result of the strike last year. A comparison of this September with September 1899, before the normal course of events had been interrupted by strikes, shows how much better trade is than it was then.

The case of W. R. Hearst against the anthracite railroads, it appears, is going to be heard by the United States Supreme Court after all. Judge Lacombe's decision on the points argued before him on appeal by the Interstate Commerce Commission were so overwhelmingly against the contentions of the Commission that many persons thought the case would never be heard of again. Probably the chief reason why the case is brought up now is connected with the November elections. Of course, Mr. Hearst's modesty will not prevent him from getting all the advertising that he can.

Although the movement of coal up the Lakes has been very heavy, a good tonnage is still going forward. Demand at the head of the Lakes shows no especial change. Buying at interior points shows some improvement. At Chicago the press reports of mines closing down and operators restricting outputs have had little effect on business, and buying shows little change, though retail demand seems improving. In territory tributary to Chicago a fair tonnage is

being taken. Along the lower lakes and in Canadian territory buying shows little change, but improvement is expected as the nights grow cooler. Along the Atlantic seaboard, where the warm weather has been most felt, the markets have been very quiet. This applies not only to Philadelphia and New York, where buying has been light for several weeks, but also to points beyond Cape Cod. Apparently buyers in the East have about coal enough for the present and are disposed to wait, especially in view of the fact that individual operators are now offering coal at Philadelphia and at New York Harbor for, in some cases, 25c. less than current quotations. Some improvement in the supply of small vessels has enabled consumers at the shoal water ports to get coal to better advantage. The regular prices, f. o. b. New York Harbor shipping port, for free-burning white ash coal are: Broken, \$4.75; egg, stove and chestnut, \$5.

BITUMINOUS.

The Atlantic seaboard soft coal trade continues quiet, and the anticipated improvement in demand comes very slowly. Car-supply is not a factor of importance in the situation, since the supply is ample for current demands; and in sharp contrast to last year, the situation before producers is not the lack of transportation facilities, but a light demand for coal. In strong contrast to last year, also, some contractors are slow in taking coal, and are way behind on their quotas, in part at least no doubt because of labor troubles, which have kept their plants idle. Probably there will be a little improvement in the movement of coal when consumers at those shoal water ports where supplies are still short realize that winter is coming, but improvement on this account will hardly be immediate, since it is likely that many purchasers will delay ordering as long as possible, in the hope of getting lower ocean freight rates.

At points beyond Cape Cod trade continues dull and consumers show no disposition to buy, although coastwise freights are a little easier than they have been. Along Long Island Sound there is apparently more activity than in any other consuming territory, and demand is slowly increasing. At New York Harbor points trade is quiet; prices continue to range from around \$2.50@2.60 for gas slack up to as high as \$3 for certain special grades. In the all-rail trade buying shows very little improvement, and price-cutting continues. Transportation from mines to tide-water is fairly prompt, coal running through in less than a week. Car-supply is sufficient for the demands of producers. Vessels in the coastwise vessel market are in fair supply, with freight rates declining slowly. We quote from Philadelphia, Boston, Salem and Portland, 85c.; Providence, New Bedford and Long Island Sound, 65@70c.; Newburyport and Bangor, \$1.05; Portsmouth and Bath, 90c. Rates from the further lower ports are about 5c. higher than above figures.

Birmingham. Sept. 14.

(From Our Special Correspondent.)

During the past week officials of the Southern railway were in this section looking after contracts for coal, while other large consumers have turned over some good contracts for their supplies of fuel this winter and next spring. The work of developing in this state continues. During the past week the Little Cahaba Coal Mining Company, operating mines in Bibb county, filed application with the probate judge of Jefferson county for the right to increase the capital stock from \$50,000 to \$200,000. It is understood that this company will develop virgin coal-lands in Bibb county. Coal prices are firm and are said to be fairly good. The railroads are doing well in furnishing cars.

The award of the Board of Arbitration as to the semi-monthly pay-days and prohibiting boys under 14 years of age from working in coal mines, will go into effect next month. The advance in wages has already gone into effect and the first pay-day will come during the present week. A large sum of money will be distributed, as the miners have been doing very well since they have returned to work.

R. V. Goss, who owns coal lands in Walker county, with a mine near Jasper, 40 miles from Birmingham, has sold his interests to Hilliard and associates, of Birmingham. The new purchasers will develop the property on a large scale.

Chicago parties are developing coal lands in Blount County, near the Altoona mines on the new extension of the Birmingham Mineral Railroad and expect to open mines so as to get out something like 1,000 tons of coal daily.

On application of Birmingham and New York creditors, the Empire Coal & Coke Company, a corporation with coal mines and coke ovens in Walker County, at Empire, has been placed in the hands of a receiver, C. A. Stillman. The receiver has authority and is operating the works of the company. The action was taken not because of financial troubles, but the death of a large stockholder prevented certain improvements and extension of operations and therefore reorganiza-

tion will be perfected. The properties of this company are considered very valuable.

Chicago. Sept. 14.

(From Our Special Correspondent.)

The coal business is quiet, for both anthracite and bituminous trade. Anthracite, which has been briskly drummed up for the last month, shows indeed a slight increase of sales, but this is not looked upon as lasting; it seems rather the effect of agitation of the supply question in newspapers and predictions by some dealers that the transportation question will make anthracite scarce and high priced as soon as cold weather sets in, causing householders to think it well to get their bins full before there is a possibility of danger. Yet in general stocks—of the householder, the retailer and the wholesaler—have been well laid in and there is not much probability of increased trade until cold weather actually comes.

Illinois and Indiana grades of bituminous are selling fairly well, considering the season. The demand for them is constant for steam purposes and the threshing trade continues good. Hocking does not move freely at \$3.90 for lump and \$3.65 for run-of-mine, the schedule prices; but there is little talk of cuts from the schedule. Users of Hocking seem to be holding off or have turned to other coal. Indiana and Illinois lump is, as last week, \$2.35@2.60; block is \$3.30; run-of-mine, \$2.25@3.00. Smokeless is \$4.30 for lump and \$3.60@3.90 for run-of-mine. West Virginia splint is said to be selling well at \$3.75@4.25. The smokeless market is dull and the general demand for Eastern bituminous is light.

Cleveland. Sept. 15.

(From Our Special Correspondent.)

The coke situation in this territory is very easy and the movement free. The furnaces are able to get all they need now, but not to collect any stocks. There is a prospect that some of the furnaces will suspend operations the latter part of the month, unless business picks up materially, and this of course will enable others, which are in operation, to come in for a surplus of coke. The prices have eased up materially, good 72-hour furnace coke holding about \$3 to \$3.50 at the oven.

The demand for coal has increased steadily during the past week and the market for steam coal is very much improved. Dealers and producers, however, are aware of a lesser demand than existed this time last year, but account for this in part by the necessity of making up some of the anthracite shortage, a year ago. The demand is strong, nevertheless, and some of the factories which are again resuming operations are adding to the volume of the trade. The prices have not changed, but the market is stronger at the old quotations.

The call for domestic coal is also improving and the work of laying in a winter's supply has started.

The shipment of coal up the lakes continues at a furious rate of speed, the supply of boats being adequate, the demand being strong and the shipment from the mines better than at any time this year. The question of rates of carriage hardly enters. The movement is very free, since the Southwestern railroads showed a tendency to move the material away from the docks more freely. The rates hold at 50c. from Lake Erie to Lake Michigan and 40c. to Lake Superior.

Pittsburg. Sept. 15.

(From Our Special Correspondent.)

Coal.—The railroad coal mines have been working fairly good time during the past week, and the river mines have been running full. The car supply has been better for coal intended for lake shipment, but there is now a lack of vessels to take the coal to the Northwestern markets and many loaded cars are being held up at the lake docks. Prices are a trifle firmer but no advance has been ordered. The Pittsburg Coal Company will not assume control of the Monongahela River Consolidated Coal and Coke Company until about November 1. It is reliably reported that the control of the Monongahela Company was obtained at a lower figure than was at first supposed. The river combine is capitalized at \$40,000,000 divided into \$10,000,000 bonds; 200,000 shares of preferred stock at \$50 and 400,000 common shares at \$50. During the past two years the common stock has sold at from \$9 to \$12 a share. It is now said that 330,000 shares of the common stock were quietly gathered in at different times at an average price of \$10 a share. If this report is correct the control of the big combine was obtained at a cost of \$3,300,000, as the common stock has the same voting power as the preferred. A statement, however, has been given out that 50,000 shares of the preferred stock were also purchased.

Connellsville Coke.—The coke trade is improving and it is impossible to buy furnace coke at less than \$2.25; and the minimum price of foundry coke is \$3. The Courier in its last report gives the production in the Connellsville region for the previous week at

250,120 tons, a slight gain. The shipments were 10,589 cars, distributed as follows: To Pittsburg and river tipples, 4,084 cars; to points west of Pittsburg, 4,849 cars; to points east of Connellsville, 1,656 cars. In the lower Connellsville region the production was 54,855 tons and the shipments 2,200 cars.

San Francisco. Sept. 12.

(From Our Special Correspondent.)

The coal market continues quiet. Arrivals of coast coals are a little better, but the market does not appear to be overstocked. The demand for fuel oil continues very good.

Prices remain steady. Quotations for Pacific Coast coals to dealers are 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 to dealers quotations are: Colorado anthracite, \$14; Castle Gate, Clear Creek, Rock Springs and Sunny-side, \$8.50. Eastern coals are nominal at \$14 for Pennsylvania anthracite and \$13 for Cumberland, the latter being rather scarce. For foreign coals, in cargo lots, prices are: Welsh anthracite, \$13; Cannel, \$8.50; Brymbo and Wallsend, \$7.50.

Foreign Coal Trade. Sept. 1.

The export market is very quiet, little being done beyond the ordinary shipments to Cuba and the other West Indies. Very little coal is coming in now, although there is an occasional receipt of English coal on old contracts.

Exports of coal and coke from Germany for the seven months ending July 31 were as follows, in metric tons:

	1902.	1903.	Changes.
Coal	8,529,905	9,618,803	1, 1,088,898
Brown coal	11,678	14,222	1, 2,544
Coke	1,116,369	1,493,725	1, 377,356
Totals	9,657,943	11,096,750	1, 1,438,807

The chief exports of coal were to Austria, Holland and Belgium; of coke, to Belgium and France.

Imports of coal and coke into Germany for the seven months ending July 31 were as follows, in metric tons:

	1902.	1903.	Changes.
Coal	3,418,194	3,717,971	1, 299,777
Brown coal	4,450,631	4,539,811	1, 89,180
Coke	209,202	247,227	1, 38,025
Total	8,078,027	8,505,009	1, 426,982

The chief imports of coal were from Great Britain. The brown coal all came from Bohemia.

The production of coal in Germany for the seven months ending July 31 is reported as follows, in metric tons:

	1902.	1903.	Changes.
Coal	90,228,861	65,847,206	1, 24,381,655
Brown coal	23,623,831	25,205,385	1, 1,581,554
Total mined	83,852,692	91,052,591	1, 7,199,899
Coke made	5,054,359	6,535,765	1, 1,481,406
Briquettes made	4,392,619	5,740,645	1, 1,348,026

The briquettes are made chiefly from brown coal (lignite). Of the total mined this year the Prussian collieries furnished 61,472,520 tons of coal, and 21,077,596 tons of brown coal.

Messrs. Hull, Blyth & Co., of Cardiff and London, report under date of September 5, that the Welsh coal market is easier and prices are weaker for all descriptions of coal. Quotations are: Best Welsh steam coal, \$3.00@3.96; seconds, \$3.78; thirds, \$3.60; dry coals, \$3.36; best Monmouthshire, \$3.36; seconds, \$3.24; best small steam coal, \$2.04; seconds, \$1.92; other sorts, \$1.80.

The above prices for Cardiff coals are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½ per cent discount.

The freight market is a shade firmer; tonnage less plentiful. Some rates quoted from Cardiff are: Marseilles, \$1.20; Genoa, \$1.14; Naples, \$1.14; Singapore, \$2.76; Las Palmas, \$1.44; St. Vincent, \$1.56; Rio Janeiro, \$2.40; Santos, \$2.76; Buenos Ayres, \$2.04.

IRON TRADE REVIEW.

New York, Sept. 16.

It begins to look a little as though the waiting period was drawing to an end. The consumers possibly have become convinced that much lower prices are not to be hoped for and are getting ready to make their purchases for the last quarter. In pig iron there has been quite a volume of sales, although most of them are comparatively small. Outside of these purchases for immediate requirements a more encouraging feature is that a number of orders have been received to make deliveries on old contracts. Some observers predict a substantial revival of business by the beginning of October.

The attempt to keep up the price of billets does not seem altogether a success, and the so-called billet pool is reported to be considering a drop in price below the standard of \$27, Pittsburg, which was fixed some time ago.

In finished material the situation is about the same. There have been more orders placed, though generally for comparatively small quantities, while deliveries on old contracts are being called for.

There has been no special pressure in any part of the market and orders have been fairly distributed. Bars, however, are generally weak, and further reductions are confidently looked for in spite of the efforts of the mills to maintain prices.

Some foreign material continues to be offered here, but the demand for it is less than for some time past, and sales can be made only on substantial concessions. The German houses, especially, seem hardly to have realized this, although they may do so later.

Birmingham. Sept. 14.

(From Our Special Correspondent.)

There are some rumors still heard to the effect that sales have been made in this district at prices from 25 to 50c. per ton under the \$12 rate for No. 2 foundry. There is a denial of the story that No. 2 foundry has been sold for \$11, but a 50c. reduction is not improbable.

One of the larger companies in the district is said to be selling about its make. The work on new furnaces in course of construction and on repairing old furnaces is being pushed. Announcement was made during the past week that No. 2 furnace of the Tennessee Coal, Iron & Railroad Company at Ensley was ready, having been thoroughly repaired and relined.

Officers and directors of the Lookout Mountain Iron Company met during the past week at Battelle, between Birmingham and Chattanooga, and inspected the work going on there. The furnace is going up rapidly. Coal is being gotten out already, and 150 of the proposed coke-ovens are in blast. A tunnel is being driven through the mountain to reach ore-beds. The officers and directors are pleased with the conditions and expect to be making iron about February, if not sooner. Twenty-nine furnaces are now in blast in Alabama. As far as can be learned there are no intentions of curtailing iron production in this state. The new furnace of the Tennessee Company at Ensley is making progress, as are the two furnaces of the Alabama Steel & Wire Company at Gadsden. The Sloss-Sheffield Steel & Iron Company announces that its Hattie Ensley furnace at Sheffield will be ready by October and the furnace will be put into commission at once, making all seven furnaces of this company in operation then.

The manufacturers in this district are still smarting at the refusal of the railroads to grant the reduction in freight rates of 50c. on the ton, and say that they will route their shipments so as to "punish" those railroads which were not anxious to grant the request of the manufacturers.

The following quotations are given: No. 1 foundry, \$12.50; No. 2 foundry, \$12; No. 3 foundry, \$11.50; No. 4 foundry, \$10.50@11; gray forge, \$10@10.50; No. 1 soft, \$12.50; No. 2 soft, \$12.

There is not much of a demand for finished iron and steel. The Birmingham mills, belonging to the Republic Iron & Steel Company, are still idle. The Bessemer mills, belonging to the Tennessee Coal, Iron & Railroad Company lost two or three days the past week, because of Labor Day, but are again in full operation, except in the plate department. The Gate City mills, belonging to the Republic Company, are working in all departments. The little Anniston mills are working.

The steady demand for steel rails continues, and as a consequence the plant of the Tennessee Company at Ensley is working regularly. The steel rails being manufactured at this establishment are being used quite extensively by Southern railroads; in fact, much of that already manufactured was delivered to the Southern railroads. The steel plow works appear to have plenty of orders on hand and are working steadily.

Foundrymen and machine shop proprietors report their trade somewhat slack yet. Prospects with them, however, are very bright, and it is believed that all will have a good business this fall and winter.

Chicago. Sept. 14.

(From Our Special Correspondent.)

There has been little, if any progress, in the sales of pig iron during the last week; rather there has been something of a reaction toward a downward tendency. Agents are predicting still lower prices than the \$11.50 Birmingham or \$15.85 which so far represents the minimum for Southern No. 2; it is declared that \$10.50 is likely to be reached before the turn for good comes. Large consumers are still buying mostly from hand to mouth; they cannot be induced to make contracts for the future, after the fashion of a year ago. The explanation of the condition seems in part, so far as local observation goes, a psychological one. Buyers, in their experience of the reaction from the very high prices that prevailed a few months ago, have come to look upon the market as inevitably a falling one, and temporary revivals of the

old-time briskness of buying flutter and fall under this spirit. No local furnaces have gone out of blast as yet, and the condition is better for them than for the Southern furnaces, to all appearances. They can meet the demand for immediate delivery better, and the transportation question is not so serious with them as with Southern furnaces. Northern iron sells for \$1 more than Southern, on the average.

It would not be quite true, perhaps, to say that the general condition of the market is worse than it was a week ago, but it is certainly no better. The trouble is in the disappointment of hopes raised by the seeming brightening of the skies two weeks ago.

Coke continues plentiful and unchanged as to price—\$5.50@5.90 for first-class furnace.

Cleveland. Sept. 15.

(From Our Special Correspondent.)

Iron Ore.—Nothing is being done in the way of ore sales and the market is dull, but prices are unchanged at \$4.50 for bessemer old Range and \$4 for bessemer Mesabi. The movement down the lakes is beginning to lag a little, and boats are plentiful. The rates, however, are unchanged on a basis of 80c. from the head of the lakes to Ohio ports.

Pig Iron.—The buying of foundry for immediate shipment is light and prices vary according to local conditions, furnaces meeting competition in their own territory and trying to invade the field occupied by others. The endeavor is to hold up to \$16 in the Valleys for No. 2 foundry, but this price is often shaded by the manner in which sales are made. On future sales the market shows more strength, as advance inquiries are rather heavy, and the business promises well; some of the concerns which consume pig iron, being in better shape than they have been. The market was strengthened by the action of the railroads in refusing to lower the rate of freight from the South, but the cutting of prices by the independent furnaces has somewhat offset this advantage. The association stacks of the South are offering material at \$12, Birmingham, but are underbid by the non-association stacks, which are offering No. 2 foundry at \$11, Birmingham. Malleable is in good demand at \$16.50 in the Valley and gray forge is fairly strong at \$16 in the Valley. The inquiry for basic for fourth-quarter delivery is a little stronger and the market is off to about \$16, Valley furnace. No business has been reported at that figure. Bessemer is dead, no sales having been made and no inquiries registered. The market is about represented by a quotation of \$16, Valley furnace.

Finished Material.—The plate trade has revived somewhat, and good business is in prospect. Some good orders have been placed of late, ranging about 500 tons and upwards, and others are coming in. Some contracts have appeared, which will entail deliveries for a year ahead. These will be closed inside of ten days. Specifications against old contracts have also been heavier. The price has been steady at 1.60c. Pittsburg. Structural has also improved. One good-sized order was closed the past week and others are pending, some of them being long-time contracts. Old projects which were partially abandoned when labor difficulties started, have been renewed and some new projects, which were held up, are being carried through. The market is rapidly gaining strength. The price holds at 1.60c., Pittsburg. Bar iron is stronger, with rumors of a pool among the mills to hold the price at 1.50c., Pittsburg, against all competition. The smaller mills have been selling a limited tonnage at 1.40c. at the mill. The steel bar situation is stronger, with some good orders placed, and others pending. In steel bars, contracts are appearing in the form of inquiries which will entail deliveries for a year ahead. The price does not change from 1.60c. Pittsburg, for bessemer, and 1.70c., Pittsburg, for open-hearth. Sheets have held firm, with small mill-cutting freely to get business, and with retribution promised from the larger mills, in the form of a decided cut in prices. The present quotations are unchanged, on a basis of 3.05c. out of stock for No. 2 black sheets. The billet trade is dull with no business of importance appearing and with prices holding steady although nominal. The inquiry for rails has about ceased for the time being.

Old Material.—The market is dull and prices are steadily sagging. Dealers are cutting prices to get business, especially in busheling scrap. The material is plentiful, but those having it to sell to the middlemen are inclined to be stiff in prices.

New York. Sept. 16.

Pig Iron.—Buying shows little improvement and the market continues quiet. We quote: No. 1X foundry, \$17; No. 2X, \$16.50, while No. 2 plain can be had for 50c. less; gray forge, \$15.50. For Southern iron, on dock, quotations are: No. 1 foundry \$17; No. 2, \$16.25; No. 3, \$15.75.

Bar Iron and Steel.—Prices for large lots on dock are: Refined bars, 1.65@1.75c.; soft steel bars, 1.70@1.80c.

Plates.—Buying continues in small orders with not much improvement in demand. Sheared plates are quoted as follows: Tank, 1/4-in. and heavier, 1.78@1.85c.; flange, 1.90@2c.; marine, 2.05@2.10c.

Steel Rails.—The quotations remain \$28 for standard sections, f. o. b. mills; light rails, \$33@36, according to weight. Relaying rails are \$28@33 for heavy sections and \$33@38 for light sections.

Structural Material.—Apparently some improvement in local demand can be expected with the settlement of labor troubles. For large lots at tidewater, nominal quotations continue 1.75@2c. for beams, angles, channels and tees.

Philadelphia.

Sept. 16.

(From Our Special Correspondent.)

Pig Iron.—The improving tendency noted in pig iron in some other centers has not manifested itself in eastern Pennsylvania to any extent. The statements made to-day by a number of the leading pig iron interests do not warrant, at least just now, some of the anticipations indulged in by makers. The stronger concerns say that the drooping tendency is about exhausted. It should be noted, however, that all along they have not recognized the force of the downward movement. They have been dragged by the heels after it, as it were, and now that there are some encouraging symptoms of improvement they say that a reaction to stronger prices is probable. Regard for all the influences at work will not permit the acceptance of such a view. Speaking generally, the downward tendency that has prevailed so long is still at work. Until there is a decidedly better demand for finished products it is useless to expect pig iron to do anything more than to hold its own at present prices. Iron has sold very low this week and options are out which expire next week, which may lead to quite a number of transactions in both No. 1 and No. 2 X foundry. Quite a number of buyers made purchases during the past few days, but the greater number are waiting to see how things turn out. Quotations may be given at \$17.50 for No. 1; \$16.50 for No. 2; \$15.50 for No. 2 plain; \$15 for standard forge; \$15 for basic and \$22 for low phosphorus with a liberal margin for variations in some cases.

Steel Billets.—A number of buyers of billets were driven into the market this week but they made small purchases. Some fresh hopes have been raised that foreign steel can be had, but there are no solid grounds for this hope. Small lots have been sold at \$28. Offers of large lots have been made at lower figures, but there is no inclination to buy in a large way in the present unsettled state of the market.

Bars.—Bar iron has sold better during the week than for some time. Quotations range from 1.50@1.60c. for refined iron, and steel bars are strong at 1.80c.

Sheets.—A strong retail business is being done in sheets at top prices, but nothing has been done in a wholesale way.

Pipes.—The demand for pipe has been fair, but no large orders have been booked.

Tubes.—The demand for tubes keeps up very well and a great deal of business has been sent to the mills most of it under requests for urgent delivery. Prices are very firm.

Merchant Steel.—The distribution of merchant steel has been interrupted by rumors of a coming cut, the reasons for which, if any, cannot be ascertained in this market. It is believed there is something going on at the mills which will lead to more favorable terms very soon. Eastern consumers of merchant steel are buying in a hand-to-mouth way.

Plates.—Careful inquiry this week shows that only one or two orders of any magnitude have been placed, but a good deal of work made up of small orders has been disposed of. Tank steel is quoted at 1.80c.; flange, 1.90c.; locomotive fire-box 2.30c.

Structural Material.—Business continues dull in this branch. No immediate recovery is in sight. Prices are very firm and there are no prospects of any abatement. Considerable work is in sight but there is no assurance that much of it will be undertaken this fall.

Steel Rails.—The only business traced up this week has been for light rails, which were sold at \$32. Concessions are now being made on light rails.

Scrap.—Old rails are unsaleable, even at \$18. Heavy steel scrap is very dull.

Pittsburg.

Sept. 15

(From Our Special Correspondent.)

The outlook for the iron and steel markets is decidedly better this week than for some time past, and there is every indication that activity will be resumed by October 1. In all branches there is a marked evidence that the period of dullness is about over. The conditions of August and September this year are only a repetition of the same months in former years with the exception of the last two. It is conceded

that prices have been abnormally high for some time past in some lines, and are now getting down to a new basis which will bring business into the market. Pig iron prices have suffered most and consumers have delayed placing orders for the fourth quarter, and all buying lately has been for absolute requirements. During the week a large quantity of pig iron that has been under contract at a higher price than has been quoted lately has been called for and prompt shipments are urged. Besides these specifications there are a large number of new orders, but the total tonnage is not particularly heavy. Gray forge has been unusually active during the week, but the price has been very low, the minimum being \$15 delivered at Pittsburg. Most of the sales were made at that figure. Foundry iron also has suffered a further decline and as low as \$16, Pittsburg, can be done for the No. 2 grade. It is reported that one large lot was sold at \$15.75, but this was not confirmed. In bessemer the sales have been very small and the prices cannot be accurately given. Furnaces continue to quote bessemer at \$17, Valley furnaces, but it is believed that odd lots can be had for delivery this month at \$16.50, Valley. There is no Southern iron in the market. Some low quotations were made by agents in the expectation that the freight rate would be reduced from \$4.85 to \$4.35, but as the railroads failed to make the cut, these prices have been withdrawn. The United States Steel Corporation has not yet come into the market for its fourth quarter requirements, but there seems to be an impression here that it soon will begin making inquiries.

It is reported here this afternoon that the United States Steel Corporation is closing contracts for 100,000 tons of bessemer pig iron, and that the price will be around \$16.50 Valley furnace; but it is impossible to obtain any reliable confirmation or denial of these rumors.

There has been a larger number of orders placed during the week for various finished steel products than for several weeks, but while the total tonnage is not great, it has stimulated the market, and it is confidently expected that, when the consumers realize that bottom prices have been reached, heavy buying will begin. It is known that merchant pipe, steel bars, plates, sheets, tin-plate and wire products will not be lower. A number of reports have been circulated lately that some mills in the steel billet agreement have been cutting the price but they are authoritatively denied. A meeting of what is called the billet pool will be held soon, probably, and it is reported that the agreed price of \$27 is to be lowered. It is admitted that billets have been offered in the market at less than the agreement made by members of the pool, but this has just been explained. When the price was much higher than it is now, a middleman purchased some lots which were sold at a higher figure. These consumers now refuse to accept deliveries according to contracts and the middleman proposes to sell at whatever price the steel will bring and then bring suit against the purchasers for the difference. As this seems to be the only grounds for the report that the pool will meet and reduce the price it can readily be seen that it has but little foundation. However, there is no certainty as to billet prices, and a cut may be ordered, but not to \$25 as has been rumored. The steel bar and shafting manufacturers have re-affirmed prices and the prices of all other finished lines are being strictly maintained. Iron bars have been weak for some time and the result is just being felt by the workers in the union rolling mills of the country. The bi-monthly examination of the sales-sheets under the annual wage scale of the Amalgamated Association of Iron, Steel & Tin Workers was made on Friday. The average of the sales of bar iron on which the scale is based was found to be 1.6c. and the pay of the puddlers for September and October will be \$6 a ton instead of \$6.25, and the wages of the finishers are cut 2 per cent. The average price of bar iron since January 1 has been 1.7c. The bi-monthly examination under the sheet and tin-plate scales also were made with the result that there will be no change in wages. Sheets have been selling below the base which is 3c on Nos. 26, 27 and 28 gauges and the base of the tin-plate scale is \$4.20 a box and the sales for the past two months have been at \$3.80 a box.

Pig Iron.—Bessemer pig iron is quoted nominally at \$17, Valley furnaces, but a sale is reported this week at \$16.50, Valley. It is not believed that much iron can be bought at that price. A number of specifications have been received for iron bought at a higher figure. Gray forge is down to \$15, Pittsburg, and several thousand tons have been sold. Foundry No. 2 in car-loads can be had at \$16@15.25, Pittsburg, and on larger lots probably \$15.75 can be done.

Steel.—The mills in the billet agreement are maintaining the price of \$27, but outsiders have been doing some cutting lately. There has been no sales of any consequence. Steel bars and plates are held firmly at 1.60c.

Sheets.—There is an improvement in the sheet market and the outlook is a shade better than it has

been. While some cutting is being done the price of 2.75c. for No. 28 gauge black sheets is being fairly well maintained and galvanized sheets bring 3.85c.

Ferro-manganese.—The market is unchanged, domestic 80 per cent still being quoted at \$49.

Cartagena, Spain.

Aug. 29.

(Special Report of Barrington & Holt.)

Iron and Manganiferous Ores.—There has been no improvement in the market, though a few odd cargoes are reported as sold for prompt shipment, notwithstanding the present high freights. Prices offered, however, are considerably lower than those of a few months ago, and mine operators are cutting down their output until something better offers. Shipments for the week were one cargo, 3,200 tons dry ore, and two cargoes, 5,920 tons manganiferous ore, all to Great Britain.

While prices offered are lower, sellers refuse to meet the situation and quote unchanged at 6s. 9d. @ 7s. per ton, f. o. b. shipping port, for ordinary 50 per cent ore; 7s. 3d. @ 7s. 9d. for special low phosphorus; 9s. 3d. for 58 per cent specular ore. Magnetic ore, 60 per cent iron, is 11s. 6d. for lump and 9s. 6d. for smalls. Manganiferous ores range from 14s. 6d. for 20 per cent manganese and 20 iron to 9s. 9d. for 12 manganese and 35 iron.

Pyrites.—Iron pyrites 40 per cent iron and 43 per cent sulphur are quoted at 10s. 6d. per ton, f. o. b. Cartagena. No shipments reported for the week.

CHEMICALS AND MINERALS.

(See also Prices-Current, page 454.)

New York, Sept. 17.

At last there are signs that consumers are ready to place contracts for 1904 supplies, especially for the heavy chemicals, alkali, caustic soda and chlorate of potash. Realizing this, domestic makers have opened their books to some customers, but to others have intimated that they prefer to wait for better prices.

An aftermath of the troubles in the domestic bromine industry some months ago, owing to an increasing production and competition, is the apparent breach of agreement with the German makers which has recently come to light. According to foreign reports American bromine preparations are being imported into Great Britain for re-export to Germany and are sold at a lower price than the German. This action is said to be contrary to what had been agreed upon when German and American producers adopted the policy of protecting their respective industries by selling only to consumers in their own territory. For years this agreement held good, but now it appears the signatures have been erased, and competition will hereafter be universal. The German producers are already beginning to cross swords by intimating that the American bromides do not comply with the local requirements as to chemical purity, and therefore can find practically no market for medicinal purposes abroad.

As American industries are important consumers of so-called special chemicals and minerals we give the following imports at New York for January 1 to July 31, this year: Aluminum sulphate, 89,436 lb.; ammonium carbonate, 228,868 lb.; ammonium muriate, 845,904 lb.; hismut, 25,490 lb.; barium sulphate (blanc fixe), 435,015 lb.; crude chalk, 23,605 tons; precipitated chalk, 408,551 lb.; china clay, 8,137 tons; cobalt oxide, 46,887 lb.; fuller's earth, 2,064 tons; lithophone, 432,908 lb.; calcined magnesite, 3,456,308 lb.; mica, 188,312 lb.; ocher, 4,880,112 lb.; ozokerite, 787,261 lb.; potassium carbonate, 2,558,530 lb.; potassium permanganate, 130,400 lb.; potassium prussiate, 1,123,581 lb.; hyposulphite of soda, 112,154 lb.; sodium nitrite, 91,080 lb.; talc, 3,494,158 lb.; gypsum (terra alba), 77 tons. Most of these substances have been received from Great Britain and Germany.

Cyanide of Potassium.—A small export trade is being done to Mexico on the basis of about 15 1/2c. per lb., which compares with 20c. asked in New York for domestic deliveries. The difference may be accounted for by the competition among manufacturers abroad, who, appreciating the extent of the consuming territory in Mexico, owing to active gold mining, are willing to make concessions in price so as to encourage the demand.

Bleaching Powder.—There are so few customers ordering bleach now that the market looks gloomy, and the likelihood is that brightness will not be forthcoming until manufacturers decide on next year's prices. It seems, however, that producers are in no hurry to announce the opening of their books for new contracts, even though the customary time for doing so has long since matured. Momentarily small spot sales of good foreign bleach are being made at \$1.05 @ \$1.10 per 100 lb., and domestic at 87 1/2 @ \$1, f. o. b. works.

Copper Sulphate.—Hardening prices for metallic copper, and the recent spurt in the sulphate market

abroad, have initiated a firmer tone in the chemical trade here. Doubtless the belief that foreign high prices for sulphate and the American duty will stop imports for a time at least, has encouraged domestic makers to ask \$4.85@4.87½ per 100 lb., f. o. b. works. Business, however, is limited.

Acids.—Oxalic is practically the only feature in the market for commercial acids. Generally, deliveries are on regular contracts, and prices are unchanged, excepting that oxalic is firmer.

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.	\$5.25@5.50
Muriatic, 20°.....	1.00	Sulphuric, 50°	.....
Muriatic, 22°.....	1.75	" " " " "	13.50@14.50
Nitric, 36°.....	4.37½	Sulphuric, 60°	1.05
Nitric, 38°.....	4.75	" " " " "	18.00@20.00
Nitric, 40°.....	5.00	Sulphuric, 66°	1.20
Nitric, 42°.....	5.37½	" " " " "	21.00@23.00

Brimstone.—Best unmined seconds on spot have sold at \$23 in a small way, while shipments are held at \$22@22.25 per ton. Best thirds are nominally \$1.25 less than seconds.

Sicilian Brimstone Market.—Messrs. Emil Fog & Sons, of Messina, write us under date of August 31 as follows: Stocks of dissidents which are replenished by the arrivals from the new melting have prompted free offerings to the detriment of values both for seconds and thirds. Even the Anglo-Sicilian Sulphur Company shows some anxiety to sell and is inclined to make concessions in price to promote business. Refined sulphur being scarce and in active demand is advancing and quoted about 7s. above the cost of best unmined seconds. The prices for refined range is at present so high that there is every probability of an increase in the consumption of seconds, especially in Germany and Scandinavia. It is reported that there are still about 12,000 miners on strike in the Caltanissetta district, and that they are supported by the Socialists' Committee at Milan. In our opinion the present strikes will influence next year's production. Freight rates are rather firmer and tonnage is not quite as freely offered as heretofore. New York ballast, 7s. 3d.; Boston, 7s. 6d.; Baltimore, Philadelphia and Portland, full cargo, 7s. 9d.; San Francisco lots of 25 tons minimum, via Antwerp, 28s. We quote sulphur per ton f. o. b. shipping port as follows: Best unmined seconds, bulk, 80s. 9d.; best thirds, 78s.; current thirds, 76s. 9d.; refined block sulphur, 87s. 9d.; refined block sulphur in bags, 90s. 3d.; refined roll sulphur, 94s. @ 99s. 3d.; in sticks, 103s. 9d. @ 105s. 9d. (unblended flowers, pure, in bags, 105s.; current, 98s. 6d.; commercial, 92s. 9d.; best seconds ground sulphur in bags, 88s. 9d.)

Pyrites.—A cargo of 3,712 tons Spanish iron pyrites arrived at New York and 4,643 tons copper ore at Baltimore this week, to be delivered on contract to fertilizer acid makers. Consumption is seasonably good, and prices continue steady.

We quote: Domestic pyrites, \$5 per ton for lump ore, f. o. b. Atlantic coast mines, and 10c. per unit for fines; sulphur content varies from 42@44 per cent. Spanish pyrites carrying from 46@52 per cent. sulphur, are quoted at 11@12c. per unit for lump and 10 @10½c. for fines delivered at Atlantic ports.

Nitrate of Soda.—This market continues very firm. Spot is quoted \$2.15 per 100 lb.; arrivals, \$2.10, and futures, \$2.05.

Sulphate of Ammonia.—Buyers of good gas liquor on spot have eased the price to \$3.10 per 100 lb., while for shipments sellers ask \$3.05. The imports at New York in the seven months ending July 31 amounted to 1,052,391 lb.

Phosphates.—Although the shipments of Florida phosphates last month were heavy, they have not been large enough to bring the total, for the 8 months ending August 31, up to last year. Roek shipments from Fernandina since January have totaled 84,210 long tons, as against 129,825 tons in the corresponding 8 months in 1902, and from Savannah, 86,447 tons, against 92,670 tons. Together these ports show a total decrease in exports this year of 51,838 tons. The domestic movement from the Peace River district, however, has improved greatly, showing a total of 47,480 tons, as against only 3,070 tons last year. Tennessee and South Carolina show quite heavy shipments to domestic consumers, and the former state is making every effort to regain a footing in some of the foreign superphosphate countries.

An interesting charter was recently taken from Tampa to Melbourne, Australia, at 21s. (\$5.04). This is 2s. or 48c. per ton less than was paid to Yokohama, Japan, about this time last year. In 1902 the exports of Florida land pebble phosphates to Australia amounted to 4,996 tons.

Attention is being given to the deposit of phosphate at Shima, in the Prefecture of Mie, Japan, where the mineral has been found associated with manganese ore. Naturally the quality of the phosphate varies a great deal, but it is believed will average about 10 per cent phosphoric acid. The deposit is said to be extensive, and the cost of mining and shipping to Funatsu on

Toba Bay, 1½ or 1¾ miles distant, is 3.45 yen (\$1.72) per ton. Should an economical method be found to separate the phosphate from the adhering manganese it is thought a super-phosphate factory may be established.

Phosphates.	Per ton.		United Kingdom or European ports.	
	F. o. b.		Unit.	Long ton.
*Fla. hard rock (77@80%)	\$7.00@7.50	6½@7½d.	\$10.53@11.70	
*Fla. land pb. (68@73%)	3.50@3.75	5½@5½d.	7.70@8.05	
†Tenn. 78@82% export	4.00@4.25	6½@7d.	10.40@11.20	
†Tenn. 78% domestic	3.75@4.00	.....	.....
†Tenn., 75% domestic	3.50	.....	.....
†Tenn., 73@74% domestic	2.95@3.20	.....	.....
†Tenn., 70@72% domestic	2.70@2.95	.....	.....
†So. Car. land rock	.....@3.25	.....	.....
†So. Car. riv. r'k (55@60%)	2.75@3.00	4½@5½d.	5.55@6.60	
Algerian (63@70%)	.....	5½@6¼d.	7.37@8.38	
Algerian (58@63%)	.....	4½@5½d.	5.55@6.90	
Gafsa (Tunis)	.....	5¼@6d.	6.30@7.20	
Christmas Isl. (80@85%)	.....	7½@8¼d.	12.38@13.61	

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

Liverpool. Sept. 2.

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

There is no special feature to report.

Soda ash is in fair request at the usual range as to destination. For tierces nearest values are about as follows: Lablanc ash, 48 per cent, £5@£5 10s.; 58 per cent, £5 10s.@£6 per ton, net cash. Ammonia ash, 48 per cent, £4 5s.@£4 10s.; 58 per cent, £4 10s.@£4 15s. per ton net cash. Bags, 5s. per ton under price for tierces.

Soda crystals are £3 7s. 6d. per ton, less 5 per cent for barrels, or 7s. less for bags, with special terms for a few favored markets.

Caustic soda is very firm, as follows: 60 per cent, £8 15s.; 70 per cent, £9 15s.; 74 per cent, £10 5s.; 76 per cent, £10 10s. per ton, net cash. Special quotations for export to the Continent and a few other quarters.

Bleaching powder is slow of sale on spot, and prices are nominal at about £3 10s.@£4 per ton, net cash, for hardwood, as to market.

Chlorate of potash is quiet at 2¼@2½d. per lb. for English make.

Bicarb soda is steady at £6 15s. per ton, less 2½ per cent, for the finest quality in 1-cwt. kegs, with usual allowances for larger packages, also special terms for a few favored markets.

Sulphate of ammonia is quiet but steady at about £12 8s. 9d.@£12 11s. 3d. per ton, less 2½ per cent, for good gray 24@25 per cent in double bags, f. o. b. here.

Nitrate of Soda is in moderate supply on spot, and quoted at £10@£10 10s. per ton, less 2½ per cent for double bags, f. o. b. here, the best quality being held for the higher figure.

METAL MARKET.

New York, Sept. 16.

Gold and Silver Exports and Imports,

At all United States Ports in August and Year.

Metal	August.		Year.	
	1902.	1903.	1902.	1903.
Gold:				
Exports.....	\$2,305,714	\$84,776	\$30,406,290	\$40,538,775
Imports.....	5,143,597	7,808,807	19,925,362	26,416,068
Excess	I. \$2,837,883	I. \$7,724,031	E.\$10,540,029	E. 14,122,707
Silver:				
Exports.....	4,744,888	2,019,655	30,944,736	22,540,420
Imports.....	1,807,219	2,319,076	16,304,439	14,964,587
Excess	E. \$2,937,669	I. \$299,021	E.\$14,640,299	\$7,675,833

These exports and imports cover the totals from 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 September 16, and for the years from January 1

Period.	Gold.		Silver.		Total Excess, Exports or Imports.
	Exports.	Imports.	Exports.	Imports.	
Week..	\$7,500	\$40,489	\$638,015	\$25,781	E. \$57,9245
1903....	31,412,903	6,237,964	21,254,914	2,918,308	E. 43,491,515
1902....	24,519,808	1,697,921	17,814,734	903,248	E. 39,793,269
1901....	25,808,029	2,269,793	22,919,116	2,759,757	E. 43,697,595

The above statement has been revised with figures furnished by the Bureau of Statistics, Treasury Department, New York, and includes Mexican and foreign silver in coin or bullion.

As usual the silver went to London almost entirely. The gold imported came from the West Indies and Central America.

Crop reports are somewhat uncertain, especially with regard to corn. Business, while generally good, begins to hesitate a little, and more is heard of the effects of Wall Street depression.

The statement of the New York banks, including the 56 banks represented in the Clearing House, for the week ending September 12, gives the following totals, comparisons being made with the corresponding weeks of 1902 and 1901:

	1901.	1902.	1903.
Loans and discounts.....	\$872,266,100	\$899,498,900	\$926,582,800
Deposits.....	931,433,000	908,769,300	918,195,000
Circulation.....	30,796,100	34,267,500	44,798,800
Specie.....	167,955,700	155,775,300	172,068,200
Legal tenders.....	72,013,100	72,132,100	72,852,900
Total reserve.....	\$239,968,800	\$227,907,400	\$244,921,100
Legal requirements.....	232,858,250	227,192,325	229,548,900
Balance surplus.....	\$7,110,559	\$715,075	\$15,372,200

Changes for the week this year were increases of \$2,167,000 in loans and discounts, \$64,300 in deposits, and \$927,400 in circulation; decreases of \$667,800 in specie, \$1,240,900 in legal tenders, and \$1,924,775 in surplus reserve.

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

	1902.		1903.	
	Gold.	Silver.	Gold.	Silver.
N. Y. Assoc.	\$155,775,300	.....	\$172,068,200	.....
England.....	187,729,365	.....	171,433,220	.....
France.....	520,507,205	\$223,446,395	508,071,620	\$223,832,655
Germany.....	175,850,000	65,040,000	175,045,000	61,500,000
Spain.....	71,230,000	97,090,000	96,720,000	11,468,000
Neth'lands.....	23,708,000	32,837,000	19,714,000	32,372,500
Belgium.....	16,220,000	8,100,000	15,113,335	7,556,665
Italy.....	80,640,000	10,373,000	96,720,000	11,468,000
Russia.....	367,255,000	42,650,000	415,490,000	42,920,000
Austria.....	227,110,000	62,230,000	227,375,000	63,810,000

The returns of the Associated Banks of New York are of date September 12 and the others September 10, 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.

Resumption of purchases of silver on Philippine account by our government, with a fair demand from India and some from the Continent, have given tone to the market and London closes firm.

The United States Assay Office in New York reports receipts of 36,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to September 3 are reported by Messrs. Pixley & Abell's circular as follows:

	1902.	1903.	Changes.
India.....	£4,303,810	£3,989,975	D. £313,835
China.....	135,850	294,186	I. 158,336
Straits.....	178,120	721,879	I. 543,759
Total.....	£4,617,780	£5,006,040	I. £388,260

Receipts for the week were £119,000 in bar silver from New York, and £14,000 from Australia; total £133,000. Shipments were £19,000 in bar silver to Bombay, £20,000 to Calcutta and £25,000 to Singapore; total, £64,000.

Indian exchange has been somewhat stronger, the Council bills offered in London having sold at 16d. per rupee. The full amount of bills was taken. At the present rate of exchange, gold shipments from Australia ought to be profitable, but just at present a considerable premium is being asked on such shipments, owing to the demand from various sources.

The exports of merchandise from the United States in August are reported by the Bureau of Statistics of the Department of Commerce and Labor at \$89,585,440, the lowest monthly figures since July, 1902. For the eight months ending August 31 the statement is as follows:

	1902.	1903.
Exports.....	\$821,929,100	\$879,088,217
Imports.....	614,413,297	676,969,029
Excess, exports.....	\$207,515,803	\$202,119,188
Add excess of exports, silver.....	.....	7,675,833
Add excess of exports, gold.....	.....	14,122,707
Apparent balance.....	.....	\$223,917,728

The gold and silver movement in detail will be found at the head of this column.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars.....	\$0.44½	\$0.46½
Peruvian soles and Chinese pesos.....	.41	.45
Victoria sovereigns.....	4.85	4.88
Twenty francs.....	3.86	4.88
Spanish 25 pesetas.....	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

September	Silver			Copper			Spelter			
	Storling Exchange	N. Y. Cts.	London Pence.	Lake, per lb.	Electrolytic, per lb.	London, per ton.	Tin, per lb.	Lead, per lb.	N. Y., per lb.	St. Louis, per lb.
10	4.80 1/2	57 1/2	20 1/2	13 1/2 @ 13 1/2	13 1/2 @ 13 1/2	57 1/2	27 1/2	4.05 @ 4.10	5.70	5.52 1/2
11	4.86	57 1/4	20 1/4	13 1/2 @ 13 1/2	13 1/2 @ 13 1/2	57 1/4	27 1/4	4.05 @ 4.10	5.70	5.52 1/2
12	4.8500	56 3/4	20 3/4	13 1/2 @ 13 1/2	13 1/2 @ 13 1/2	57 3/4	27 3/4	4.05 @ 4.10	5.70	5.52 1/2
14	4.8500	57 1/2	20 1/2	13 1/2 @ 13 1/2	13 1/2 @ 13 1/2	57 1/2	27	4.05 @ 4.10	5.70	5.52 1/2
15	4.8500	57 1/2	20 1/2	13 1/2 @ 13 1/2	13 1/2 @ 13 1/2	56 3/4	27	4.35 @ 4.40	5.70	5.52 1/2
16	4.8505	57 1/2	20 1/2	13 1/2 @ 13 1/2	13 1/2 @ 13 1/2	56 3/4	27	4.35 @ 4.40	5.70	5.52 1/2

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

Copper.—The market has ruled quiet but steady throughout the week, but, on the whole, is somewhat easier in tone. There has been a fair consumptive inquiry, but, on the other hand, producers have met the demand freely. Stocks in first hands are reported very light indeed. The closing quotations are given as 13 1/2 @ 13 1/2 c. for Lake copper; 13 1/4 @ 13 1/2 c. for electrolytic copper in ingots, cakes and wirebars, 13 @ 13 1/2 c. in cathodes; 12 1/2 @ 12 3/4 c. for casting copper.

The market for standard copper in London, which closed last week at £57 17s. 6d., opened Monday at £57 2s. 6d., and the closing quotations on Wednesday are cabled at £56 5s @ £56 7s. 6d. for spot, £56 @ £56 2s. 6d. for three months.

Statistics for the first half of September show an increase in the visible supplies of only about 50 tons. Refined and manufactured sorts we quote: English tough, £62 @ £62 10s; best selected, £62 10s @ £63; strong sheets, £70 @ £71; India sheets, £67 @ £68; yellow metal, 6 1/4 @ 6 3/4 d.

Exports and imports of copper at New York, Philadelphia and Baltimore, in the week of September 15 and for the year to date, were in long tons:

	Week.	Year.
Austria	50	4,002
Belgium	20	1,037
France	1,039	14,470
Germany	1,161	18,257
Holland	1,161	27,478
Italy	35	1,951
United Kingdom	468	11,996
Other countries	80	4,063
Total copper	3,464	83,224
Matte	286	984
Imports	70	18,820
Copper	70	18,820
Matte	984	984
Ore	2,785	29,462

Tin has been rather dull throughout the week, although efforts are being made to establish a premium for spot. Consumers do not take much interest in the article and only cover their immediate requirements. The closing quotations are given at 26 3/4 @ 27 c. for spot, 26 1/2 @ 26 3/4 c. for September, 26 1/4 @ 26 1/2 c. for October.

The foreign market, which closed last week at £122 12s. 6d., opened on Monday at £121 12s. 6d., declined on Tuesday to £121, and the closing quotations are cabled on Wednesday at £120 12s. 6d. @ £120 15s. for spot, £120 10s. @ £120 12s. 6d. for three months.

Lead.—The feature of the week has been an advance of \$6.00 per ton in the prices quoted by the American Smelting & Refining Company, which was announced on Tuesday. The demand on the part of consumers is reported quite satisfactory. The closing quotations are given as 4.27 1/2 @ 4.32 1/2 c., St. Louis; 4.35 @ 4.40 c., New York.

The foreign market has been rather easy, the closing quotations being cabled at £11 3d. 9d. for Spanish lead, £11 6s. 3d. for English lead.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of August 29, that the price of silver during the week has been 14 reales per oz. Exchange has gone up 15 centimos, making it 34.50 pesetas to £1. Local quotation for pig lead on wharf has been 62.25 reales per quintal, which, on current exchange, is equal to £10 1s. 5d. per ton of 2,240 lb., f. o. b. Cartagena. Exports have been 124,676 kgs. pig lead to Marseilles, 107,500 kgs. desilverized lead to Marseilles, and 600,000 kgs. desilverized to London.

Spelter continues in good demand, for early delivery, which commands quite a premium, but otherwise there is no special feature to the market. The ruling quotations for shipment from the west are 5.52 1/2 c., St. Louis; 5.70 c., New York.

The foreign market is firm, good ordinaries being quoted at £21 5s., specials at £21 10s.

Silesian Spelter Market.—Herr Paul Speier reports from Breslau, Silesia, under date of September 1, that there has been recently some improvement, owing to the appearance of some heavy buyers in the market. For good brands the quotation has been recently from 21.25 to 22 marks per 50 kgs., f. o. b. cars at Breslau. This is equivalent to 4.67c. per lb. The Silesian production for the first quarter of the current year was 28,751 metric tons of spelter, an increase of only 53 tons over the first quarter of 1902.

Zinc dust has been in some demand, with a corresponding improvement in prices, the advance being about 1 mark per 100 kgs. Quotations averaged about 59 marks per 100 kgs., f. o. b. Stettin.

Exports from Germany, for the seven months ending July 31, included 42,935 tons spelter, 10,111 tons zinc sheets, 1,100 tons scrap, 12,162 tons of zinc oxide and zinc dust, and 4,993 tons lithophone. All these items showed an increase, except scrap zinc. Imports for the seven months were 13,581 tons spelter, 69 tons sheets, 535 tons scrap, 2,044 tons zinc white. Imports of ore were 39,532 tons, while exports were 27,668 tons. A special importation in July was 2,082 tons of ore from Greece.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of August 29, that prices are a little more lively, owing to better quotations for spelter. Miners are hopeful that they will be able to secure what they have been asking. No shipments are reported for the week.

Antimony is quiet but steady. We quote Cookson's at 7 @ 7 1/4 c.; Hallett's at 6 3/4 @ 6 1/2 c.; U. S. 6 @ 6 1/4 c.; Italian and French at 6 @ 6 1/2 c.; Japanese at 5 3/4 @ 5 1/2 c.

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 lb.

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

Quicksilver.—The New York price is unchanged at \$47.50 per flask for large lots, with a slightly higher figure quoted for small orders. The San Francisco quotations are \$45 @ \$46 per flask for domestic orders and \$42 @ \$43 for export. The London price is £8 7s. 6d. per flask, with the same quotation asked by second hands.

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

	Per lb.	Per lb.
No. 1. 90% ingots	33 @ 37c.	38c.
No. 2. 90% ingots	31 @ 34c.	35c.
Rolled Sheets	4c. up	45c.
Alum-bronze	20 @ 23c.	22c.
Nickel-alum.	31 @ 30c.	30c.
Bismuth	\$2.10	\$1.82
Chromium, pure (N. Y.)	80c.	70c.
Copper, red oxide	50c.	50c.
Ferro-Molybde'm (50%)	\$1.25	1.00c.
Ferro-Titanium (10)	90c.	70c.
Ferro-Titanium (20 @ 25%)	55c.	62c.
N. Y.)	55c.	62c.
Ferro-Tungsten (37%)	38c.	38c.
Magnesium, pure (N. Y.)	60c.	60c.
Magnesium	\$2.75	2.75
Mangan'e Cop. (20% Mn)	32c.	32c.
Mangan'e Cop. (30% Mn)	38c.	38c.
Molybdenum (Best)	\$1.82	1.82
Phosphorus, foreign	45c.	45c.
Phosphorus, American	70c.	70c.
Sodium metal	50c.	50c.
Tungsten (Best)	62c.	62c.

Missouri Zinc Ore Market. Sept. 12.

(From Our Special Correspondent.)

There is no change in prices as a rule, the highest point remaining at \$40 and the assay basis at \$35 to \$37 per ton of 60 per cent zinc. Lead, however, was raised \$1.50 per ton, making a total advance of \$3 in three weeks, and closed the week steady at \$55.50 per ton, a price that leaves a margin of only \$4 per ton smelting charges, figuring 70 per cent metal contents in ore, against the former charge of \$7 per ton. Powder supplies have become short and some of the outlying mines are forced to lay off a part of the time.

Following are the shipments of zinc and lead from the various camps of the Joplin district for the week ending to-day:

	Zinc, lb.	Lead, lb.	Total value.
Joplin	2,982,390	331,140	\$62,280
Cartersville-Webb City	1,786,140	225,380	37,460
Galena-Empire	1,123,040	104,420	22,575
Duenweg	807,670	57,710	16,530
Alba-Neck	641,150	37,750	13,200
Aurora	603,680	16,040	9,635
Zincite	253,320	5,930	4,850
Carthage	234,200	...	4,450
Oronogo	201,770	3,790	3,425
Mitchell	173,610	...	3,125
Carl Junction	148,690	...	2,725
Granby	273,000	10,000	2,490
Prosperity	104,780	12,610	2,185
Central City	89,790	3,220	1,585
Badger	99,000	...	1,190
Sprague-Fring City	29,340	23,590	1,120
Stotts City	62,000	...	1,080
Sedalia	69,510	...	1,050
Gilliam, Ark.	62,420	...	950
Totals	9,649,370	831,580	\$191,885
37 weeks	\$350,584,180	\$40,600,510	\$7,124,540

Values: Zinc this week, \$168,985; 37 weeks, \$6,030,115; values: lead this week, \$22,900; 37 weeks, \$1,094,425.

Lead is \$6.50 per ton higher than a year ago and zinc is \$2 per ton higher in price, and this brings the value of the past week just \$106 more than the same week of last year, although the shipment was 150 tons of zinc and 223 tons of lead less.

Average Prices of Silver, per ounce Troy.

Month.	1903		1902		1901	
	London Pence.	N. Y., Cents.	London Pence.	N. Y., Cents.	London Pence.	N. Y., Cents.
January	21.98	45.57	25.62	55.56	28.97	62.82
February	22.11	47.89	25.41	55.09	28.13	61.06
March	22.49	48.72	25.00	54.23	27.04	60.23
April	23.38	50.56	24.34	52.72	27.30	59.29
May	24.59	54.11	23.71	51.51	27.43	59.64
June	24.29	52.86	24.17	52.36	27.42	59.57
July	24.86	53.92	24.38	52.88	28.08	58.46
August	25.63	55.36	24.23	52.52	28.94	58.37
September	...	...	23.88	51.52	26.95	58.26
October	...	...	23.40	50.57	26.62	57.59
November	...	...	22.70	49.07	26.12	56.64
December	...	...	22.21	48.03	25.46	55.10
Year	...	...	24.00	52.16	27.11	58.95

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

Average Prices of Copper.

Month.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1902.	1903.	1902.	1903.	1902.
January	12.150	11.053	12.361	11.322	53.52	48.43
February	12.778	12.173	12.901	12.378	57.34	55.16
March	14.416	11.882	14.572	12.188	63.65	53.39
April	14.454	11.618	14.642	11.986	61.72	52.79
May	14.435	11.856	14.618	12.226	61.73	54.03
June	13.942	12.110	14.212	12.360	57.30	53.93
July	13.094	11.771	13.341	11.923	56.64	52.89
August	12.962	11.404	13.159	11.649	58.44	51.96
September	...	11.480	...	11.760	...	52.68
October	...	11.449	...	11.722	...	52.18
November	...	11.288	...	11.553	...	51.08
December	...	11.430	...	11.569	...	50.95
Year	...	11.626	...	11.887	...	52.46

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 Metals per lb., New York.

Month.	Tin.		Lead.		Spelter.	
	1903.	1902.	1903.	1902.	1903.	1902.
January	28.33	23.54	4.075	4.000	4.865	4.27
February	29.43	24.07	4.075	4.075	5.043	4.15
March	30.15	26.32	4.442	4.075	5.349	4.28
April	29.81	27.77	4.567	4.075	5.550	4.37
May	29.51	29.85	4.225	4.075	5.639	4.47
June	28.34	29.36	4.310	4.075	5.697	4.96
July	27.68	28.38	4.075	4.075	5.662	5.27
August	28.29	28.23	4.075	4.075	5.725	5.44
September	...	28.60	...	4.075	...	5.49
October	...	28.07	...	4.075	...	5.38
November	...	25.68	...	4.075	...	5.18
December	...	25.68	...	4.075	...	4.78
Year	...	26.79	...	4.060	...	4.84

NOTE.—The average price of spelter in St. Louis for the month of January, 1903, was 4.689c. per lb.; for February, 4.681c.; for March, 5.174c.; for April, 5.375c.; for May, 5.469c.; for June, 5.537c.; for July, 5.507c.; August, 5.55c.

ASSESSMENTS.

Name of Company.	Loca-tion No.	Delinq.	Sale.	Am't
Albion	Utah	Sept. 23	Oct. 10	.04
Bullion	Utah	Sept. 23	Oct. 14	.05
Caledonia	Utah	Sept. 30	Oct. 21	.15
Challenge Con.	Utah	Sept. 15	Oct. 6	.10
Chollar	Utah	Sept. 17	Oct. 8	.10
Crown Point	Utah	Oct. 7	Oct. 28	.10
East Sierra & Nevada	Utah	Sept. 23	Oct. 10	.05
Hale & Norcross	Utah	Aug. 31	Sept. 30	.10
Julia Con.	Utah	Oct. 6	Oct. 29	.03
Mexican	Utah	Sept. 24	Oct. 15	.10
Omaha Con.	Cal.	Oct. 10	...	.66 1/2
Ophir	Utah	Sept. 15	Oct. 5	.15
Potosi	Utah	Sept. 14	Oct. 6	.10
Reamer Con.	Cal.	Oct. 5	...	.10
Silver Coin	Utah	Oct. 1	Oct. 8	.01
Swansea	Utah	Sept. 21	Oct. 8	.15
Union Con.	Utah	Sept. 23	Oct. 12	.10
Utah Con.	Utah	Oct. 8	Oct. 29	.10

DIVIDENDS.

Name of Company.	Date.	Per Share.	Total.	Total to Date.
*Bartolome de Medina, Mex.	Sept. 30	10.68	1,365	75,713
Calumet &				

STOCK QUOTATIONS

NEW YORK.

Table of stock quotations for New York, listing companies like Alice, Mont., Amalgamated c., Mont., Anaconda, Gold Colo., Best & Belcher, Nev., etc., with columns for Par Val, Shares Listed, and prices for Sept. 9-15.

Total sales 154,830 shares. † Ex-Dividend.

COLORADO SPRINGS (By Telegraph).

Table of stock quotations for Colorado Springs, listing companies like Acacia, Am. Con., Anaconda, Blue Bell, Cripple Creek Con., etc., with columns for Sept. 14 and Sept. 15 prices.

COLORADO SPRINGS, COLO.*

Table of stock quotations for Colorado Springs, listing companies like Acacia, Am. Con., Anaconda, Ben Hur, Blue Bell, C. C. & N., etc., with columns for Sept. 5, Sept. 7, Sept. 8, Sept. 9, Sept. 10, and Sept. 11 prices.

*Colo. Springs Mining Stock Exchange. All mines are in Colorado. Total sales 101,887 shares.

SAN FRANCISCO (By Telegraph).

Table of stock quotations for San Francisco, listing companies like Belcher, Best & Belcher, Caledonia, Challenge Con., Chollar, Confidence, etc., with columns for Shares Issued and September 14-15 prices.

COAL, IRON AND INDUSTRIAL STOCKS.*

Table of stock quotations for Coal, Iron and Industrial Stocks, listing companies like Allis-Chalmers, U. S., Am. Agr. Chem., U. S., Am. Agr. Chem., U. S., etc., with columns for Par Val, Shares Issued, and prices for Sept. 9-15.

† Ex-dividend. Total sales 288,305 shares.

BOSTON, MASS.*

Table of stock quotations for Boston, listing companies like Adventure Con., c., Alouez, U. S., Am. Gold Dredging, Am. Z. L. & Sm., Anaconda, Arcadian, c., Arnold, Atlantic, c., etc., with columns for Par Val, Shares listed, and prices for Sept. 9-15.

† Ex Dividend. ‡ Assessment Paid. Total sales, 112,491 shares.

SAN FRANCISCO.*

Table of stock quotations for San Francisco, listing companies like Central Eureka, Colehan, Esperanza, Gipsy Queen, Hannaph, MacNamara, etc., with columns for Location, Capitalization, and prices for Sept. 4-10.

Board not in Session. September 7, 8, 9. Total sales 62,750 shares.

STOCK QUOTATIONS

MEXICO*

Aug 28

Table with columns: Name of Company, Shares Issued, Last div'd, Prices (Bid, Ask). Includes companies like Durango, Guanajuato, Guerrero, Hidalgo, and San Luis Potosi.

Table with columns: Name of Company, Shares Issued, Last div'd, Prices (Bid, Ask). Includes companies like Mexico, Michoacan, Nuevo Leon, Zacatecas, and San Luis Potosi.

*Values are in Mexican currency.

LONDON.

Sept 4

Large table with columns: Name and Country of Company, Shares Issued, Par value, Latest dividend (Amt, Date), Quotations (Buyers, Sellers). Includes companies like Alaska-Treadwell, Anaconda, and various European firms.

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver. Ex-Dividend.

TORONTO, ONT.*

Sept. 12.

Table with columns: Name of Company, Par val, Prices (High, Low), Sales. Includes companies like Black Tail, Cariboo, and Dominion S. & I.

Total sales, 1,100

SALT LAKE CITY.*

Sept. 12.

Table with columns: Name of Company, Par Val, Shares, High, Low, Sales. Includes companies like Ajax, Butler Liberal, and Mammoth.

*By our Special Correspondent. All mines are in Utah. Total sales, 331,085 shares.

PHILADELPHIA, PA *

Table with columns: Name and Location of Co., Par val, Sept. 9, Sept. 10, Sept. 11, Sept. 12, Sept. 14, Sept. 15, Sales. Includes companies like Am. Alkali, Am. Cement, and U. S. Steel.

Total sales 27,084

LONDON (By Cable.)*

Table with columns: Name of Company, Sept. 8, Sept. 15, Name of Company, Sept. 8, Sept. 15. Includes companies like Anaconda, British South Africa, and Jagersfontein.

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS.

Aug 27

Table with columns: Name of Company, Country, Product, Capital Stock, Par value, Latest divs., Prices (Opening, Closing). Includes companies like Alameda, Bolco, and Canadian Am.

ST. LOUIS, MO.

Sept. 12.

Table with columns: Name, Par Val, Shares, Prices (Bid, Ask), Name, Par Val, Shares, Prices (Bid, Ask). Includes companies like Am.-Nettie, Columbia Lead, and Granite Bimet.

*By our Special Correspondent.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—		BARIUM		GRAPHITE—Am. f.o.b. Prov.		PAINTS AND COLORS—	
	Cust. Meas. Price.		Cust. Meas. Price.		Cust. Meas. Price.		Cust. Meas. Price.
Carborundum, f.o.b. Niagara	32.00	Sulphate (Blanc Fixe)	ib.	Idence, R. I., lump	sb. ton	Metall. brown	sh. ton
Falls, Powd., F. F. F. F.	lb. \$0.08			Pulverized	"	Red	"
Grains	.10	BARYTES—		Am. pulv., other than R. I.	"	Ocher, Am. common	"
Corundum, N. C.	.07 @ .10	Am. Crude, No. 1	sh. ton	f. o. b., New York	"	Best	"
Chester, Mass.	.04 1/2 @ .05	Crude, No. 2	"	Best flake	"	Dutch, washed	lb.
Barry's Bay, Ont.	.07 1/2 @ .09 1/2	Crude, No. 3	"	German, com. pulv.	ib.	French, washed	"
Mont. car-lots, f.o.b. Chicago	.07 @ .07 1/2	Floated	"	Best pulverized	"	Orange mineral, Am.	"
Crushed Steel, f.o.b. Pittsburg	.05 1/2	Foreign gray	"	Ceylon, common pulv.	"	Foreign, as to make	"
Emery, Turkish flour in kegs	.03 1/2	Snow white	"	Best pulverized	"	Paris green, pure, bulk	"
Grains, in kegs	.05 @ .05 1/2	Floated	"	Italian, pulv.	"	Red lead, American	"
Naxos flour, in kegs	.03 1/2	BAUKITE—Ga. or Ala. Mines:		Gypsum—Ground	sh. ton	Foreign	"
Grains, in kegs	.05 @ .05 1/2	First grade	lg. ton	Fertilizer	"	Turpentine, spirits	gal.
Chester flour, in kegs	.03 1/2	Second grade	"	Rock	ig. ton	White lead, Am., dry	lb.
Grains, in kegs	.05 @ .05 1/2	BISMUTH—Sublimate	lb.	English and French	"	American, in oil	"
Peekskill, f.o.b. Easton	.01 1/2	Subcarbonate	"	INFUSORIAL EARTH—Gr'd.		Foreign, in oil	"
Pa., flour, in kegs	.02 1/2	BITUMEN—"B"	"	American best	"	Zinc, white, Am., ex. dry	"
Grains, in kegs	.02 1/2	"A"	"	French	"	Foreign, red seal, dry	"
Crude, ex-ship N. Y.; Abbott (Turkey)	lg. ton 26.50 @ 30.00	BONE ASH	"	German	"	Green seal, dry	"
Kuluk (Turkey)	22.00 @ 24.00	BORAX	"	IODINE—Crude	100 lbs.	POTASH—	
Naxos (Greek) h. gr.	26.00	BROMIDE—Bulk	"	IRON—Muriate	lb.	Castile, ordinary	"
Garnet, as per quality	sh. ton 25.00 @ 35.00	CADMIUM—Metallic	"	Nitrate, com'l.	"	Elect. (90%)	"
Pumice Stone, Am. Powd.	lb. .01 1/2 @ .02	Sulphate	100 lbs.	True	"	POTASSIUM—	
Italian, powdered	.01 1/2	CALCIUM—Acetate, gray	"	Purple-brown	"	Bicarbonate cryst.	"
Lump, per quality	.04 @ .40	" brown	"	Venetian red	"	Powdered or gran.	"
Rottensone, ground	.02 1/2 @ .04 1/2	Carbide, ton lots f.o.b. Niagara Falls, N. Y.	for Jersey City, N. J.	Scale	"	Bichromate, Am.	"
Lump, per quality	.06 @ .20	Chloride	100 lbs.	KAOLIN—(See China Clay.)		Scotch	"
Rouge, per quality	.10 @ .30	CEMENT—		KRYOLITH—(See Cryolite.)		Bromide	"
Steel Emery, f.o.b. Pittsburg	.07	Portland, Am., 400 lbs.	bbi.	LEAD—Acetate, white	"	Carbonate (20 @ 85%)	"
ACIDS—		Foreign	"	Brown	"	Chlorate, powd.	"
Boracic, crystals	.10 1/2 @ .11	" Rosendale," 300 lbs.	"	Nitrate, com'l.	"	Crystals	"
Powdered	.11 1/2 @ .11 3/4	Slag cement	"	gran.	"	Chromate	"
Carbonic, liquid gas	.12 1/2	CERESINE—		Finishing	"	Cyanide (98 @ 99%)	ig. ton
Chromic, crude	.20	Orange and Yellow	ib.	LIME—Com., abt. 250 lbs. bbl.		Kainit	"
Hydrofluoric, 30	.03	White	ib.	MAGNESITE—Greece	"	Manure salt, 20%	100 lbs.
48%	.05	CHALK—Lump, bulk	sb. ton	Crude (95%)	lg. ton	D'le Manure Salt, 48 @ 53%	"
60%	.11	Ppt. per quality	lb.	Calcined	sb. ton	Muriate, 80 @ 85%	"
Sulphurous, liquid anhy.	.10 @ .20	CHLORINE—Liquid	"	Bricks, best imp., f.o.b. N. Y.	M.	95%	"
f.o.b. Bound Brook, N. J.	.06	Water	"	domes., per qual., f.o.b. Pittsburg	"	Permanganate	lb.
ALCOHOL—Grain	gal. 2.39 @ 2.40	CHROME ORE		MANGANESE—		Russiate, yellow	"
Refined wood, 85 @ 97 1/2	.50 @ .55	(50% cb.) ex-ship N. Y.	lg. ton	Carbonate, light, fine pd.	ib.	Red	"
Purified	1.25 @ 1.30	Bricks f.o.b. Pittsburg	M	Blocks	"	Sulphate, 90%	100 lbs.
ALUM—Lump	100 lbs. 1.75	CLAY, CHINA—Am. com., ex-dock, N. Y.	lg. ton	Chloride, com'l.	"	Sylvanit	unit
Ground	1.85	Am. best, ex-dock, N. Y.	"	Fused	"	QUARTZ—(See Silica.)	
Porous	1.00	Englsh, common	"	Nitrate	"	SALT—N. Y. com. fine 280 lbs bbl.	72 @ 1.18
Powdered	3.00	Best grade	"	Sulphate	100 lbs.	N. Y. agricultural	sh. ton
Chrome, com'l.	2.75 @ 3.00	Fire Clay, ordinary	sb. ton	MANGANESE—		SALTPETRE—Crude	100 lbs. 3.30
ALUMINUM—		Best	"	Crude powd.	"	Refined	4.00 @ 4.50
Nitrate	ib. 1.50	Slip Clay	"	70 @ 75% binoxide	lb.	SILICA—Best foreign	lg. ton 10.00 @ 11.00
Oxide, com'l, common	.06 1/2	COAL TAR PITCH	gal. .08	75 @ 85% binoxide	"	Ground quartz, ord.	sb. ton 6.00 @ 8.00
Best	.20	COBALT—Carbonate	lb. 1.75	85 @ 90% binoxide	"	Best	12.00 @ 13.00
Pure	.80	Nitrate	"	90 @ 95% binoxide	"	Lump quartz	"
Hydrated	100 lbs. 2.60	Oxide - Black	"	Carbonate	"	Glass sand	"
Sulphate, com'l.	1.25 @ 1.50	Gray	"	Chloride	"	SILVER—Chloride	oz. .65
AMMONIA—		Small, blue ordinary	"	Ore, Foreign	unit	Nitrate Crystals	"
Aqua, 18"	ib. .03	Best	"	Domestic, 1st quality	"	Oxide	"
18"	.03 1/2	COPPERAS—Bulk	100 lbs. .47 1/2	MARBLE—Flour	sb. ton 6.00 @ 7.00	SODIUM—	
20"	.03 3/4	In bbls.	.52 1/2	MERCURY—Bichloride	lb.	Bicarb. ord., bulk f.o.b. wk's.	100 lbs.
28"	.07 1/2	COPPER—Carbonate	lb. 1.18 @ 1.19	MICA—N. Y. gr'd, coarse	sb. ton 33.00 @ 38.00	Foreign, f.o.b. N. Y.	"
AMMONIUM—		Chloride	"	Fine	ib.	Bichromate	lb.
Carbonate, lump	" .07 1/2	Nitrate, crystals	"	Sheets are sold as to size and quality.	"	Carbonated ash, high test, in bags, f.o.b. works	100 lbs.
Powdered	" .08 1/2	Oxide, com'l.	"	MINERAL WOOL—		Foreign, f.o.b. N. Y.	"
Muriate	" .05 1/2	CRYOLITE	"	Slag, ordinary	sb. ton	Canstic, 6 @ 7%, f.o.b. wk's.	"
Lump	" .09	EXPLOSIVES—		Selected	"	Foreign, f.o.b. N. Y.	"
Nitrate, white pure (99%)	" .12	Blasting powder, A.	25-lb. keg .65	Rock, ordinary	"	Chlorate, com'l.	"
Phosphate, com'l.	" .09	Blasting powder, B.	" 1.40	Selected	"	Hyposulphite, Am.	"
Pure	" .12	"Rackarock," A.	ib. .25	NICKEL Oxide, No. 1	lb. 1.00	German	"
ANTIMONY—Glass	" .30 @ .40	"Rackarock," B.	" .18	No. 2	"	Nitrate, spot	"
Needle, lump	" .05 1/2 @ .06	Judson R.R. powder	" .10	Sulphate	"	Sublimates	lb.
Powdered, ordinary	" .05 1/2 @ .07 1/2	Dynamite (20% nitro-glycerine)	" .13	Oils—Black, reduced 29 gr.	gal. .13 @ .13 1/2	Peroxide	"
Oxide, com'l white, 95%	" .03 1/2	(30% nitro-glycerine)	" .14	25 @ 30, cold test	"	Phosphate	"
Com'l white, 95%	" .12	(40% nitro-glycerine)	" .15	15, cold test	"	Prussiate	"
Com'l gray	" .07	(5% nitro-glycerine)	" .16 1/2	Zero	"	Sai soda, f.o.b. works	100 lbs.
Sulphuret, com'l.	" .16	(8% nitro-glycerine)	" .18	Summer	"	Foreign, f.o.b. N. Y.	"
ARSENIC—White powd.	" .03 @ .03 1/2	(7% nitro-glycerine)	" .21	Cylinder, dark steam ref.	"	Silicate, conc.	lb.
Red	" .06 1/2 @ .06 3/4	Glycerine for nitro (32-2-10° Be.)	12 1/2 @ 12 3/4	Dark, filtered	"	Com'l	"
ASPHALTUM—		FELDSPAR—Ground	sb. ton 8.00 @ 9.00	Light, filtered	"	Sulphate, com'l.	100 lbs.
Ventura, Cal.	sb. ton 32.00	FLINT PEBBLES—Dan. Best	lg. ton 14.75	Extra cold test	"	Sulphide	lb.
Cuban	lb. .01 1/2 @ .03 1/2	French, Best	" 11.75	Gasoline, 88 @ 90	"	Sulphite crystals	"
Egyptian, crude	" .05 1/2 @ .06	FLOURSPAR—		Naptha, crude, 68 @ 72	bbi. 12.40	SULPHUR—Roll	100 lbs. 1.85
Trinidad, refined	sb. ton 35.00	Am. lump, 1st grade	sb. ton 14.40	"Stove"	gal. .15	Flour	" 1.90
San Valentino (Italian)	lg. ton 16.00	2d grade	" 13.90	Flowers, sublimed	" 2.15	TALC—N. C., 1st grade	sb. ton 20.00
Seysse (French), mastic	sh. ton 21.00	Gravel and crushed, 1st gr.	" 13.40	TALC—Fibrous, best	100 lbs. 10.25	French, best	" 2.00
Gilsonite, Utah, ordinary	lb. .03	2d grade	" 12.40	Italian, best	" 2.25	TAR—Regular	bbi. 2.70
Select	" .06 1/2	Ground, 1st grade	" 17.30	TIN—Crystals	lb. 2.24 @ 2.3	Oil, bbl.	4.70
BARIUM—		Ground, 2d grade	" 16.50	Oxide	"	TIN—Oxide	" 2.25 @ 3.00
Carb. Lump, 80 @ 90%	sb. ton 25.00 @ 27.00	Foreign, lump	" 8.00 @ 12.00	URANIUM—Oxide	" 2.25 @ 3.00	ZINC—Metallic, cb. pure	" .07 @ .09 1/2
92 @ 98%	" 26.00 @ 29.00	Ground	" 11.50 @ 14.00	ZINC—Carbonate, ppt.	" .02 1/2	Chloride so ution, com'l.	" .02 1/2
Powdered, 80 @ 90%	ib. .01 1/2 @ .02	FULLER'S EARTH	100 lbs. .80	Chloride granular	" .15	Dust	" .04 1/2 @ .04 3/4
Chloride, com'l.	100 lbs. 1.67 1/2 @ 1.76			Sulphate	" .02 1/2 @ .02 3/4	THE RARE EARTHS.	
Chem. pure cryst.	lb. .05			BORON—Nitrate	lb. \$1.50	CALCIUM—Nitrate	" .60
Nitrate, powdered	" .05 1/2			CALCIUM—Tungstate (Scheelite)	" .60	CERIUM—Nitrate	" 10.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.