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MR. F. G. CORNING has gone on a professional trip to South America that will involve an absence of some months. He may be addressed in the mean time, care of G. H. BENJAMIN & Co., No. 234 Broadway, or J. HAYS HAMMOND, mining engineer, No. 56 Wall street, city.

As we reported last week, steel rails have dropped down to \$30 at mill, or rather that figure was openly announced after it had probably formed the basis, practically, of a number of secret transactions. Such a figure of course means a heavy loss to all those mills that are not exceptionally situated in regard to their supplies of raw material. Works possessing their own ore mines, their own furnaces, and their own collieries may be able to weather the storm; but those that are dependent on purchased pig, whether it is domestic or imported, can not expect to live unless they use raw material that is not quite up to the mark. We are informed that one establishment is almost exclusively blowing pig con-

taining a notoriously large percentage of sulphur. The suggestion is made in some quarters that it would be good policy to reduce output by agreeing to twelve instead of eight-hour shifts.

RESTRICTING THE ANTHRACITE OUTPUT.

Since "monopoly" has become one of the favorite cries of the disaffected, it is a pet theme to denounce the policy of the anthracite coal companies and to insist that they are combining to rob consumers and reap exorbitant profits. Some assert, every time a stoppage is announced, that it is another confession of weakness, and make it a pretext for a renewed attack upon the properties. It may be conceded that the necessity for restriction is a proof that the market will not take all the coal that can be produced; but that is far from creating an artificial scarcity in order to force high prices. It is true that the coal companies have occasionally laid themselves open to this charge, and we have repeatedly protested against such a course, to which the outside public, however, attach more importance than the facts in the case warrant. In reality, persistent adherence to a policy of restriction is the only salvation for the coal companies. Only those who have intimate relations with the management of some of the companies have any conception of the hardships of one kind or another which the majority of the interests must submit to, for the general good. It is highly creditable to those who have been at the head of a trade so constantly menaced by danger that they have often set aside weighty considerations affecting the welfare of the enterprises under their immediate care, to agree upon a general policy protecting all interests. No one single interest has suffered so much by carrying out faithfully the spirit and the letter of the agreement entered into as the Philadelphia & Reading Company, and we venture to say that its fidelity to the combination has been one of the leading causes of its recent trouble. Had it been able to provide for a reduction of its output in a different way, so as to meet the demands of its trade, without the heavy expenses incurred in the present system, its difficulties would have been much modified. The Reading has a very heavy line trade, fully 60 per cent of its tonnage being thus absorbed, while about 40 per cent, during full-time work, reaches tide-water competitive markets. As soon as restriction is ordered, the Reading Company finds it difficult to provide fully even for the former branch of its business, and is often in a position where it can not begin to fill its orders for tide-water shipment. Most of the other companies place only a comparatively small tonnage along their own lines. Therefore the Reading Company, while it is the heaviest producer, is the one least benefited and the most seriously affected by half-time work. Another feature of the present system of restriction by stoppage at specified periods grows out of the attitude of the Pennsylvania Railroad Company. Knowing that the other companies are not in a position to enforce a demand for its co-operation in reducing the output, by adopting extreme measures, that company has persistently held aloof from the combination. It has reaped the advantages of restriction without an equivalent on its part. A considerable portion of its tonnage is special coals from the Lykens Valley and Shamokin districts. Its only competitor on these coals is the Reading Company, which is placed in the peculiar position, by these stoppages, of at times abandoning the market on these special coals to its independent rival.

While the case of the Reading Company is quoted as a striking example of the drawbacks of the present system of curtailment, there is not a single one of the others whose interests are not in some way injuriously affected by it. On broad, general grounds, the method of stopping the entire mining, preparation, and shipment of anthracite coal is an extremely costly one. The anxiety of all the producers to distribute general expenses of all kinds by a heavy tonnage has led to a development far beyond the present needs of the market. The aim of the managers has been to crowd a production into as short a time as possible. This has carried the capacity to a point where it has reached 850,000 tons in one week, or equal to forty millions of tons of coal annually, which is more than will be required for some years to come, and far exceeds the present demand. It will be readily understood that this reserve capacity is not only a constant danger, but also a continuous source of expenditure. Any one acquainted with mining matters will appreciate the fact that it takes a heavy annual outlay to pump, ventilate, and timber the mines; to keep a surface plant far beyond the actual requirements in running order; to employ a large clerical staff for dispatching business; and last, though not least, to have a force of laborers and miners, alternately busy and idle, who are in a chronic state of discontent and poverty. In the aggregate, this represents a very large waste of money, which the companies themselves can not, in the long run, tolerate. It is contrary to all sound public policy, and is besides directly and largely injurious to some of the greatest and most powerful interests.

It is not surprising, therefore, that there has been some discussion of late, looking to some better method of reaching what will be generally conceded to be an end justified by the circumstances, namely, the restric-

tion of the output within the requirements of the market. With the view of throwing some light on the subject and of supplying some of the data upon which proposals for any change must be based, we have traced the growth of the trade during the past six years :

	1873.	1879.	1880.	1881.	1882.	1883.
Philadelphia & Reading RR	5,112,218	7,442,617	5,969,923	6,940,283	7,000,113	12,232,409
Central Railroad of New Jersey	2,261,979	3,325,553	3,471,141	4,085,424	4,211,652	
Lehigh Valley Railroad	3,438,318	4,405,956	4,394,533	5,721,870	5,938,740	6,271,773
Delaware, Lack. & Western RR	2,180,672	3,867,404	3,558,348	4,388,669	4,638,717	5,079,123
Delaware & Hudson Canal Co	3,432,234	3,013,117	2,674,704	3,211,496	3,203,168	3,512,912
Pennsylvania Railroad	1,362,673	1,080,443	1,864,031	2,311,993	2,332,974	2,773,419
Pennsylvania Coal Company	957,832	1,427,149	1,138,406	1,475,380	1,469,821	1,541,145
N. Y., Lake Erie & Western RR	278,132	447,782	111,095	463,230	339,511	382,194
Total	17,605,258	26,141,021	23,437,241	28,500,015	29,120,096	31,733,023

In the whole business in six years, the companies participated with the following percentages :

	1878.	1879.	1880.	1881.	1882.	1883.
Phila. & Reading RR	29.0	28.5	25.3	24.3	24.0	20.07
Central RR. of N. J.	12.9	14.6	15.0	14.3	14.5	38.5
Lehigh Valley RR	19.3	16.8	18.3	18.1	20.4	19.8
Del., Lack. & W. RR	12.4	14.8	15.1	15.4	15.9	15.9
Del. & Hudson C. Co	11.7	11.5	11.5	11.2	11.0	11.0
Pennsylvania RR	7.7	6.5	8.0	7.8	8.0	8.7
P. n. Coal Co.	5.4	5.5	5.0	5.2	5.0	4.9
N. Y., L. E. & W. RR	1.6	1.8	1.8	1.7	1.2	1.2

On the whole, it will be seen that the percentages of the different companies are fairly uniform, especially during the past three years. The matter assumes a different aspect, however, when the first five months of this year, as compared with the corresponding period in 1883, are considered.

	PRODUCTION.		PERCENTAGES.				Average per cent. 1881 to 1883.
	Five months, 1884.	Five months, 1883.	Five months, 1884.	Five months, 1883.	First quarter, 1884.	First quarter, 1883.	
Philadelphia & Reading Railroad	3,098,843	4,364,128	35.03	38.48	33.9	38.0	38.53
Central Railroad of New Jersey	2,261,979	2,318,801	19.80	20.45	19.9	21.0	20.07
Lehigh Valley Railroad	2,204,599	1,802,037	17.04	15.89	17.2	15.9	15.73
Delaware, Lack. & Western RR	1,896,629	1,243,813	10.92	10.97	10.5	11.1	11.10
Delaware & Hudson Canal Co	1,215,939	955,297	10.49	8.42	12.9	8.1	8.17
Pennsylvania Railroad	1,167,512	506,141	5.28	4.66	4.3	4.7	5.03
Pennsylvania Coal Company	506,141	127,443	1.26	1.12	1.3	1.2	1.36
New York, L. E. & Western RR	140,412						
Total	11,130,074	11,340,186	99.99	99.99			

The tonnage of the Pennsylvania Railroad increases by two points, the Delaware, Lackawanna & Western is a gainer by more than one point, while the Philadelphia & Reading drops off seriously, and the Lehigh Valley and the Pennsylvania Coal Company show a smaller decline. Since the Pennsylvania Railroad does not act in harmony with the combination, it is necessary to eliminate its tonnage to arrive at some conclusion concerning the participation of the others in the tonnage.

The following table of percentages will afford an opportunity to judge how far they have remained constant :

	Total tonnage. 1878-1884.	Percentage. 1878-1884.	Percentage. 1883.	Percentage. 5 months 1884.
Philadelphia & Reading	62,578,705	43.336	42.152	40.139
Central RR. of N. J.	30,131,191	20.866	21.612	22.129
Lehigh Valley RR	23,775,233	16.416	17.502	19.038
Del. & Hudson Canal Co	17,662,691	12.232	12.105	12.205
Pennsylvania Coal Co.	8,008,993	5.546	5.311	5.070
N. Y., L. E. & Western RR	2,314,944	1.603	1.317	1.415

With the exception of the Delaware, Lackawanna & Western, which has been forging ahead, mainly at the expense of the Reading, these figures do not reveal any great changes. The constancy of the percentages therefore removes one of the main obstacles to a plan by which allotments would be made to the different companies, at intervals which might be agreed upon, leaving it to each company how and when to provide for the tonnage accorded to it. Under the allotment plan, each company might run a part of its collieries full-time during the entire year, keep others in reserve for periods of activity, and close down unprofitable mines that are draining its resources only because every one is eager to make the best of full weeks' work. We should not then have the spectacle of constant additions to plant aggravating an evil that, for its correction, taxes constantly to the utmost the resources of producers and the good nature of the managers of the companies. There is one point in the carrying out of such a plan that we believe should be conceded. Producers of special coals, by which we mean more particularly red ash coals, which do not directly affect the general anthracite market, should be granted the privilege of excluding this product from the general allotment. By way of illustration, let us take the remainder of the current year. Let it be assumed that the market will take 30,000,000 tons of anthracite coal. Of this, say 3,250,000 tons would have to be deducted as the independent tonnage of the Pennsylvania Railroad, leaving 26,750,000 tons to the combination. Out of this, nearly 10,000,000 tons have been already brought to market by the companies in the combination during the first five months, leaving 16,750,000 tons for the next seven months. Ruling out say 750,000 tons as special coals not subject to allotment, there is a balance of 16,000,000 tons. Let us assume a

fair percentage to be as follows, then the tonnage for the next seven months and of the total for the year of the different companies would be :

	Percentages.	Tonnage. Seven mo.	Tonnage for year 1884.
Philadelphia & Reading Railroad	42.75	6,840,000	10,840,000
Lehigh Valley Railroad	21.25	3,400,000	5,600,000
Delaware, Lackawanna & Western Railroad	16.75	2,680,000	4,580,000
Delaware & Hudson Canal Company	12.25	1,960,000	3,180,000
Pennsylvania Coal Company	5.50	880,000	1,380,000
New York, Lake Erie & Western Railroad	1.50	240,000	380,000
Total	100.00	16,000,000	25,960,000

Such a distribution of the tonnage would of course involve the wise administration of a governing committee, which should make the allotments monthly, guided by the exigencies of the trade. A general plan for the year might be worked upon the basis of a minimum output, which would leave them in the position of at any time ordering an increase of production, which would undoubtedly be needed during the later and busier part of the year.

We do not believe it probable that an allotment plan on such a basis as we have outlined will be adopted for the current year. We are convinced, however, that its advantages and eminent fairness will commend it to the consideration of the managers of the coal trade as the proper plan of action for the coming year. A comparison of the present awkward and costly system with a fairer and more advantageous allotment plan can not fail to show the great advantages to all concerned of the latter.

THE COST OF PRODUCTION OF QUICKSILVER AT ALMADEN, SPAIN.

In concluding a sketch of the recent developments at the quicksilver mines at Almaden, Roman Oriol, editor of the *Revista Minera y Metalurgica*, of Madrid, gives some valuable figures covering a series of years, concerning the output, the yield, and the cost of production, which we reproduce :

Fiscal year.	Ore mined.	Ore treated.	Quicksilver produced.	
			Metric tons.	Flasks @ 34.5 kilograms.
1872-73	13,509	16,094	1,155	33,478
1873-74	13,714	16,380	976	28,287
1874-75	19,183	18,816	1,264	36,640
1875-76	19,356	17,077	1,255	36,383
1876-77	18,105	18,000	1,325	38,418
1877-78	16,960	15,410	1,406	40,747
1878-79	17,381	17,085	1,446	41,913
1879-80	14,482	16,943	1,557	45,136
1880-81	15,080	15,274	1,573	45,588
1881-82	18,809	15,248	1,592	46,137
1882-83	17,226	15,704	1,608	46,614

Fiscal year.	Average grade of ore.	Per metric ton of ore.	Cost in francs.	
			Per metric ton of quicksilver.	Per flask of quicksilver.
1872-73	7.18	68.3	1222.2	42.17
1873-74	5.96	69.8	1515.4	52.29
1874-75	6.72	52.5	1323.4	45.67
1875-76	7.34	49.2	1311.3	45.25
1876-77	7.20	53.4	1208.3	41.69
1877-78	9.12	54.8	1140.8	39.36
1878-79	8.46	53.2	1155.1	39.85
1879-80	9.19	56.7	967.0	33.37
1880-81	10.30	56.7	797.4	27.51
1881-82	10.44	50.2	866.3	29.90
1882-83	10.24	53.3	1030.0	35.34

The mining cost per metric ton of ore was made up as follows during the fiscal year 1882-83 :

Excavation	21.9 francs.	General expenses	9.4 francs.
Timbering and masonry	8.9 "	Incidental expenses	7.6 "
Pumping	0.1 "	Repairs	1.6 "
Haulage, below and above ground	3.8 "	Total	53.3

The total cost of mining and treatment figures up as follows :

	Per metric ton of quicksilver.	Per flask of 34.5 kilos.
Superintendence	104.2 francs.	3.60 francs.
Office supplies	3.8 "	0.13 "
Mining	556.7 "	18.40 "
Distillation and bottling	277.9 "	9.59 "
Repairs	17.1 "	0.59 "
Miscellaneous expenses	33.9 "	1.17 "
Hospital and church dues	21.6 "	0.74 "
Pasture for mules	10.7 "	0.37 "
Unforeseen expenses	4.4 "	0.15 "
Total	1030.0	35.34

It is therefore approximately correct to state that quicksilver costs, at the Almaden mine, 20 cents a pound.

UTILIZING THE RESIDUE OF BURNT PYRITES.—The *Revue Industrielle* reports that M. Michel Perret, of the Compagnie de Saint-Gobain, has succeeded in bringing the percentage of sulphur in burnt pyrites down to a maximum of 1.5 per cent, by roasting these pyrites in thin layers in shelf-furnaces. Hitherto, attempts made at Givors, Denain, and Anzin to use this residue in the manufacture of iron have been unsuccessful. The Terre Noire Company succeeded only in using it for the manufacture of steel that was not required to weld, the copper and the arsenic in the pyrites robbing the iron of the property to weld. In order to agglomerate the residues or "blue billy," as the English phrase it, so that they could be used in quantity in the blast-furnace, clay was first used. This process, however, was found to be too costly. Then burnt lime was tried, and that, in turn, has been abandoned for hydraulic lime, which does not require long drying. To 100 parts of the blue billy, 15 parts of hydraulic lime are added and mixed in mills. The mixture is formed into bricks in a machine. The bricks possess some strength, but they must be transported in drying-flues heated by gas, and can only be used in furnaces of moderate height.

NEW PUBLICATIONS.

MINERAL STATISTICS OF FRANCE FOR 1882. *Statistiques de l'Industrie Minière et des Appareils à Vapeur en France et en Algérie pour l'Année 1882.* 207 pages. With diagrams and two colored plates. Paris: Imprimerie Nationale. For sale by Dunod, No. 49 Quai des Grand Augustins. Price, 8 francs.

SECOND PAPER.

Pig-Iron.—The following table gives the production of pig-iron in detail in France, classified according to grade and according to fuel used :

FUEL.	(a) Forge and Bessemer. (b) Ferro-manganese. Tons.	Foundry pig. Tons.	Castings direct from furnace. Tons.	Total tons.
Coke.....	{ a 1,520,000 b 17,000 }	329,000	74,000	1,940,000
Charcoal.....	43,000	2,000	10,000	55,000
Mixed fuel.....	18,000	10,000	16,000	44,000
Total.....	1,588,000	341,000	100,000	2,039,000

As the following table proves, there was quite a steady increase of production of pig-iron during the years preceding 1882 :

Year.	Foundry and forge pig.	Direct castings.	Total.	Average price of pig.	Average price of castings.
1873.....	1,310,000	72,000	1,382,000	Francs. 132	Francs. 242
1874.....	1,328,000	88,000	1,416,000	144	198
1875.....	1,373,000	75,000	1,448,000	103	195
1876.....	1,337,000	98,000	1,435,000	93	179
1877.....	1,402,000	105,000	1,507,000	89	173
1878.....	1,429,000	92,000	1,521,000	83	163
1879.....	1,376,000	74,000	1,450,000	78	177
1880.....	1,631,000	94,000	1,725,000	85	185
1881.....	1,798,000	88,000	1,886,000	85	179
1882.....	1,939,000	100,000	2,039,000	85	185

The most important producing departments were the Meurthe-et-Moselle, with 716,000 tons; the Nord, with 255,000 tons; the Saône-et-Loire, with 178,000 tons; the Gard, with 145,000 tons; and the Ardèche, with 103,000 metric tons. Important changes are going on in the geographical distribution and the economical condition of the French blast-furnace industry. The manufacture of pig-iron is developing, on the one hand, in the east of France, where there is an abundance of cheap ores, and on the other hand at the coast, where freights favor the import of Spanish and Algerian ores. In both cases, the furnaces use foreign coal, as French fuel can not reach them at the same figure. In 1882, there were 210 furnaces in blast in France. 148 of them coke, 43 charcoal furnaces, and 19 using mixed fuel. The largest plant is the Crensat, with 8 furnaces; then the Montluçon works of the Commentry-Fourchambault; and the Mont-Saint-Martin works, with six furnaces. The average output of a coke-furnace has risen from 7600 tons in 1873 to 13,100 tons in 1882, while that of the charcoal furnaces was 1283 tons annually, and of the furnaces using mixed fuel 2311 tons. The blast-furnaces consumed 2,528,000 tons of coke, 67,000 tons of coal, and 80,000 tons of charcoal, making the fuel consumption per ton of pig 1'314 tons of coke, 1'159 tons of charcoal, and 1'416 tons of fuel, including 0'361 part of charcoal for furnaces using mixed fuel. The total consumption of ore was 4,772,300 tons, so that the average quantity required to produce one ton of pig-iron was 2'343 tons.

Wrought-Iron.—The official statistics of the production of wrought-iron are classified in accordance with two systems, one according to commercial product, the other according to metallurgical treatment. The following table gives the figures for the year 1882 :

	Merchant bar.	Rails.	Plate and sheet.	Total.
Puddled.....	778,000	27,000	138,000	939,000
Refined with charcoal.....	27,000	15,000	42,000
From old and scrap.....	80,000	12,000	92,000
Total.....	885,000	27,000	163,000	1,573,000

For a series of years, the growth and the decline of the different branches of the industry are shown in the following :

Year.	Sheet and plate.	Merchant bar.	Rails.	Total production.	Average price of merchant bar.	Average price of plate and sheet.
1873.....	Tons. 132,000	Tons. 607,000	Tons. 154,000	Tons. 893,000	Francs. 328	Francs. 447
1874.....	116,000	581,000	161,000	858,000	282	380
1875.....	124,000	627,000	11,000	870,000	256	347
1876.....	128,000	627,000	82,000	837,000	230	327
1877.....	129,000	695,000	60,000	884,000	216	309
1878.....	132,000	659,000	52,000	843,000	203	293
1879.....	137,000	680,000	40,000	857,000	204	304
1880.....	155,000	769,000	42,000	966,000	214	327
1881.....	168,000	830,000	28,000	1,026,000	208	335
1882.....	163,000	883,000	27,000	1,075,000	214	327

The Nord Department produces the bulk of the production, or 335,000 tons, followed in importance by the Haute-Marne, with 91,000 tons; the Loire, with 84,000 tons; the Ardennes, with 80,000 tons; and the Saône-et-Loire Department, with 65,000 tons. In 210 works running, there were 997 puddling-furnaces, and 146 refining-furnaces.

Steel.—The steel industry has developed quite steadily, as the following figures show :

Year.	Bessemer and open-hearth.		Other grades of steel.	Total.	Average price of rails.
	Rails.	Merchant steel.			
1873.....	Tons. 102,000	Tons. 18,000	Tons. 31,000	Tons. 151	Francs. 291
1874.....	154,000	28,000	27,000	209	259
1875.....	178,000	45,000	34,000	256	240
1876.....	181,000	30,000	31,000	242	238
1877.....	184,000	56,000	29,000	269	216
1878.....	231,000	52,000	30,000	313	218
1879.....	254,000	53,000	26,000	333	218
1880.....	280,000	80,000	29,000	389	218
1881.....	303,000	91,000	28,000	422	209
1882.....	336,000	97,000	25,000	458	199

In 1882, for the first time, the government attempted to separate the product of the Bessemer converters from that of the open-hearth furnaces, with the following results :

	Quantity.	Value per ton.
Bessemer steel :	Tons.	Francs.
Rails.....	258,600	199
Merchant steel.....	13,000	345
Sheet and plates.....	1,800	333
Total.....	273,400	207
Open-hearth steel :		
Rails.....	77,700	199
Merchant steel.....	63,300	533
Sheet.....	18,500	399
Total.....	159,500	355
Other grades of steel :		
Puddled.....	14,300	505
Cement.....	2,700	684
Crucible.....	7,900	778
Scrap reworked.....	400	626
Total.....	25,300	611
Grand total.....	438,200	281

Metals.—The statistics are limited to the production of metals and of copper mattes from metalliferous ores. They include, too, the treatment of base bullion by desilverization, but not the refining of metals or their subsequent working. The figures are given below, leaving out the base bullion simply desilverized, but including the silver obtained from it :

Gold.....	46 kilograms.
Silver.....	66,940 kilograms.
Lead (from ores).....	8,076 tons.
Copper.....	3,627 "
Copper mattes.....	450 "
Spelter.....	18,525 "
Nickel.....	30 "
Aluminium.....	2,349 kilograms.
Antimony.....	178 tons.

These metals were produced in 23 works, consuming 132,000 tons of coal, and employing 1600 workmen. The lead was produced from 15,600 tons of galena, of which 4700 tons were from French mines, Pontgibaud, in the department of Puy-de-Dôme, worked by an English company, supplying the bulk of it. The imported ores came from Greece, Spain, and principally from Sardinia. Besides these, 20,600 tons of base bullion was worked, derived chiefly from Spain.

The 41,000 tons of calamine and blende worked during the year 1882 in zinc-works were, with the exception of 6000 tons from the Gard Department, imported. More than one half of the zinc was produced at the Auby-lez-Douai (Nord) works, where the Compagnie Royale Asturienne treats exclusively Spanish calamines. The Vieille-Montagne Company, too, at its Viviez (Aveyron) works smelted almost exclusively imported ores, while the Compagnie des Zinc Français at Bousquet d'Orb (Hérault) treated the ores from the Gard Department. The average yield was about 45 per cent.

The copper ores of the Cerisier mine (Alps-Maritimes) are converted into matte on the spot. Other French ores were treated at the Eguille works (Vaucluse), mixed with Spanish, Italian, and American ores, using the Manhès process. The Biache-Saint-Waase smelting-works (Pas-de-Calais) were supplied with copper matte from Norway and rich ores from Bolivia and Chili, and Bolivian ores were smelted at the Flohrmont works (Ardennes). The bulk of the copper product is therefore derived from foreign raw materials.

The aluminium is made at Salindres, in the Gard Department, from bauxite obtained at Luc (Var), and Greenland cryolite. The nickel was turned out by the firm of Christofle at their Saint-Denis works (Seine) from New Caledonian ores, taken from an accumulated stock.

The imports and exports of the principal metals were in 1882 :

	Imports.	Exports.
Lead.....	65,369 tons.	5,301 tons.
Copper and brass.....	26,105 "	2,603 "
Zinc.....	34,167 "	4,551 "
Tin.....	5,507 "	391 "
Nickel.....	154 "	82 "
Quicksilver.....	215.9 "	6.7 "

These figures, coupled with those of the home production, show how heavy a consumer of metals France really is, taking as it did, apparently, in 1882, 68,144 tons of lead, 27,129 tons of copper, and 48,141 tons of spelter.

Boiler Statistics.—The French Department of Mines has under its charge the inspection of boilers, and collects the statistics relating to it annually. It divides them into three classes, stationary, locomotive, and marine boilers, exclusive of the navy. The following is a summary relating to the stationary boilers in France and Algiers :

	France.	Algiers.
Number of establishments.....	37,489	465
Engines.....	46,289	524
Horse-power.....	611,838	5,642
Steam-boilers.....	52,006	561
Heaters.....	5,249	31
Receivers.....	21,675	17

According to their type, the boilers are represented as follows :

With interior grate.....	28,047
Tubular with interior grate.....	18,588
Non-tubular with interior grate.....	8,932
Other types.....	1,688
	57,255

Among the different industries, the total horse-power was distributed as follows :

Metallurgical works.....	20.4 per cent.
Textile industries.....	18.6 "
Mines and quarries.....	15.5 "
Alimentary industries.....	14.9 "
Building trades.....	8.4 "
Agriculture.....	7.7 "
Chemical industries and tanneries.....	5.6 "
Paper, dyeing, and printing.....	4.3 "
State works.....	2.5 "
Miscellaneous.....	2.1 "

The locomotive boilers were 8401 in number, with 3,090,500 horse-power in France, and 172 locomotives, with 54,080 horse-power in Algiers. The French merchant marine had, in 1882, 617 steamers, with 1479 boilers of an aggregate horse-power of 365,814, while there were 543 river steamers, with 583 boilers, having a total of 32,353 horse-power. The total horse-power of all the 71,092 boilers in France and Algiers was 4,120,851 horse-power.

There were 37 boiler explosions in 1882, causing the death of 40 and the injury of 20 persons.

THE MINING BUSINESS IN THE BLUE GRASS REGION OF KENTUCKY.

Correspondence of the Engineering and Mining Journal.

An overheard remark at a large Short-Horn sale at our Fair Grounds (Richmond, Kentucky), yesterday, suggested the propriety of writing one at least of a long promised series of letters to the ENGINEERING AND MINING JOURNAL. The remark was, "that when the next dividend comes from the — mine, I will buy Short-Horns." This was said by an owner of stock in a company representing a property in Gunnison County, Colo. What a change has been wrought in a few years!

It will be doubtless a matter of some surprise to your more Eastern readers to know that, taking the average of the moneyed men present at the sale, there were more who had money, and more of it too, in Western mines than in Short-Horns. There are still others ready to invest when the opportunity offers. Singular to say, this interest in mining has been developed in the very teeth of manifest swindles and visionary schemes. The old-time prejudice against mining is gone. This little city and Lexington have passed the wild-cat, cart-before-the-horse stage, and are now ready to hear reports from competent experts. The "practical business man" miner has overdone the thing. He has not been a success. A similar fate has been the lot of the amateur mining engineer. Sherman, who, like a Gunnison editor, talks of a mine carrying a large vein of high-grade porphyry, is not expecting to be heard from any more. But notwithstanding these hopeful signs, Richmond and Lexington both rejoice in a six million dollar company. The former was rescued from bad management in time to make it, up to the present writing, a partial success and a brilliant promise. The stockholders in the Lexington six million enterprise are trying to find out how it was all done. I was appealed to by one of the sufferers to visit the property on my next trip to the West. I was willing to put it on my list for a reasonable fee, but thought I could tell, without visiting the mines, why six hundred thousand dollars of development money would not make a group of a dozen good mines pay. A useless "silver mill" absorbed a large amount, fancy prices for the mines absorbed another large amount, middle-men and lessees probably got the remainder. Many widows lost heavily by this *fiasco*, as well as quite a number of families of small means. It has given mining a black eye in the eyes of many would-be bonanza kings in Central Kentucky. The high capitalization ought to have condemned the enterprise in its incipiency. The parties who engineered the affair among our people were men of means and to the manor born. *Hinc ille lachryma*. The Richmond Company owns nine mines in the Tomichi Mining District, Gunnison County, Colorado. Its principal mine, so far, is the Legal Lender, opened on Clover Mountain, far above timber-line. It shipped quite a quantity of good ore last summer and fall, and returned to the home office some twenty-two or twenty-three thousand dollars. The snow, since November, has blockaded shipments. The nearest accessible depot is at Sargent's, on the Denver & Rio Grande Railroad, fourteen miles distant. There are stables, supply-store, banking-house, assay-office, and other buildings belonging to the company. It put up a fifteen thousand dollar dry concentrator, entirely unsuitable to the ores, at a cost to the company of thirty-three thousand dollars; but fortunately it was burned to the ground not long after erection. Owing to carelessness somewhere, the insurance, as ordered by the president, was not renewed, and when the fire occurred it had been out about a week.

I have sketched briefly this company's history to show how much bad management discredits the mining industry. The failure of the Lexington six million was due to no deficiency in ore-supply; for I am credibly informed that, since the "bust," some one in three months' time has cleared \$16,300 on a lease of 300 feet of one of the claims owned by the company. Besides this company, there are in process of organization about three others in Richmond and Lexington taken together. Both places are wrestling with a two million organization, and are selling stock with encouraging rapidity, while a proposition to organize on a capitalization of \$200,000 on a known property, of a given output per day, of an established grade and quality of ore, hangs fire. The latter would have succeeded but for the too eager desire of the promoters of the sale of the property to close the trade. They started out by asking \$50,000, and ended by agreeing to take \$30,000. In the start they would not grant but sixty days, or until the middle of May, when no one could conveniently visit the claim. At the close, they agreed to give until the middle of August. Necessarily, this sort of dealing created suspicions that would not down; consequently, there will probably be a failure to close trade, even at the last figures and the latest date.

Well, I have given you an inkling, or rather a penciling of how mining matters are among Short-Horn Blue Grass mule men. I expect to start, on the 23d inst. for Colorado, and will jot down whatever may appear to me to be of interest to the general reader of mining news. I expect to abide some time in that paradise of geologists, the Elk Mountain country. I shall visit the Red Mountain country, where they find mines already shafted and galleried, with "carbonate sands" already heaped up on floors of subterranean chambers, and where paupers refuse millions for claims they have had staked off but a fortnight or so, etc. Also, I am to revisit Lake City, and several mines around the city, and several up Henson Creek, near the city. T.

GOLD IN FOSSILIFEROUS LIMESTONE IN THE JUDITH MOUNTAINS, MONTANA.

Written for the Engineering and Mining Journal by W. M. Courts, M.E., Detroit, Mich.

The district where the above ore has been found is called the Warm Spring Mining District or Maginnis country. The Judith Mountains form one of the numerous small groups or ranges rising abruptly from the rolling high table-lands between the Yellowstone and Missouri rivers, and are about one hundred miles north of Custer station, Northern Pacific Railroad, on the Yellowstone. The highest peaks are about 2000 feet above the plains, or 6500 feet above the sea.

The gulches are narrow and the streams small, fed by springs or melting snow. About four miles from the mines, are warm springs, with a fine body of water. The mountains are steep slopes or abrupt bluffs of limestone or trap. They are partly well timbered, but much has been destroyed by fires. The limestone is full of caves, forming good retreats for the bears, which are still quite plenty.

The formation appears to be the Lower Silurian, closely resembling the lower beds of the upper copper rocks of the north shore of Lake Superior, while the plains with the coal-beds are much younger. The coal varies from a poor anthracite through fine soft coals to poor lignites. As yet, no coking coal has been found near, but undoubtedly it will be when the field is more carefully looked over.

The rocks are limestone, with encrinite stems and other fossils, dolomite banded with chert, black and green slates, sandstones, columnar trap, porphyritic trachyte, and probably diorite. A marked characteristic of the rocks of this district is the perfect crystallization of the feldspar and quartz. The separate crystals weather out, and may be found perfect, both single and twinned, simple and modified. One rock seems an aggregate of perfect feldspar crystals, like grains of rice, with but little cement. Through this rock, like plums in a pudding, are larger double pyramid crystals of quartz, perfect but not clear. In another rock, the feldspar crystals are several inches long, but quite narrow, in a green matrix, making a beautiful variegated stone. Pure white marble is also found, and veins of saltpeter, but whether of value has not yet been determined. The main porphyry belt, which seems to have been the mineralizer, has the appearance of rhyolite, but is much altered by kaolinization, especially near the ore-deposits. The best of these deposits are on the contacts next the limestone. The dolomite, as in Lake Superior, seems to have a bad effect on the ore, the rich silver minerals being replaced by low-grade lead and iron.

The gulches carry gold in paying quantities, and are washed while water lasts; but, owing to the small size of the streams, much of the ground is unavailable. The gold is coarse; the largest nugget was \$83. Late discoveries have opened up some very rich ground and promise of more fine leads.

The only mine that is developing except in prospecting is the property of the Maginnis Mining Company, which has just been incorporated by Messrs. Hauser & Holter, of Helena, with a capital of \$500,000. They prospected it last year with a small two stamp-mill, losing two thirds of the gold and yet doing very well. Their tailings were about \$60, so the ore probably averaged \$100, though there is much that is of lower grade. This season, the old mill is to be enlarged and completed with better machinery.

The ore is a "soft carbonate," so called, but really has but occasional spots of lead carbonate or galena. In parts of the mine, the ore-body is large, fifteen or twenty feet across. This is the case at the bottom of the deepest shaft, some 200 feet from the outcrop. Specimens can be had of any value that show but little free gold, but on firing are covered with beads. The small bunches of galena are rich in silver, assays running up to nearly 200 ounces.

The Kentucky Favorite and Spotted Horse, east of this property, belong to the same vein system. These are only prospects as yet; but promise to make fine mines, when more opened. The ore-body is of good size, and rich so far as opened.

The ore of the former carries grains of sylvanite probably, as tests show tellurium and gold with a little silver.

On the Spotted Horse, the limestone crops out, at the side of the vein, in bluffs reaching down to the gulch. It has the appearance of having been mixed while in a semi-fluid state with patches of the gangue of the vein, which has somewhat altered the limestone and distorted the encrinite stems, which still in some cases are quite perfect. Not only the gangue, but also the simple limestone is full of cavities, evidently pseudomorphs of crystals, filled with a spongy cement gold of the appearance of iron oxide, but which under the knife welds together and polishes. These cavities have the appearance of being the same tellurium mineral as in the Kentucky, from which may also be driven off by the blow-pipe the tellurium, etc., leaving a mass of spongy gold, which bubbles out and then melts to a bead of nearly pure gold, bright yellow. The ore assays about half and half silver and gold, but the former may be in other minerals. There is an immense amount of this limestone. One piece not showing on the exterior free gold to the eye assayed some \$500. Picked samples will run any thing needed. As no work has been done on the bluff, it is not known how far the gold extends into the limestone; but with hand-hammers, all that can be broken off shows more or less gold anywhere on the surface of the bluff that shows the action of the gangue. The fossils have been distorted so much that they might not be recognized in hand specimens; but taking the hill-side and weathered faces, they can be seen in every state to perfection.

This gold has been found by assay, if not free, for 1000 feet along the face of the bluff where uncovered.

There are many other fine claims not yet developed beyond the prospect stage. There are also large bodies of "iron carbonates" that carry gold and silver, and offer inducements to explore these contacts with every promise of success. The Montana has already proved that these efforts may be successful.

Producing rich galena and carbonates are the War Eagle, St. Paul, and Black Bird. The Florence, Comet, Aline, Silver Star, and Golden Terry are valuable claims, with sulphuret, arsenical, and antimonial ores of high grade. The Bamboo Chief is gaining a reputation for high-grade ore. There are large deposits of low-grade galenas and carbonates, fluxes of fine quality, plenty of fuel, and large streams of water below the mines. The country around is very favorable for stock-raising, and is fast filling up with ranches, driving back the game, which was formerly abundant, and still offers good sport, with once in a while a little excitement in a brush with some old silver-tip bear.

It is the same old story of gullible inexperience, an extravagant plan, with too little capital, multiple managers, great expectations, and poor results. Debts and attachments close up what might have been a success had the mine been carefully opened before the great expense of machinery was incurred.

Parties wishing to get interests for developing prospects would do well to look over the opportunities offered in this camp. It is at present off the line of travel, and through its misfortunes has been set back, but it seems to me to be on the eve of a prosperous future on a solid basis.

The miners and citizens of Maiden have started a reduction company, with the praiseworthy intention of putting their own shoulder to the wheel. What the camp needs is a company with experience and capital sufficient to wait for and aid development.

RUSSELL'S IMPROVED PROCESS FOR THE LIXIVIATION OF SILVER ORES.—IX.*

With Critical Remarks on other Methods of Copper, Silver, and Gold Extraction.

By C. A. Stetefeldt, New York City.

(CONCLUDED.)

POSTSCRIPT TO § 8.

The solubility of lead sulphate increases materially with the temperature of the solution. In exposing 20 gm. PbSO₄ to 1000 c.c. of a 5 per cent sodium hyposulphite solution for one hour, 0.048 parts of PbSO₄ per unit of Na₂S₂O₃ + 5aq. were dissolved at 21 degrees C., while the solubility coefficient at 49 degrees C. was 0.095.

POSTSCRIPT TO § 10.

Influence of Sodium Sulphate.—The presence of this salt depresses the solvent energy of sodium hyposulphite for silver chloride. In experimenting with solutions containing 1½ per cent of Na₂S₂O₃ + 5aq., their solvent energy was diminished 6 per cent by addition of 2 per cent of sodium sulphate, and 8 per cent by addition of 5 per cent of this salt.

The solvent energy of potassium hyposulphite is, however, increased by sodium sulphate. This, no doubt, is based upon the formation of potassium sulphate and sodium hyposulphite, which latter is a much better solvent for silver chloride than the potassium salt, as will be found in § 26.

Influence of Caustic Alkalies and Alkaline Earths.—Mr. Russell found that the presence of a very slight quantity of a caustic alkali or an alkaline earth in a hyposulphite solution has a very deleterious effect on the solubility of silver chloride and other silver combinations. This is not the case with carbonates of the alkalies. The presence of one tenth of one per cent of caustic soda is sufficient to depress the results in working on a large scale from 6 to 17 per cent, if extra-solution is used, and as much as 80 per cent if ordinary solution alone is used. If tailings from such defective lixiviation are subsequently treated in the laboratory with more concentrated sodium hyposulphite solutions, in some cases only a small percentage of the silver can be extracted. The same effect is produced by caustic lime. In adding one half of one per cent of caustic lime to a sodium hyposulphite solution, the percentage of silver extracted from Ontario ore was depressed from 11 to 24 per cent. These facts seem to have been overlooked so far.

A sample of roasted Ontario ore, which yielded by lixiviation tests with ordinary solution 86.5 per cent, and with extra-solution 93 per cent of its silver, was first leached with water, and then treated for thirty-six hours with sodium hyposulphite solutions of 2½ per cent concentration, to which various amounts of caustic soda had been added.

Per cent of caustic-soda added.	Per cent of the silver extracted.
0.2	6.5
0.5	3.7
1.0	4.8
5.0	5.9

We note here that, after the maximum effect has been produced, an increase of caustic soda is actually beneficial. A sodium hyposulphite solution of 2½ per cent concentration, saturated with caustic lime, extracted from the same ore 60 per cent of its silver. In case lixiviation tests are made without first leaching with water, the effect of caustics is materially lessened by their action upon sulphates and chlorides of copper, zinc, and manganese.

From numerous experiments carried out by Mr. Russell, it appears that the effect of caustic soda is generally not so pronounced as in the example given above. The character of the ore seems to have an influence on the results. More concentrated hyposulphite solutions lessen the effect; hence lixiviation tests in the laboratory will extract more silver from the tailings resulting from such defective lixiviation. It can easily be seen that caustics may be introduced into a lixiviation solution, namely, by the alkaline sulphides used as precipitants for the silver. It seems difficult to prepare these alkaline sulphides in such a manner that they are entirely free from caustics, which applies more to the sodium than to the calcium preparation. If lead is precipitated as PbCO₃ by soda-ash, or as basic hydroxide by caustic lime, this is another source of introducing caustics, namely, if the soda-ash contains caustic soda, or if

* Read at the Cincinnati Meeting of the American Institute of Mining Engineers.

a surplus of caustic lime has been added. Caustic lime also decomposes sodium sulphate with formation of gypsum and caustic soda. This will be further discussed in the following paragraph.

If caustic soda is present in the lixiviation solution, Mr. Russell counteracts its injurious effect by making the solution slightly acid with sulphuric acid. The deleterious effect of caustic alkali and alkaline earths in amalgamation is well known, and this is one of several parallels we meet in both processes.

POSTSCRIPT TO § 11.

Before entering on the last-named subject, some further remarks about Russell's method of separating lead will be in order. In Kerl's *Metallurgy*, edition 1865, vol. iv., page 299, occurs the following passage: "In order to extract silver and gold from ores, Kiss roasts them with salt, lixiviates the roasted ore with calcium hyposulphite, and precipitates from the solution gold and silver by calcium sulphide. . . . Alkalies [*Alkalien*] separate silver and gold from the calcium hyposulphite double salts contained in the solution either not at all or only in case the lime itself is precipitated, while lead, zinc, and antimony are precipitated at once."

The meaning of this passage is in some respects obscure. That Kiss did not use this method for the separation of lead becomes evident from the fact that the sulphides he obtained in this process contained 18½ per cent of lead sulphide. Neither is there any thing definitely expressed, if Kiss meant by "Alkalien" caustic alkalies or carbonates of alkalies [*Kohlensaure Alkalien*]. Whoever reads without prejudice the quoted passage, and what follows, in Kerl's *Metallurgy*, must acknowledge that Kiss was not aware that a perfect and practical separation of lead could be accomplished by sodium carbonate from a sodium hyposulphite solution. All that can be said is, that Russell's discovery might be anticipated from the remarks of Kiss. Between anticipation, however, and the perfection of a method for practical ends, there is a great difference.

The Separation of Lead by Caustic Lime.—From the Walker Lake Bulletin of April 30th, 1884, it appears that at the Mount Cory mill, Nevada, caustic lime is used as precipitant for lead from the lixiviation solution. In this case, the lead is obtained as basic hydroxide, together with gypsum and such impurities of the caustic lime as do not enter into the reaction. Cheapness and the possibility of using calcium pentasulphide for the precipitation of silver and copper are claimed as the advantages of this method. It does not follow that because a method is apparently cheap it is the best. [That the cheapness of calcium pentasulphide is a delusion, will be discussed later.] Its disadvantages are easily perceptible.

1st. It is difficult, indeed impossible, to notice the end of the reaction without calling some other reagent into requisition. The use of a solution of caustic lime in water is not permissible on account of its dilute character, hence caustic milk of lime, or slacked lime, must be added at random, and the reagent itself being in the form of a precipitate, the end of the reaction can not be observed by addition of a sufficient quantity of the reagent.

2d. If a surplus of lime has been used, hydroxide of lead will be redissolved, it being soluble in caustics. Hence no complete separation of the lead can be effected.

3d. The lead precipitate with lime, being very impure, is of less commercial value than the lead carbonate in Russell's process.

4th. I doubt whether the lead hydroxide can be obtained as free from silver and copper as Russell's lead carbonate.

5th. If a surplus of caustic lime has been added to the lixiviation solution, and, after precipitating the sulphides, the caustic lime is not neutralized by an acid, such lixiviation solution will not be a good solvent for silver, as demonstrated in § 10. A lixiviation solution of 2 per cent concentration in sodium hyposulphite dissolves 50 per cent more calcium hydrate than pure water does. Even if no surplus of caustic lime has been added, the solution may become caustic by the formation of caustic soda.

POSTSCRIPT TO II. EXTRA-SOLUTION.

This salt [2Na₂S₂O₃.3Cu₂S₂O₃ + 5aq.] is very little soluble in water; 1 part requires 352 parts of water for solution at ordinary temperature. In aqueous sodium hyposulphite, it dissolves freely, as the figures below demonstrate:

100 c. c. of a 5 per cent solution dissolve	12.28 gm.
" " " 7½ " "	17.46 "
" " " 10 " "	22.54 "

This gives 2.46 gm., 2.32 gm., and 2.25 gm. of 2Na₂S₂O₃.3Cu₂S₂O₃ + 5aq. per gm. of Na₂S₂O₃ + 5aq. respectively.

In calculating the atomic weights, I find that it takes nearly 2 equivalents of sodium hyposulphite to dissolve 1 equivalent of the ½ salt of Lenz. Hence a double salt of the formula 4Na₂S₂O₃.3Cu₂S₂O₃ + x aq. must be assumed to exist in the solution.

POSTSCRIPT TO END OF § 14.

The effect of such solutions on Ag₂S is as follows, namely:

Saturated solution of the ½ salt in aqueous sodium hyposulphite of	Silver dissolved per gm. of the ½ salt of Lenz.
5 per cent concentration.	0.137 gm.
7½ " " "	0.115 "
10 " " "	0.113 "

A solution of the ½ salt in water dissolved only 0.022 gm. silver per gm. of this salt.

It seems to me that the most effective solution must be one which contains so much sodium hyposulphite that the double salt 2Na₂S₂O₃.Cu₂S₂O₃ is formed. In this instance, if copper is replaced by silver, the most soluble argentic double salt 2Na₂S₂O₃.Ag₂S₂O₃ will be the result of the reaction. The aqueous solution of the ½ salt has such a low solubility coefficient for silver, because in this case argentic double salts are formed that are not easily soluble.

POSTSCRIPT TO § 18.

Recent investigations have demonstrated that what I have said above about the influence of fine crushing in raw lixiviation does not hold good as a general rule. On the contrary, Mr. Russell found that in the greater number of cases crushing through No. 120 or No. 30, or even No. 20 screen produces no great difference in the percentage of silver extracted by extra-solution.

I have finally to record a curious fact lately noticed by Mr. Russell.

In a few cases, the extra-solution actually extracted less silver than the ordinary solution. But if the raw ore was first treated with ordinary solution, and subsequently with extra-solution, the latter extracted an additional amount of silver. Hence it is always best to apply the two solutions in succession. In the table below, I give another series of lixiviation tests, made with ores from a great number of mines. The solvents used were extra-solution, ordinary solution, caustic ammonia, and concentrated brine:

Name of mine.	Value of ore. Ounces silver per ton.	Per cent of the silver extracted by lixiviation with:			
		Extra-solution.	Ordinary solution.	Caustic ammonia.	Concentrated brine.
Grand Central, Arizona.....	43.2	93.7	86.6	48.2	50.5
Horn-Silver, Utah.....	184.0	90.7	81.6	74.2	56.6
Price River, Utah.....	25.0	87.2	77.6	13.6	42.5
Sombretillo, Mexico.....	80.4	84.0	75.1	6.7	3.4
Tombstone, Arizona.....	52.8	81.1	70.5	30.7	27.3
Silver Reef, Utah.....	45.0	77.8	50.7	20.0	36.9
Gray Rock, Montana.....	19.0	73.4	47.4	10.9	19.0
Custer, Idaho.....	30.8	72.8	27.8	27.5	17.3
Pearshall, Colorado.....	100.8	68.3	36.6	6.8	16.8
Tybo, Nevada.....	20.0	58.0	39.0	0.0	8.0
Ramshorn, Idaho.....	89.6	50.5	34.4	2.2	11.8
Silver Spring, Montana.....	62.8	49.0	24.4	20.0	15.7
Highland Chief, ".....	51.2	48.1	31.6	17.6	13.2

It will be proper to refer here to the fact that lixiviation of raw ores has been practiced before, especially at the Old Telegraph mine, Utah. In the latter case, the ore contained silver chloride, and had minerals that were concentrated after lixiviation. In attempting to concentrate the ore at once, the silver chloride was lost. There is no doubt that the extra-solution would have extracted a much higher percentage of the silver. This system may be used to advantage in many cases where the character of the ore is such that a large percentage of the silver is lost by direct concentration, and this silver is in a form soluble in extra-solution.

POSTSCRIPT TO § 22. THE SWANSEA PROCESS.

Considering the richness of the Argo matte, the percentage of gold extracted is extremely high. The disadvantages of this method are, that it is expensive in fuel and repairs of furnaces, and that the furnace hearth is liable to absorb considerable quantities of the precious metal. Formerly in use at Vivian's works, Swansea, it has been replaced there by Hartmann's process, to which reference is made below.

POSTSCRIPT TO § 22. THE ELECTROLYTIC PROCESS.

To those who are interested in electro-metallurgy, I recommend the reading of Martin Kiliani's papers, published in the *Berg- und Hüttenmännische Zeitung*, Nos. 21, 22, 32, 34, and 36 of 1883. Although Kiliani's experiments were all carried out on a small scale, they have great practical value, and his original researches give more information than all the books taken together that pretend to treat the subject of electro-metallurgy.*

An important patent application has recently been filed by Dr. Moebius. His improvements apply especially to the parting and refining of high-grade bullion. By ingenious devices, he has completely overcome the influence of polarization.

POSTSCRIPT TO § 22. HARTMANN'S PROCESS.

After writing the above, I received the following information from Mr. John Williams regarding Hartmann's process: "This process has been in operation at least two years. Thousands of tons of matte from Montana, and all parts of the world, have been treated, and 'best selected' copper made therefrom. Mr. Hartmann states that as to impurities, namely, arsenic, antimony, and bismuth, the two latter do not go into solution with the dilute sulphuric acid used; and that any arsenic is easily removed in the final melting and refining. For one ton of copper, about three tons of coal are consumed, including the refining of the precious metals."

POSTSCRIPT TO § 26. A.

Since writing the above, Mr. Russell has sent me a tabular statement containing the results of 238 experiments on the preparation of sodium and calcium sulphide, of which 188 refer to the former, and 50 to the latter. These experiments have demonstrated, beyond doubt, the best *modus operandi* for sodium sulphide to be as follows, namely: The caustic soda is dissolved in an iron tank, in its own weight of water. The solution should not fill more than one fourth of the tank. Considerable heat is evolved, and in case the solution has not by itself reached a temperature of about 80 degrees C. (this can easily be effected by using warm water), it is brought to 80 or 90 degrees C. by a fire underneath the tank. For 100 parts of caustic soda, 66 parts of pulverized sulphur are now gradually added. The temperature of the solution soon rises to about 145 degrees C., and it foams up to two or three times its volume. In about five minutes, the sulphur has dissolved, and the reaction is completed. Upon cooling, the mass solidifies; hence it is necessary to ladle it out, and either dissolve it at once or cast it into molds, and preserve the cakes. If the sodium sulphide is dissolved not in water, but in lixiviation solution, no dilution of the latter takes place in precipitating the silver. From the consumption of sulphur, it follows that the sodium sulphide is principally Na_2S_2 , a combination to be considered as the most desirable one. Solutions so prepared show remarkably high precipitating coefficients, both for caustic soda and sulphur, ranging from 184 to 230 parts of silver for 100 parts of caustic soda; and from 275 to 345 parts of silver for 100 parts of sulphur. In the preparation of calcium polysulphide, the best coefficients were from 98 to 132 parts of silver precipitated by 100 parts of sulphur consumed, and that with freshly made solutions. Considering how much the latter deteriorate, after some time, it is safe to assume that the precipitation of silver by calcium polysulphide requires about three times as much sulphur as is needed with properly prepared sodium sulphide. This item, the convenience of making sodium sulphide, and the loss in hyposulphite caused by boiling caustic lime with sulphur, more than compensate the extra expense for caustic soda.

POSTSCRIPT TO § 26. B. A.

Hyposulphite solutions of different concentration were exposed in

soup-plates to the atmosphere for seven days at a temperature of from 20 to 22 degrees C., and the solutions brought to their original volume at the expiration of that time. The relation of the depth of the solution to the diameter of the plate was about 1 to 8. A re-determination of the solvent energy of these solutions for silver chloride gave the following average results, namely: The sodium hyposulphite solutions had deteriorated $1\frac{1}{10}$ per cent. The calcium hyposulphite solutions had deteriorated $16\frac{1}{10}$ per cent.

ON PRECAUTIONARY MEASURES AGAINST EXPLOSIONS OF FIRE-DAMP.—VIII.*

By M. Hoernecke, Halle, Germany.

Cross-Cuts.—According to the purpose, cross-cuts may be designated as main cross-cuts, section cross-cuts, and ventilating cross-cuts. From the first named, the main levels are driven into the different seams; it is through them that they receive the necessary fresh air, and it is in them that the transportation of coal from the different seams opened out is concentrated. Being indirectly the continuation, so far as ventilation is concerned, of the shafts, the dimensions of these cross-cuts must be great enough to correspond with the section of the shafts. Since double tracks are necessary in the cross-cuts for moving large quantities of coal, it is not good policy to attempt to save money in driving them. On the contrary, it is wise to follow English practice in this respect, especially since the increased cost of a larger section is little more than the outlay involved in hoisting an additional quantity of rock.

Section cross-cuts serve to concentrate the working of a larger or smaller number of seams at a distance from the main cross-cuts: the connection of this series of workings with the main cross-cut being effected by a common hauling level, and the return air being carried by one common return air-drift. However necessary or convenient such an arrangement may occasionally be for working and for haulage, it is a serious drawback, so far as ventilation is concerned, if the section cross-cut is arranged for single track from motives of economy, because small area of air-courses, or occasional obstacles, may have as a consequence a dearth of ventilation. Therefore such cross-cuts must be driven so that their section is large enough to suffice for the ventilation of the section. It is still better, though more expensive, to open out every bed by the main cross-cut, to give it its air by its own main level, and to carry the return air-course through a sufficiently large special drift.

Ventilating cross-cuts generally prove sufficient in those cases where the former main cross-cut serves for the purpose. Otherwise, it is customary, especially in Westphalia, to drive the ventilating cross-cuts with single-track width. Although their original section does not suffice for ventilation, their area is further diminished by the pressure of the ground, and by using them to store old material, cars, etc. In this manner, ventilation is further interfered with. It is highly desirable, therefore, that the arrangements acknowledged to be theoretically correct be adopted.

In Westphalia, diffusion is usually relied upon to ventilate cross-cuts while they are driven, when they are short and their section is large. In country-rock, this may suffice in many cases, but it certainly will not do when long cross-cuts are to be put through coal formation with fiery seams. At the Rheinpreussen colliery, in which the cross-cuts are driven by hydraulic power-drills, fresh air is obtained by covering the drain with an arch, thus partitioning off a space with smooth walls and sufficient area into which a 0.04-inch jet of water, under 31 atmospheres pressure, is directed. In the Saarbruecken mines, the lower level is opened out from the upper by means of a winze, and thus they are connected much earlier. Therefore, brattices are rarely used in the cross-cuts, the ventilation being obtained by pipes coming from the shaft, and often worked by a hand-fan. Where compressed air is available, Koerting apparatus are used. In general, it may be stated that all the methods already referred to for ventilation may be suitably employed to aid in driving cross-cuts.

Preparatory Workings.—The preparatory workings in the coal require much more attention in fiery mines, even than the later work of extraction, because the escape of fire-damp is strongest in freshly-cut coal. Therefore all the dangers of fire-damp are greatest in the driving of such workings as main levels, winzes, and uprisings. One of the most prominent sources of danger is the firing of blasts, which may not only cause the explosion of fire-damp already accumulated, but may lead to it, in places where there has not been a single trace of fire-damp, by the shot opening out a blower ignited simultaneously. The accidents in firing shots constitute a considerable percentage of the accidents from fire-damp explosions. Since blasting is so general that the driving of preparatory workings would in many localities be almost impossible without it, it is a leading duty of engineers to lessen its danger. Explosions due to firing shots are caused by the ignition of the fire-damp through the fuse. In order to diminish them as much as possible, the German mining authorities have issued instructions providing that, in those workings in which the presence of fire-damp is noticed, blasting must only be done by the direction and under the responsibility of the manager; that the fuse must be of such a character that it burns without flame; and that the workings must be first tested for the presence of fire-damp before firing the shots. The mining authorities of the Breslau District have gone farther, prohibiting blasting entirely as soon as the gas mixture near the roof approaches an explosive character. Explosions can only be avoided entirely when the shots are fired by electricity.

Ignition of fire-damp may be caused furthermore by the force of the explosion itself. Many efforts have been made to avoid this flame in firing. In the latest experiments made by the English Commission on Accidents in Mines, dynamite cartridges placed in cases filled with water did not throw out any flames or sparks; but in trials with powder, the flame could not be entirely suppressed. The water surrounding the cartridge is supposed, by its evaporation, to diminish the temperature of the gases of combustion of the charge, so that it is below the temperature of ignition of the fire-damp. But success by this water cooling in all cases seems at least doubtful, when other gases or coal-dust are present,

* A translation of Kiliani's paper will appear in an early issue.—EDITOR ENGINEERING AND MINING JOURNAL.

* Verhandlungen des Vereins für Beförderung des Gewerbfleisses.

although the temperature of ignition of fire-damp is the same in all mixtures. No explosives used to replace powder in blasting have thus far led to any satisfactory result, and it seems that mechanical contrivances are better calculated to make the driving of preparatory workings less dangerous.

For many years, such an arrangement, a wedge, has been in use in Belgian collieries. It consists of two pieces somewhat longer than the hole is deep. The outer surfaces of these pieces are arched, more strongly at the lower than at the upper end, while their inner surfaces are flat. Both consist of a number of lengths connected by hinges. They are put together at their flat surfaces, and are introduced into the hole so that they nearly fill its deepest part, while there is some play between them at the top. A flat wedge is then driven between the two pieces, acting most strongly in the deeper parts of the hole. The driving of the wedge may be done by hand; but it is better to use for this purpose the rock-drill employed for drilling the hole.

Levet's hydraulic wedge is used of late with good success at the Friedrichsthal colliery, near Saarbruecken, the position and the effect of the driving-wedge being reversed, the thicker end being in the bottom of the hole and the thinner end near its top. It is driven from below upward. The results obtained thus far with the apparatus give rise to the hope that, when further improved and simplified, it may make the driving of preparatory workings in fiery ground safer than when done with blasting, and at the time less expensive, as compared with hand-work alone.

In ventilating preparatory workings, the main principle is, that the fire-damp must be immediately carried off or be rendered harmless by the means already discussed. It will not do to rely for it upon diffusion for any length of time. What arrangements are to be made, and what particular method is to be chosen, depend not only upon local conditions and needs, but also upon local customs and opinions, because there is a great diversity of opinion concerning the utility and adaptability of the different methods, and because definite rules on the subject have not yet been laid down.

The main levels generally serve as the means of first opening out the seams struck by a cross-cut. They are therefore driven farthest into the coal, to test the seam, and as they must handle the entire tonnage of the seam opened out, they are provided with a double track. The dimensions of the main level are dependent on the thickness of the seam and the character of the rock, so that they may vary between wide limits. They should, however, always be as great as possible, because the main level must supply the entire seam opened out by it with fresh air. On this account, it is necessary to maintain the dimensions chosen, even when driving through faults or other disturbances of the ground, because every narrowing, for however short a distance, leads to a weakening of the current of air. It is good practice in branching off with the main level from the cross-cut to round off the corners, not only because the radius of the curve of the track can be made larger, but also because the current of air in bending into the main level meets with less resistance. This rounding off should be done in the corners of all levels that the current of air must turn.

In order to supply main levels with air while they are pushed, it will suffice, under simple conditions and for short distances, to continue the system of ventilation used in the cross-cut into the main level, simply making the brattices, pipes, etc., longer. For greater lengths of main levels, ventilation by pipes carried down from the surface is less advantageous, and brattices do not meet the requirements, so far as their durability is concerned. Therefore, it is best for great lengths of main levels to use parallel drifts. The fresh air is then carried along in the main level, and is returned through the entry parallel with it. The simplest method of driving double entries is in the case of thin seams, or in seams in which there is a large bench, so that enough rock is obtained in driving a very wide level to carry along a wall in the middle of the level. Both entries are then always directly connected, and the fresh air directly reaches the face. On the other hand, the greater width of the level occasions a more abundant development of gas; but this disadvantage, and those incident to all workings in which there is filling with gob, are more than compensated for by the uniformity of the ventilating current obtained.

If there is not enough rock to form an air-tight partition between the two entries, they are driven singly, and a sufficiently wide pillar of coal is left between them to afford a sufficient resistance to the pressure of the ground. The two entries are connected at intervals as occasion may demand. As the entries progress, the older connections are closed, so that the current of air must pass through the last one. When regular ventilation is thus provided for the greater part of the level, it is only necessary to attend to that part that remains between the last connection of the two entries and the face. Generally, it is believed that this may be left to diffusion, especially because the distances are disregarded as too small, and out of proportion to those generally driven without ventilation. But the frequency of explosions in these parts of the entries proves the contrary, and makes it seem judicious to carry the current of air even from the last connection to the very face of the entries, whenever even a small quantity of fire-damp is noticed.

At the Luisenthal and other collieries near Saarbruecken, duck brattices are used to carry the current to the face on both entries. At the Dudweiler colliery, the use of zinc pipes is preferred. They are either arranged so that the pipe in one exhausts and the one in the other acts as blower, by putting a door into the last connection, or the door is put into the entry through which the fresh air comes, and through which both pipes are carried to both faces, acting both as blowers; or thirdly, the door is put in the return course, and both pipes exhaust from the faces. The latter arrangement is preferred in all cases where there are sudden outbursts of gas in either of the entries, in order to carry the fire-damp away as promptly as possible, and bring it into the current of air. Whenever the ventilation by single pipes does not suffice, their number may be increased as much as the section of the entries will admit of, or hand-fans are put in. Ventilating holes put in between the face and the last connection of the entries do not hamper the working or the haulage in any way; but there must be a large number when there is any amount of fire-damp, and then they become costly. The last hole of course must be kept open, while those back of it are closed.

POPULAR FALLACIES REGARDING PRECIOUS METAL ORE-DEPOSITS.*

By Albert Williams, Jr.

THE PREJUDICE IN FAVOR OF CERTAIN STRIKES AND AGAINST OTHERS.

A very considerable proportion of American precious metal miners have received their education directly or indirectly from the California mines; that is, many miners operating in other portions of the country have either gained their practical experience from actual work in and observation of the typical vein mines of California, or have become familiar with the mode of occurrence of these deposits by contact with old California miners and by reading the published accounts of the California mines. For a long time, the tendency to generalize irrationally led to a belief that a northwest and southeast course was a prime characteristic of valuable and permanent mines wherever located, and that the wider the divergence from the favorite direction the less the probable worth of newly discovered veins. A few noteworthy exceptions had to be admitted, however—as, for example, the Comstock lode, which trends near y north and south throughout its productive portion. Still, to illustrate the predilection for the northwest-southeast strike, the well-known story may be cited of a celebrated expert's having reported adversely upon a Utah mine, simply on the ground that its vein ran east and west, in the face of a fair surface exposure of ore, arguing that a mine with such a strike was unreliable. In this case, the slighted mine subsequently proved to be a profitable one.

Nature does not bind herself to any such empirical restrictions. The only approach to a positive regularity of occurrence that has been shown by the actual facts is that, as faulting fissures naturally strike with the general trend of uplifts, and the latter are parallel over considerable areas, because formed by similar and possibly contemporary dynamic causes, the veins of this class are often found in parallel belts following the lines of upheaval. So, on the west flank of the Sierra, a large number of northwest-southeast veins are encountered; in the Great Basin, where a marked parallelism of the Basin ranges occurs, many important north-and-south veins are met with; while in Idaho, a preponderance of northeast-southwest fissures appears. In each case, the determining cause seems to be the structural peculiarities of the mountain chains. It is not difficult to understand why a faulting fissure should follow a line approximately parallel with the trend of a range; for it is only at right angles to that direction that there is room for a slide or upheaval to take place, unless, indeed, the main rib be fractured, a somewhat violent supposition. There are other classes of "vein" deposits that can not be safely ascribed to faulting, and these suggest different explanations; yet, except where mountain sculpture is largely the result of erosion, the fissures very commonly have a strike parallel with the axis of the chain and a dip conforming to the original slope of the mountains, though diverging more or less from the surface contour.

Whatever theories are formulated as to the origin of mineral veins, it is certain that an arbitrary strike is not now considered an essential item in the equipment of a successful mine.

THE PREDILECTION FOR "TRUE FISSURES."

A certain unaccountable glamour seems to hang about the term "true fissure." Many famous mines are undoubtedly true fissures in the fullest sense, the fissure generally being the result of a fault. But, on the other hand, a large number of valuable deposits have been found that could not, by any elastic use of the name, be called "true fissures." Such, for instance, are the pegmatite veins and the Black Hills gold conglomerates. The truth seems to be, that a large and strong quartz vein requires a correspondingly extensive fissure for its formation. It may or may not be metalliferous; while, on the other hand, small local segregations and replacements may contain ores in such a state of concentration as to compensate for their limited extent.

THE BLOCK SYSTEM OF UNDERGROUND PROSPECTING.

The plan of development that has been practiced in certain very large and important veins, by opening drifts in or parallel with the course of the ore-channel and cross-cutting from the main drifts at intervals of from 50 to 100 feet, thus dividing off the ground exposed into blocks, is one that results in an apparently methodical and workmanlike system. By following it, the main openings are kept straight, and, when a large body of ore is struck, its extraction is much facilitated by the plan of operations that has been conducted during the prospecting period. Unfortunately, however, there are few mines that can be economically opened and developed in this way. The system appears to be the only one feasible in cases like that of the Comstock lode, where the width of the ore-bearing ground is very considerable and the ore occurs in detached bodies, giving few indications of its presence until the mass itself is struck. A company having large capital and extensive plant often proceeds to develop narrow veins on the same plan, when the more natural and practical method would be to strictly follow the vein on each level, provided good working ground is found on the course of the vein itself, and to keep all workings, such as uprisings and winzes, within or as near as possible to the ore region. The objections to this method are, that the workings are crooked, and often extremely tortuous; that the distances from point to point are sometimes considerably increased; and that the appearance of the mine, to one who has been accustomed to the system of cross-cutting in blocks, is wanting in the regularity of the latter method. On the whole, however, the chances of finding ore, and at all events of missing as little of it as possible, are much increased by working so far as practicable entirely in the ore-channel. It should be remembered that the only objects of mining at all are, in the first place, to find, and, in the second, to extract, ore. The latter part of the work can be easily enough managed after the development has proceeded to such an extent as to show reason for changing the system of openings in any way. It certainly seems absurd to proceed to open a mine on the grand scale that would be appropriate in handling enormous bonanzas, when, by adopting the more economical method, a small but certain profit could be assured. The Mexicans, who are miners born, and not by education, and who have the keenest instinct for following indications of ore, limit the size of their prospecting-drifts to the smallest possible

* From the Fourth Annual Report of the Director of the United States Geological Survey.

dimensions, so that often they have the appearance of burrowings rather than of systematic mine openings. It is not necessary to adopt their system in its entirety, nor to carry it to that extreme that results in the making of gopher-holes through which a man has to pass on his hands and knees; and on the other hand, it is perfectly feasible, having once found ore in quantity, to stope it out and raise it by our most approved methods. But there is no doubt that much could be learned in the way of economy and practical success from the primitive and despised but very efficient methods of mining of the Mexicans.

In working argentiferous lead deposits in limestone, cross-cutting in blocks is a most uncertain means of prospecting; for the stringers and pipes that serve as leaders to the main bodies are easily missed by drifts; and unless the galleries are very numerous and close together, unexplored places are left that might contain profitable ore-bodies. At Eureka, Nevada, the two opposite systems have been pursued in the same district. The Eureka Consolidated Company has, as a rule, conducted its prospecting operations on the plan of following ore indications, with little regard to the regularity of its drifts. The Richmond Company, adjoining, has pursued the course of laying off its ground in blocks and cross-cutting for ore. These cases, however, show little to decide the question of relative success; for both companies have been very fortunate, and the cross-cutting system, owing to the immense size of the ore-bodies, has been followed under exceptionally advantageous conditions. Where ore exists in such large masses, it is not a difficult matter to find it, no matter what system be adopted; but it is safe to say that in most lead mining districts blind cross-cutting would be neither the safer nor the more economical plan.

A parallel extravagance is sometimes committed in locating shafts too great a distance in the hanging-wall country from the outcrop of veins of medium dip; the object being to develop the ground at the greatest possible depth by a single shaft. Very often, in cases where the underground features are not well known, the more sensible plan would be to follow the vein down by an incline on the dip. Having once struck a bonanza of size sufficient to warrant it, the sinking of a vertical shaft in the proper place becomes a simple matter, and the cost of pushing shafts and other openings in barren country-rock is justified by the developments; but in exploiting claims that can only be classed as prospects, the shortest and most economical means should be pursued. Mining on the grand scale is being steadily supplanted by more practical and less pretentious means.

THE PREJUDICE AGAINST BEDDED DEPOSITS AND VEINS OF SMALL DIP.

Up to the time when the value of the Leadville deposits was fully established, there existed a strong and pretty general dislike to what are called, with implied depreciation, "blanket lodes." A blanket lode, in the vocabulary of the miner, is one that extends in an approximately horizontal direction or has an average dip not exceeding some 20 to 25 degrees. Two circumstances operated to create this prejudice. One was the uncertainty of title arising from the United States mining law, which was designed to cover locations of mineral deposits (in place) of the class best known in 1872, when the law was drafted—that is, veins of considerable dip. A comparatively flat dip carries the lode soon beyond the vertical side-lines of a 1500 by 600-foot claim, and into an adjoining location. If continuity below the surface is proved from the croppings of the first claim, the case is usually a clear one; but it often happens that a connection is not easily traceable; sometimes, too, owing to the configuration of the surface, a bed or vein may crop a second time at some distance from the original point. In such instances, the question of title frequently becomes a vexed one, and much litigation ensues. This could be avoided by the adoption of "square location" laws, but such a plan is not in general favor. The second cause was the unfortunate history of some of the earlier blanket lodes, in which the ore-deposits did not extend over large areas, and, being shallow, were soon exhausted. The disappointments of White Pine, the most prominent instance in point, undoubtedly had much influence in shaping prevalent opinion.

So far as economic considerations are involved, the flat deposits, other things being equal, have much the advantage over vertical veins and those of a steep dip. It is cheaper to work ore-bodies that from their outcrop descend at gentle angles from the surface than to explore deep veins. The cost of hoisting and pumping is so much less (though that of stoping may be slightly greater) that when the workings have extended to some distance from the first shafts, it is not a very expensive matter to sink new shafts at convenient points, as the plan necessary for working such deposits need not be heavy in comparison with what is required in veins of extreme dip. A blanket lode corresponding in plane surface area with the Comstock, for instance, could have been explored and worked at a fractional proportion of the outlay necessitated by the latter. As further examples, it only need be considered what would have been the history of Silver Reef, if the sandstone strata had been tilted into a vertical position; or even how much more disappointing the results at White Pine would have been, had the ore, instead of being so accessible, extended vertically downward in sheets of the same thickness and extent.

A very unpractical idea, and one doubtless unconsciously accepted, that appears to have taken possession of the uninitiated, is, that imposing and correspondingly expensive hoisting-works are a necessary feature of a successful mine. Certainly there is something very fascinating about the appearance of these heavy works, beside which the tunnels, short shafts, and light plant of even the most profitable flat mines seem wholly insignificant.

THAT THE APPEARANCE OF ORES IS A TRUSTWORTHY INDEX OF THEIR VALUE.

This caption may seem self-evidently absurd to the experienced miner. It is intended, however, to cover only certain marked peculiarities of ores that are sometimes relied on as indices of their contents in cases when no assays are applied, and when the actual precious metal ore is obscure. It will be sufficient to cite a few instances of the most common delusive characteristics.

Argentiferous Galena.—Many persons still believe that the relative silver tenor of galena may be estimated in a rough way by the color and fineness of the grain. It is difficult to trace the source of this belief; but the fact remains that a micro-granular, "off-colored," finely disseminated galena is an especial favorite of many miners and prospectors; while

"chunky" galena of the typical pure lead-gray color and luster, fracturing in large cubes, is not as a rule expected to contain much silver. The idea is generally taken on faith. The assumed fact might naturally be accounted for on the probability that pure galena (which is merely another term for galena richer in lead, but poorer in accidental impurities, including silver) would be apt to form larger crystals; while the impure (and richer) varieties would crystallize imperfectly. The variation from the standard hue might also be presumed to be a ground for inferring impurities (such as silver). However plausible this explanation may be, the facts do not warrant any reliance on these distinctions as a test of relative value. The examination of a very large number of specimens, and the communicated experience of other observers, have convinced me that the exceptions are entirely too numerous to prove the rule. Suites of galena specimens from the Wood River mines, Idaho, would alone suffice to dispel the illusion. These ores embrace a wide range in variety of appearance, with a rather unusual uniformity in the silver tenor. For example, solid galena from the Idahoan mine, have a coarse structure that produces large slabs of mineral, assays between 125 and 150 ounces of silver a ton. Another mine in this region, the Mayflower, shows a steely, close-grained galena, containing more or less antimony, and sometimes apparently admixed with fine, fibrous stibnite. This occurs associated with a more regular galena; but between the two pronounced varieties there is little to choose as to their relative silver contents.

Auriferous Pyrite.—In the same way, it is often asserted that barren pyrite, or pyrite containing gold in too small quantity to be workable, may be distinguished from the richer pyrites by its brighter color and larger cubes. There may be somewhat more reasonable ground for this belief than in the case of argentiferous galena; but the known exceptions are very numerous. Finely disseminated pyrite is often confounded in practice with marcasite and mispickel; so that comparative results are to be regarded with some suspicion, except in cases where the gangue mineral is thoroughly identified. In this connection, it may be remarked that the argentiferous pyrite found in the Grand Prize, Belle Isle, and other mines of Tuscarora crystallizes in large cubes and is of very bright color. On the other hand, it is quite true that most of the exceptionally large pyrite crystals, such as reach say an inch cube in size, are usually practically barren of either gold or silver.

"Lively" Quartz.—A rusty, decomposed, and honeycombed quartz, especially in gold-bearing veins, is a favorite that is often disappointing. Prospectors speak of it as "lively"—that is, a promising gangue. A dull, tough, and solid quartz, carrying no pyrite nor oxide from pyrite, is in some places locally known as "bull" quartz, and is in especial disfavor. Many of the rich Arizona gold ores, however, are to be classed in the latter category; and the high-grade doré ore from the croppings of the Custer mine, in Idaho, although unusually exposed to weathering, is a very tough, agate-like quartz. Decomposition and marks of infiltration are characteristic of most mineral veins (including poor ones), but it is by no means safe to judge of relative richness by these signs alone.

The prejudice in favor of weather-stained, decomposed quartz probably arose from the fact that the standard of excellence in mines was established by the showing from exposed croppings of certain of the best known and earliest discovered of the California gold veins. A miner whose experience had been gained in such mines would naturally look for similar indications in the quartz elsewhere. As has been observed in a preceding section, the ore immediately at the surface is apt to be richer than that found a few feet below. Many mines that show "lively" quartz at and near the surface contain in depth (below the water-line) a "dead" quartz that has been protected from atmospheric decomposing agencies.

As regards the marks of infiltration and their bearing on richness, it should be noted that the most perfect quartz crystals occurring in vugs, or open fissures, are generally barren themselves, though they may be accompanied by rich ores; in fact, the handsomest specimens of quartz crystals are not found in gold mines. From the appearance of different varieties of quartzose ores, it may be distinctly inferred that two distinct methods of vein enrichment are proved: (1) a deposition of the precious metals simultaneously with the quartz; and (2) a secondary infiltration of the partially decomposed quartz, which may have been originally barren, by solutions charged with gold and silver. In some cases, both causes may have operated in the formation of the same vein, thus giving rise to marked differences in the appearance of the ore.

Stains Mistaken for Silver Minerals.—Some pyritous gold ores are deeply stained by certain valueless minerals that, prior to assay, are often assumed to be silver-bearing. Many a custom mill has earned a bad reputation by not being able to extract silver from ore that did not contain it; the shippers of small lots of ore being careless in the matter of sampling and assaying, and assuming any bluish or blackish stains to be silver minerals. One of the most frequent causes of deception is the occurrence of very finely disseminated mispickel. This mineral, when sparsely scattered in microscopic particles through a white quartz, gives it a bluish-black tinge, such as is seen in many low-grade argente and stephanite ores. Other minerals, not so readily recognized before the blow-pipe as mispickel produce similar effects. Tyndall has emphasized the fact that minute particles of matter of very different kinds give similar hues to the medium in which they are diffused, though when in mass they may present contrasted colors. This occurs to a certain extent with minerals finely disseminated in quartz.

In Colorado, where telluride ores, such as sylvanite, hessite, petzite, and coloradoite, form a notable source of the precious metals, there is a tendency to call strange or obscure minerals "tellurides," the cause evidently being the known fact that the true tellurides are, next to metallic gold and silver, the richest of ores. In Utah, Idaho, and Arizona, the popular determination of azurite and malachite stains is "bromide of silver," or sometimes "chloro-bromide;" the fact being that bromides and chloro-bromides are really of infrequent occurrence, though so often reported. Lead ochre, in the same way, occasionally becomes "iodide of silver."

Chloride Ores.—Horn-silver, in aggregations large enough to be tested with a knife, is easily recognized. But in the greater part of chloride ores, the mineral is recognized with difficulty, and may entirely escape the notice of one not familiar with the local characteristics. The miners

become wonderfully expert in the ability to judge and sort the ores to which they are accustomed; but very frequently systematic assays are the only reliance in selecting ore for stoping and for the mill. Cerargyrite finely diffused in quartz or "vein porphyry" is apt to escape detection altogether, unless its presence is indicated by associated minerals more readily recognized. When cerargyrite in this diffused state is the only metallic mineral in an ore, a hand-specimen that would give fair assays might seem to the stranger to be a palpable hoax. It is evident that the assayer to whom a fragment of common grindstone had been sent for assay by a waggish prospector, and who returned in his report a high value in silver, had been familiar with this class of ores, and may not after all have been so ignorant as the story has represented him to be.

Sulphide Ores.—As a rule, it is much easier to estimate the probable tenor of these ores by merely looking at them than in the case of chloride ores. There are, however, two important exceptions: first, when the ore mineral is masked by large quantities of more prominent but worthless metallic minerals; and second, when free-milling silver ore, such as argentine, is so microscopically diffused in the gangue as not to perceptibly affect its color. The low-grade "sugar quartz" of the Comstock is an instance of the latter class. Some of this contains so little metal that it will not pay the expense of milling; while another portion, presenting an apparently identical appearance, having the same granular texture and whiteness, may be sufficiently rich to yield a fair though small profit above the cost of extraction and milling. Those most familiar with this ore are often puzzled by it, and are obliged to rely largely upon assays. In developed mines and districts, the obscure ores do not give much trouble; for the means of assay are at hand, and the miners have become practiced in judging them. In new regions, however, the case is different, and the most experienced prospectors are often misled by the appearance of the ores.

It would be unfair to infer, from the confusing and irreconcilable prejudices and partialities that have had more or less sway, that the whole subject of precious metal mining is involved in doubt and perplexity. On the contrary, a great deal of solid fact is now established, room for which has been gained only by clearing away a mass of misconceptions. Much remains to be learned; in fact, the study of precious metal deposits is only beginning. But whatever the explanation of geologic features, or the theory of the genesis of ores, it must be admitted that on the purely practical side great advances have been made. Each year, less money and less effort, relatively speaking, are thrown away on guess-work or hopeless undertakings than in the year preceding; and as the wondrous varieties and possibilities of occurrence are becoming better known, the whimsical notions of earlier days steadily disappear. The best miner is least trammelled by prejudice and rule of thumb. And is it not safe to add that the best geologist is he who frankly admits that his knowledge is still in its infancy? Unquestionably all occurrences are governed by law, and it is, perhaps, not visionary to hope that the precious metal deposits may be as well understood at no very distant day as the coal and iron beds are now, in spite of the greater complexity of the former. But, for the present, it is surely best to meet the issue squarely, and confess that even this stage is far from having been attained.

THE VALUE OF PETROLEUM AS A FUEL FOR METALLURGICAL PURPOSES.

Written for the Engineering and Mining Journal by H. M. Howe, M.E., Boston, Mass.

As a great amount of money and of valuable time and energy is now expending in attempts to introduce vaporized petroleum for fuel for metallurgical purposes, and as these attempts have been made to a certain extent blindly, and without ascertaining whether there was any probability that a given amount of work could be done as cheaply with petroleum as with coal, the following remarks are written with the view of putting engineers and capitalists contemplating these attempts on their guard, and of pointing out to them how small, how exceedingly small, the chance is, that petroleum can compete with coal as long as anything like the present relation between the prices of the two continues.

The many attempts that have lately been made to substitute petroleum for coal, all inevitably destined to fail, seem either to have been made without any reflection whatever as to the relative calorific powers of the two forms of fuel, or else to have been based on a crude, vague notion that, if you can only burn your petroleum as thoroughly and utilize its heat as thoroughly as you do with coal, you will have a much cheaper fuel; that is, that there is more available calorific power in a dollar's worth of petroleum than in a dollar's worth of coal. This fallacious notion has probably been greatly favored by the confusion arising from the fact that coal is sold by weight and petroleum by measure. To say that 80 gallons of petroleum contain as much calorific power as a ton of coal does not sound as startling as it does to say that there is as much calorific power in one pound of petroleum as in 4.3 pounds of coal; yet the two statements mean precisely the same. The advocates of petroleum are constantly telling us what calorific power petroleum ought to have, according to calculation, owing to its high percentage of hydrogen, and what it has done in their own experiments. But people seem to have generally overlooked the fact that the actual calorific power of petroleum has been determined by a most eminent, competent, and wholly disinterested authority, and that there is no need of looking to the statements of interested persons or of conducting enormously costly experiments to see how it compares with that of coal, since the matter is already one of record.

At the request of the Emperor Napoleon the Third, the illustrious Henri St. Clair Deville investigated elaborately the calorific power of petroleum, and gave the world his results.* These are readily accessible probably in every large public library in the country; and it is perhaps surprising if not mortifying that they should not have prevented the enormous expenditure of money that has taken place in the last few years in experimenting on a gigantic scale on this subject.

Comparing the calorific power of petroleum, as determined by him, with that of coal, we learn that, allowing for the presence of 11 per cent of ash and water, the complete combustion of one pound of coal (such as yields from 60 to 74 per cent of coke) generates about 80 per cent as much available heat as does one pound of petroleum; while with coals yield-

ing 74 per cent and upward of coke, complete combustion generates on an average about 85 per cent as much heat as is yielded by the combustion of an equal weight of petroleum. Turning pounds of petroleum into gallons, there is, roughly speaking, as much calorific power in 2240 pounds of coal (including ash and water) as there is in about 302 gallons of petroleum. At the prices ruling here for coal by the cargo and petroleum in large tank lots, our 302 gallons of petroleum would cost about \$14.75, or more than three times as much as a ton of coal. Now, it seems to me that, if the engineers and capitalists who have been carrying on gigantic experiments in the use of petroleum had clearly understood this most important fact, that petroleum costs three times as much per unit of calorific power as coal does, it ought to have been pretty hard to induce them to undertake the enterprise. It is to be remembered that the calorific power of petroleum that I have quoted is not the theoretical but the actual power. It is not derived from theoretical considerations, but from direct actual tests most carefully conducted. The results of such tests are entitled to the same kind of confidence as are those of the chemical analyses of a trustworthy chemist; and it is no more likely that they can be controverted by large scale tests than that the decomposition of water on a large scale will show it to contain more than 11.11 per cent of hydrogen.

Now, is it probable that this enormous disadvantage under which petroleum suffers, owing to its vastly greater first cost per unit of calorific power, can be compensated for by its peculiar advantages? It seems most unlikely; one is almost tempted to say that it is absurd to expect it.

We are told much of the great saving in handling the material, since petroleum can be fed into the furnace by simply starting a steam-pump, while coal has to be shoveled and worked over, its clinkers broken up, and its ashes removed. Were there any thing approaching equality in the cost of the two materials, then the greater ease of handling petroleum would tell heavily in its favor. But, when we consider that petroleum equal in calorific power to a ton of coal costs nearly \$15, the comparatively trifling saving in the handling of material sinks into insignificance. The trouble and labor in handling the ton of coal form but a trifling fraction of the extra \$10, which its equivalent in petroleum would cost. We might nearly as well advocate the use of gold instead of iron for ship cables on account of its freedom from rust. Saving in the cost of repairing, the fire-box is also urged in favor of petroleum. But this also is too light a matter to avail much in compensation for the fearful first cost of the fluid fuel.

The advocates of the use of petroleum might perhaps at the first blush hope to offset its greater first cost by obtaining greater efficiency than is possible with coal, that is, by utilizing a greater portion of the heat generated by the combustion of petroleum than can be utilized in the case of coal; but a little reflection should dispel this hope. While it must be admitted that experiment may show that a somewhat higher efficiency is attainable with petroleum than with coal, it does seem preposterous to expect that, with equally well-devised forms of apparatus, the efficiency of the former can be thrice or even twice as great as that of the latter. Of course, the efficiency of petroleum in highly efficient furnaces, such as the Siemens and Ponsard furnaces, might well be thrice as great as that of coal in very wasteful ones (for example, in direct-firing crucible furnaces). But no reason appears why the efficiency of petroleum should be at all greater than that of coal in equally well-designed furnaces.

It is true that the efficiency of coal is generally very low, sometimes less than 2 per cent of the calorific power of the fuel being utilized. But this low efficiency is only slightly, if at all, to be ascribed to the form of fuel used, being due to the form of furnace employed; and this in turn is due to the requirements of the metallurgical process employed and but to a small extent, if at all, to the condition of the fuel. The low efficiency of even well-designed regenerative reverberatories is due to the immense losses by radiation and the imperfect contact between the burning fuel and the material to be heated. In non-regenerative reverberatories, besides these heavy causes of loss, we have a still greater one in the high temperature at which the products of combustion escape from the furnace. Thus, while in some kinds of furnaces the efficiency is as low as two per cent, it rises in well-designed Siemens furnaces to 20 per cent; in cupola furnaces, where the loss by radiation is small and where efficiency is promoted by the intimate contact between the fuel and the substance to be melted, the efficiency rises, according to Gruner, to even 50 per cent; while in iron blast-furnaces, according to this eminent authority, even 80 per cent of the heat generated is utilized (the complete combustion of the fuel both in cupolas and blast-furnaces being of course impossible).

As I have already said, this variation from an efficiency of two per cent to even 80 per cent is due almost wholly to the form of apparatus employed, and to the necessities of the metallurgical operations performed, and not to the nature of the fuel. This is clearly illustrated in the case of coke, one and the same fuel giving an efficiency of two per cent in the crucible furnace, 20 per cent in the Siemens open-hearth furnace, and 80 per cent in the blast-furnace. The form of apparatus is in each case fitted to the metallurgical process employed. If we could make crucible steel or open-hearth steel in the blast-furnace with a fuel efficiency of 80 per cent, we would do so.

Now, to suppose that for any ordinary and extended application, be it for raising steam, puddling, making open-hearth steel, or whatever you please, a furnace can be designed, suitable to the particular process or operation, in which petroleum will have thrice as great efficiency as can be obtained with coal in the most economical furnace in which the latter fuel can be used for that same operation, seems most rash (I had almost said wildly absurd). Of course, there may arise extraordinary operations in which petroleum may offer special advantages counterbalancing its greater cost.

Against what has been said above may be quoted various results said to have been obtained in practice. Thus, we have had in the papers astounding results of the small amount of petroleum required to heat a ton of ingots. Well, there is a difference between heating cold ingots and soaking hot ones. Again, apparently wonderful results have been obtained (so we are told) with open-hearth steel furnaces. Some of these I have had opportunity of investigating, and the efficiency of the petroleum was indeed quite high. But this was owing to the furnace being run at a much higher temperature than is wise. We all know that, whether your fuel be coal, or petroleum, or sawdust, or wet tan, with a

*Comptes Rendus, tome lxxvi., p. 444, and lxxviii., pp. 486 and 686.

properly designed Siemens furnace you can obtain a temperature that will melt down any refractory material. Now, it is always a question how hot it pays to run an open-hearth furnace. If you run it so hot that your furnace melts down in a week, your fuel consumption per ton of ingots may be very low, but it does not pay. In these cases, I have not the slightest doubt that about as good efficiency could have been obtained with coal as was obtained with petroleum, if it had been thought wise to sacrifice the life of the furnace to saving fuel; for it goes without saying that you can get as high a temperature with coal as with petroleum, if your apparatus is designed for that end.

Beyond all this, there can not be the slightest doubt that many of the statements that have appeared in the technical papers in the last year as to the consumption of petroleum in accomplishing a given result have been grossly inaccurate (which is putting it mildly), though I do not mean to imply that they have been intentionally so.

In fine, I can not believe that petroleum can replace coal for any ordinary or extended metallurgical purpose until the cost of 300 gallons (or say 1900 pounds) of petroleum shall be somewhere about the same as that of a ton of coal. There may be points in the world where something approaching this relation between the prices of coal and petroleum exists, as, for instance, in the immediate neighborhood of petroleum-fields and far removed from coal. Such conditions may exist on the west coast of South America in certain probably very limited regions, or at certain places in India.

The writer knows of no place in North America where the use of petroleum has been found economical, where the facts have been carefully and systematically investigated by competent and disinterested engineers. On the other hand, there are important and extensive establishments where its use has been thoroughly tested on an enormous scale, for many months consecutively, in furnaces designed and remodeled by its strongest advocates—establishments where the ratio of the price of petroleum to that of coal is comparatively low; and in these, its use has been found not only more costly but vastly more costly than that of coal, even making all possible allowances for its undoubted advantages of saving in handling and in repairs.

BOSTON, June 23.

FURNACE, MILL, AND FACTORY.

The Maiden Reduction Company, of Montana, has ordered a \$3100 smelter from Fraser & Chalmers, of Chicago.

The Union Pacific Railroad Company has closed the Laramie Rolling-Mills and the Omaha Foundry, as it can buy cheaper than it can produce.

The Brown & Van Arsdale Manufacturing Company, of Chicago, Ill., has made an assignment. Liabilities, \$110,000; assets, \$200,000.

The South Mountain Powder Company has been bought out by the Duponts.

The Elba Iron and Bolt Company's mill has resumed operations in full.

Oley Furnace, in Berks County, Pa., owned by the Clymer Iron Company, is again in blast and doing well.

The Pittsburg Bessemer Steel Company is erecting a mill for the manufacture of structural steel for buildings and machinery. The foundation of the building is laying, and the whole will cost \$80,000.

It is stated that Reading will probably have a large steel-works, the chief movers in the matter being John Keppelman, formerly of the Union Foundry, North Reading, Jerome L. Boyer, Dr. Stanley Smith, W. Bentley Smith, and Augustus Stein, a German metallurgist and steel manufacturer, who recently came to this country. The works, if built, will utilize certain inventions of Mr. Stein in the steel-making line that are pronounced to be very valuable improvements on present methods.

The National Tube-Works Company has reduced its capital stock from \$500,000 to \$150,000.

The Pennsylvania Railroad Company has just placed its order with the Cummer Engine Company of Cleveland, Ohio, after a thorough investigation of the various automatic engines by its best experts, who visited the different manufactories and examined the engines in operation and in course of construction. It is stated that the Pennsylvania Railroad Company thoroughly investigates the merits of every thing it purchases, even down to the smallest detail. The Cummer Engine Company shipped another one of its Ballantine ice and refrigerating machines recently to the Robert Fortner Brewing Company, Alexandria, Virginia, and will soon ship two more of these machines to the Buffalo Co-operative Brewing Company, Buffalo, New York. The refrigerating-machine recently shipped to Albert Ziegele & Co., of Buffalo, has been successfully started up, and the purchasers are much pleased with its performance. The company has just furnished a 225 horse-power engine to the Amoskeag Manufacturing Company, of Manchester, New Hampshire, and will in a few days ship a 67 horse-power engine to Messrs Stults & Kile, of Orwell, Ohio. The following orders have just been placed with the company: A 55 horse-power engine, with complete outfit, for Messrs. Todd & Hosford, Eugene, Ind.; one of 350 horse-power for Carlton, Foster & Co., Oshkosh, Wis. and a 55 horse-power, outfit complete, for A. Dietly & Son, Moorheadville, Pa.

The production of the Pennsylvania Steel Company's plant for the month of May was as follows: Bessemer ingots, 13,249 tons; blooms, 13,095 tons; steel rails, 8834 tons; open-hearth ingots, 1862 tons; pig-iron, 13,168 tons. We glean the foregoing information from the *Steeltown Reporter*, which adds: 'Four furnaces are in full operation and show the following production for the month of May: No. 1, 1800 tons; No. 2, 2889 tons; No. 3, 4429 tons; and No. 4, 3000 tons.

Hussey, Howe & Co., of Pittsburg, Pa., have introduced natural gas into a steel-melting furnace as an experiment. The new appliances used added to the success of the experiment.

Edward S. Rappello has been appointed receiver of the Howe Scale Company, of Rutland, Vermont.

At the Elizabeth street station, New York City, of the Brush Electric Illuminating Company, a 3-inch shaft revolving at a speed of 750 revolutions, was for a week lubricated with Barthel's solidified oil. No trouble was experienced, as with other lubricators, in preventing its scattering about, and the lubricating was done fully as well.

The Bowers Furnace property of the Cumberland Coal and Iron Company was sold at Cumberland, Md., at sheriff's sale, June 18th, and purchased by Messrs. Fulmer, Hilliard, and Gwinner, who are understood to represent a bank at Easton, Pennsylvania. The amount paid was \$100. The property is encumbered to the extent of over \$100,000. It is probable that some basis of settlement will be reached by which the company can regain control of the property.

The troubles surrounding the Westlake mill, at Youngstown, Ohio, are in a fair way of amicable adjustment. The Himrod furnaces, at Youngstown, Ohio, are still idle, and will probably not be put in blast again at present.

The furnace erected by the Youngstown Steel Casting Company at Brier Hill, Ohio, is producing thirty-five tons a day of dephosphorized metal.

The Wellsville Rolling-Mill Company, Ohio, which has been boring for gas, struck it at the depth of 540 feet, and will use it for fuel through the works.

Mr. A. J. Ricks, Special Master Commissioner in the Brown, Bonnell & Co.

case, has made his final report. It shows that the whole number of creditors of the firm is 176, with an aggregate amount claimed of \$1,307,073.76. The aggregate amount allowed by Mr. Ricks is \$1,232,069.20, with \$84,786.08 interest, making a total of \$1,316,855.28. A carefully prepared schedule showing the amount each creditor claims, what is allowed by the master, and the interest, accompanies the report.

Reports from Pittsburg, Pa., are, that A. Garrison & Co. have just finished the new sheet-iron trains for the Chartiers Iron and Steel Company at Mansfield. They have also just completed the new wire-rod trains for the Oliver & Roberts Wire Company mill of Pittsburg, which was started on the 12th inst., and is now in successful operation. The firm has recently shipped to Groove, Grier & Co., of Danville, a steel sheet train and also the new 25-inch and 84-inch chill rolls and dressings for the Linden Steel Company. It has under way a 24-inch universal train for the Pottstown Iron Company, and an 18-inch and 9-inch train for the H. P. Nail Company, of Cleveland. The same firm completed last week for MacIntosh, Hemphill & Co. a set of three-high 32-inch and 115-inch chill rolls with a 20-inch intermediate. These rolls are to go in the new plate-mill of Park Brothers & Co., of the Black Diamond Steel-Works, of Pittsburg, and are the largest chilled rolls in the world.

The Volta Iron Company's mill, at Apollo, Pa., started up June 23d full handed.

The American Galvanized Iron Association, which was organized in Pittsburg a short time ago, will hold a meeting at Cresson Springs on the 15th of July. A permanent organization will be effected and other business of importance transacted.

The manufacture of mineral wool has been begun at the Isabella blast-furnaces at Sharpsburg, Pennsylvania.

The well-known producers of Connellsville coke, the H. C. Frick Coke Company, of Pittsburg, have issued two pamphlets concerning the applications of that fuel to a variety of purposes. The firm now controls 3500 coke-ovens, with a daily capacity of 350 cars, or 5250 tons. An average analysis of the coke, made by Mr. Andrew S. McCreath, a well-known chemist of the Pennsylvania Geological Survey, shows its composition to be: 0.030 per cent of water at 225 degrees; 0.460 per cent of volatile matter; 89.576 per cent of fixed carbon; 0.821 per cent of sulphur; and 9.113 per cent of ash. The coal from which it is made contains 61.527 per cent of carbon, 1.124 per cent of moisture, 6.094 per cent of ash, 0.758 per cent of sulphur, and 30.497 per cent of volatile matter. The coke weighs 40 pounds to the bushel. For foundry purposes, Connellsville coke has been gaining an extending market in the Eastern and Middle States, crowding out anthracite, which was formerly exclusively used for that purpose. A second pamphlet by the H. C. Frick Coke Company gives instructions how to use crushed coke for domestic purposes, and gives the results of tests made. An interesting statement is submitted concerning a Morris, Tasker & Co. water-heater, showing a saving of 30 per cent in favor of coke.

RAILROAD NEWS.

A report was filed June 20th in the Prothonotary's office at Philadelphia by E. Coppee Mitchell, as master in a suit of the Kelsey Oil and Mineral Company against the Oil Creek & Alleghany River Railroad Company, to recover compensation for ten years' use of a railroad, about a mile and a half long, running north from Rousseville. The master recommends a decree in favor of the oil company for \$77,132.35. The oil company charged that the road was secured by the defendant under a fraudulent conveyance. The suit was brought in 1870 and the right of receiver was decided by the Common Pleas Court several years ago.

The Reading & Pottsville Railroad Company has completed a survey and location for its road through Pottsville, which has been adopted by the directors. The route is the same as that heretofore located by the Pottsville & Mahanoy Company, a friendly corporation, which is endeavoring in the courts to establish its right thereto as against the Philadelphia & Reading Railroad Company, the Schuylkill Navigation Company, the People's Railroad Company, and the Water Gap & Schuylkill Railroad Company. The property claimed by these rival corporations and appropriated by the Pottsville & Mahanoy Company lies south of the town, where the new company means to erect a round-house, water stations, shops, etc.

The receivers of the Philadelphia & Reading Railroad Company and the Philadelphia & Reading Coal and Iron Company have issued an official notice, in compliance with the order of the court on the subject, which states that they will be prepared to issue after June 30th receivers' certificates bearing 4 per cent interest from June 20th, 1884, for all claims for materials and supplies furnished to the several companies since April 1st, 1884. All parties having such claims will present them for settlement to D. Jones, Controller of the Philadelphia & Reading Railroad Company, or F. P. Kaercher, Secretary of the Philadelphia & Reading Coal and Iron Company.

LABOR AND WAGES.

The strike at the Warrior mines, Alabama, has been satisfactorily settled. There has been no reduction with the exception of two mines that had two and a half cents a ton more than the other mines.

The directors of the Chesapeake & Ohio Canal decided on June 20th to reduce the pay of the officers and clerks 20 per cent., and to dispense with all labor not absolutely necessary.

Fifty molders at the Penn Hardware Company's Works, at Reading, Pa., left in a body June 20th. The size of their molds was increased recently without any advance in their pay, and the men refused to work on the patterns. All the men belonged to the union. Thirty molders remain in the shop.

The coal miners of the Hocking Valley have asked that a general strike be declared in Ohio against the reduction from seventy to sixty cents in their pay. The operators demand a reduction in railroad rates in order to accede to the demands of the miners. Thirty-two mines are closed, and about 5000 men are out of employment, besides those living along the railroads in the coal regions.

Twenty-one branches of the Miners' Amalgamated Association have been established in Schuylkill County, Pa., within a month. President Harris is now in Luzerne County organizing that section.

D. R. Jones, ex-President of the Miners' Association, has been prominently mentioned as Chief of the Bureau of Labor Statistics, as a compromise candidate between Messrs. John Jarrett and T. V. Powderly.

The payment of the April wages of the New Jersey Central Railroad employes has been finished. The employes of the main line received their money several days ago. This leaves the company still a month in arrears, the May wages having been due, according to the established custom of payment, between the 10th and the 15th of the present month. But this arrearage will be at once liquidated. The pay-car will start out again June 30th, and will pay the May salaries as quickly as possible.

COAL TRADE NOTES.

ALABAMA.

At the Pierce mines, Warrior, on the Louisville & Nashville Railroad, operated by J. T. Pierce & Co., the old shaft is working steadily, employing about 60 men. The new shaft has not got fairly at work yet. They are also opening about twelve drifts down in the valley, which will be reached by an inclined plane down the side of the mountain. They have the engines fixed ready for work.

and are busy with the dumps. These drifts will extensively add to their shipments. The coal ranges from two feet six inches to three feet six inches. At the Hainey mine, work is steady. The coal here is also three feet. They pay 80 cents a net ton. Brake's mines, which are about two miles south of Warrior, are working steadily, and pay 80 cents a net ton.

COLORADO.

The engineers at the coal mine at Louisville having received notice of a reduction in their pay, struck, and consequently the mine is idle until matters can be adjusted.

The Purrier Coal Company has been incorporated, with a capital stock of \$25,000. The directors are Thomson H. Thomas, Henry Purrier, and Loudore Mullin. The principal office will be at Guionison City.

ILLINOIS.

The Grundy County Coal Company, at Rochelle, has been incorporated with a capital stock of \$75,000.

INDIANA.

The Brazil & Chicago Coal Company and the Brazil Block Coal Company have merged their mining interests by the former company selling out to the latter. The consolidated company at the same time purchased the mining interests of Zeller & McClellan, so that there passes into the management of the new concern, which will be known as the Brazil Block Coal Company, eight of the leading mines of the famous Block Coal District, with a capacity of upward of 2500 tons a day. The Brazil Block Coal Company has increased its capital from \$150,000 to \$400,000. It now possesses nearly 1600 acres of coal lands in the best part of the field. The output of the eight mines was more than 400,000 tons, and the new company controls more than one half of the capacity of the district. It has opened an office in the New Commercial Bank Building in Chicago, which is the principal market for the block coal.

The strike in the district, which had been going on for three months, was terminated on the 1st of June by the acceptance, on the part of the miners, of the operators' terms, 75 cents a ton for mining. The miners are now working and are doing a fair amount of business for the summer season.

MARYLAND.

Reports from the mines at Lonaconing, for the week ended June 20th, state that Detmold is working full-time. Coney, full-time. Jackson, about three-quarter time. Koonz, half-time. Pekin, full-time. Franklin, three-quarter time. Hampshire, half-time. Phoenix, doing very little. Potomac, full-time. Swanton, six hoppers a day. Ocean, full-time. Midland, full-time. Miller, full-time. Midlothian, suspended. Hoffman, half-time. Borden Shaft, half-time.

MONTANA.

It is reliably reported that 200 miners will soon be employed in the Bozeman Coal Company's mines—the demand for coal and coke necessitating the increased force.

OHIO.

Work continues to go slowly in the Nelsonville District, and in fact throughout the entire Hocking Valley, and there is no indication of any improvement.

The operators of the Mahoning Valley report a slight increase in the coal trade. Work has been commenced on the new Kyle shaft, on the T. P. De Camp farm, near Youngstown. The Manning shaft is running, with plenty of orders on the books.

Brookfield bank, at Brookfield, is running about half-time. It had steady work the first week in the month, but is back to the old place again.

The coal trade in the lower part of the Tuscarawas Valley is about at a standstill. All the sidings between Massillon and the river are standing full of loaded coal-cars, and work at all the drift mines is generally suspended. The coal from this region has recently been sold through a pool, the breaking up of which a few days ago has disarranged trade, and each company will now have to establish its own trade. It is hoped all will soon get to work again. The lake orders have not yet begun to come in very strong.

The coal business continues dull in the neighborhood of Steubenville. The Market street shaft is running steadily, but it has only a few of its coke-ovens in blast. The rolling-mill shaft is averaging about three-quarter time. Swift's shaft is idle. Averick's shaft made full-time last week. The Gravel shaft and the furnace are idle. Bustard's shaft is running about two-thirds time. The rolling-mill is on double turn, with no stock of rails on hand. Both blast-furnaces are out.

An explosion of fire-damp recently occurred in the Leadville shaft at Weathersfield, by which three persons were injured and one killed.

The Pine Hill shaft is down to coal, and pumps to clear the water have been put in. They have struck some old workings and are troubled with foul air.

A deposit of natural gas was struck at Steubenville June 23d by drillers at the Jefferson Iron-Works.

The Columbus & Hocking Coal and Iron Company has reduced the price of coal as follows: Lump coal, \$2.25; nut, \$2. Prices at yards 25 cents a ton less. Special prices to manufacturers.

PENNSYLVANIA.

ANTHRACITE.

Charles Miesse, former proprietor of the Pottsville coal-yards, has leased a large tract of coal and timber land at Newtown, in the western part of the county. Ground has been broken for a colliery, which will ship coal from two large veins similar in quality to Lykens Valley coal.

Another vein of coal has been struck at the second opening of the Woodward shaft on the hill below Kingston.

Excavations began June 23d for the starting of a second opening or air-shaft to the Pettebons colliery of the Delaware, Lackawanna & Western Coal Company, at a point about 300 feet to the northwest of the main opening.

Owing to the fact that the Clark vein at the Mount Pleasant mine can not be reached by the slope now located there, a new shaft is to be sunk.

The tunnel is pushed straight into the hill by the Parrish Coal Company at Plymouth, from which a slope is to be sunk. It does not yet penetrate any of the anthracite except an insignificant portion of the outcrop.

Preparations are making for the sinking of a new slope at the North Laurel Ridge colliery. The slope will be 60 yards long from the drift or water-level, and be driven on the 4-foot vein lying between the Skidmore and Mammoth veins. A tunnel will then be run to the Mammoth vein and to take the coal from the old workings of Gilberton colliery.

In excavating, while working on the Girard Dam, in the mountain ravine above Lost Creek, a seam of coal of a superior quality has been discovered. Some of the coal is used in the engine.

BITUMINOUS.

The Cambria Mining and Manufacturing Company has decided to begin the development of its extensive coal property on the Pennsylvania Railroad, near Sonman station, Cambria County. The two tracts, 600 and 800 acres of solid coal, have been placed in charge of John Whiteside, a Clearfield operator of large experience. A short time ago, he and the engineer, George L. Miller,

divided the property into plots that will admit of its development by a number of operators.

The Globe Coal Company, of Pittsburg, has filed application for a charter to mine and deal in coal found principally in Washington County. The capital stock is \$40,000. The directors are John Blythe, Henry L. Silverdinger, John Musgrave, Robert Gregg, and W. K. Gillespie. The first-named gentleman is president of the company.

At Leith, there are three fire-bosses who are compelled to hand in a written report of their examination of the mine each morning previous to the time for the miners to go to work. There is also an inspector of machinery who is required to make a thorough inspection of the ropes, cages, and all the other machinery every morning, and report in writing.

The Umpire coal-works, at Brownsville, may have to be abandoned. For weeks past, the hill has been falling in, and from present indications the bank will be ruined.

The works at Leechburg are only doing tolerably well. Leechburg Colliery, No. 1, is employing only forty-five men and running about two-thirds time. No. 2 is doing a little better, and employing about sixty men, with a fair prospect. No. 3 is employing about sixty men, but not making more than half-time, while No. 4 is employing about fifty men and has been making about two-thirds time. The price of mining at Nos. 1, 2, and 4 is fifty-five cents a ton over a three-quarter inch screen, and at No. 3 sixty cents a ton over an inch screen.

An explosion of gas in Rankin's coal mine, at Monongahela City, June 26th, fatally injured one and badly turned another miner.

COKE.

The Coke Producers' Association decided, June 20th, in view of the unsatisfactory condition of the trade, to further restrict the production by closing down 10 per cent of the ovens. This will reduce the production 25 per cent, as 15 per cent of the ovens have been idle since the formation of the pool. No change will be made in the selling price.

One hundred coke-ovens are erecting at Gallitzin, on the Pennsylvania road.

NATURAL GAS.

Jones & Laughlins have begun the drilling of a well at the American Iron-Works, and Moorhead, McCleane & Co. at Soho. A syndicate of Allegheny River mills proposes drilling at Zug's, Shoenerger's, Parks's, and Miller, Metcalf & Parkin's. Major Howard Martin has completed arrangements to drill on his place at Forward and Murray avenues, Twenty-second ward. At the Pennsylvania Tube-Works, Fourteenth ward, natural gas has been in use some two weeks, at a cost about half the old expense for coal and coke, and with the most satisfactory results in other respects. The workmen find the new fuel superior in its application to the manufacture of wrought-iron tubes, and the works are taking on an appearance of cleanliness heretofore unknown in Pittsburg factories. Of the four wells projected along the Allegheny River mill district, in the Ninth, Twelfth, Fifteenth, and Seventeenth wards, that at the Black Diamond Steel-Works, foot of Thirty-first street, has been commenced.

At Hulton, Allegheny Valley Railroad, Agnew & Brothers are about to drill a well for gas at a point about 500 feet from the river. The derrick and engine-house are completed, and the drill will be started this week. It is understood that the drill will also be started soon on the tract near Hulton owned by Mr. Alexander Nimick, and should gas be got in sufficient quantity, the large steel plant of Singer, Nimick & Co., Thirty-fourth ward, South Side, will be in part removed to Hulton, and future extension of the works be made there.

A meeting of the Special Natural Gas Committee of Councils was held at Pittsburg, June 20th, to consider the Westinghouse ordinance. Mr. W. A. Magee stated that his object in obtaining the reference to the committee was to provide such safeguards in the piping and consumption of the gas as would obviate danger to person and property. Mr. Westinghouse stated in return that he proposed to lay a double pipe, one inside of another. The in-side pipe is to be the high-pressure pipe into which the gas from the well goes directly, and the leakage from it will be caught up by the outside pipe. The pressure from the well is about 200 pounds to the square inch, and no one would want a connection with his house or factory with such an immense pressure. A pressure of from a quarter to half a pound is enough. The connections with houses will only be made to the outside pipe, into which the leakage from the high-pressure pipe goes, and if enough does not leak in to supply consumers, a valve can be opened to let more gas into the outside pipe. A valve is to be made to each connection with the outside pipe, and in case the pressure gets too strong, it will automatically close. The excess of gas over what is needed by consumers can be let out by means of pipes running from the pipe into the air, alongside of or over the tops of houses. Mr. Westinghouse's pipe operates on the same principle as his air-brake, using the high pressure of gas from the well instead of compressed air. The committee will meet again June 28th.

The consolidation of the Penn Fuel Company and the Fuel-Gas Company is said to be so nearly closed as to be virtually an accomplished fact.

GENERAL MINING NEWS.

ARIZONA.

GRAHAM COUNTY.

ARIZONA COPPER COMPANY.—At present, only development-work is doing at the Longfellow mine, as the ore-dumps are all full of good ore. At six different points, deposits of ore have been struck, and near the company's boarding-house, where work is continued on the big cut, over 100 tons of red oxide ore have recently been mined. At the Detroit claim, after sinking a shaft 55 feet in depth, a level has been run that is now 135 feet in length. Two uprisings have been made on this level, both of which are in ore. At the Modoc, the winze is down 30 feet, following the slope of the mountain. The winze is entirely in ore assaying from 45 to 50 per cent. South of the winze, an open cut has been started that shows considerable quantities of high-grade ore. Development-work has been commenced on the White Hawk, Black Hawk, and Oriental claims. In the White Hawk, an open cut is making, in which a body of ore three feet in width has been reached. The ore is basic, and of a good smelting character. On the Little Annie, the main tunnel is now timbering, and the work will be pushed ahead as fast as possible. The new plant is nearly completed. The company had steam up in a portion of the works for the first time June 9th.

PIMA COUNTY—QUIJOTOA DISTRICT.

PEER & PEERLESS—Tunnel No. 1, Peerless, east side of mountain, is in 195 feet. The rock is very hard, and little progress has been made during the last seven days. Crocker tunnel No. 4, east side of the mountain, is in 213 feet. Good progress has been made in this tunnel during the past week. The face is a very favorable formation, showing streaks of quartz, with favorable results. The last contract of 100 feet has been completed. The men at present are working by the day. Bids will be opened for further contract during the coming week. South drift from tunnel No. 2 is in 75 feet. The face is looking about the same as when last reported. The winze is down 93 feet; the foot-wall has been encountered, and the workmen are sinking on that at an angle of 70 degrees to the west. Peer tunnel No. 3, west side of the mountain, is in 197 feet. The face is in a softer material than when last reported, showing some iron stains, and indications are, that the vein is near. Crocker tunnel No. 5, on the west side of

the mountain, is in 18 feet, and is pushed ahead as fast as possible with eight-hour shifts.

YAVAPAI COUNTY.

LYNX CREEK HYDRAULIC WORKS.—The Eastern parties having a bond on this property failing to come to time, Governor Tittle, in company with the Murphy Brothers, will, it is rumored, hereafter operate these rich diggings. During the last winter, it is said that nearly \$20,000 in gold were taken out.

CALIFORNIA.

The World's Electrical Rebellious Ore Reduction Company has been incorporated at San Francisco, to operate and control different patents for reducing, roasting, and amalgamating gold, silver, and other metals; to manufacture mining machinery, to purchase ores, etc.; to locate, sell, or work mines. The capital stock is \$10,000,000, divided into 100,000 shares. Andrew M. Shields, Lewis A. Gates, William B. Douglass, William L. Dawson, and J. F. Stirling are directors. The Rebellious Ore Reduction Company was incorporated for the same purpose, with a capital of \$10,000,000 and the same directors, except that Joseph Dinkelspiel is substituted for J. F. Stirling.

ALAMEDA COUNTY.

CASTLE DOME.—The personal property of the Castle Dome Mining and Smelting Company, at its works at Malrose, brought at sheriff's sale \$17,321. It consisted chiefly of machinery, tools, assay outfit, lead and bullion bars, and was purchased, for the most part, by Whittier, Fuller & Co., the judgment creditors.

AMADOR COUNTY.

OLETA.—This mining company has been incorporated to operate the old Slaughter-House ground.

CALAVERAS COUNTY.

Money is raising among the farmers on the Calaveras River to prosecute hydraulic miners in Calaveras County.

INYO COUNTY.

MAXIM.—This company works the old Chase and other mines. The five-stamp mill has just started up.

MONO COUNTY—BODIE DISTRICT.

Reports for the week ended June 16th:

BODIE CONSOLIDATED.—The secretary's report, presented at the annual meeting held at San Francisco June 16th, showed cash on hand \$146,933.03. The following officers and directors were elected for the ensuing year: Thomas Brown, Archie Borland, Joseph Clark (Vice-President), W. H. King, George I. Ives, J. L. Browne, W. P. Willard (President); Bank of California, Treasurer; John Kelly, Superintendent; George W. Sessions, Secretary. During the week, 546 tons of ore were crushed at the mills. The average assay of the pulp is \$22, and of the tailings \$2.

BODIE TUNNEL.—The vein in the face is improving, while the rock breaks about the same.

STANDARD CONSOLIDATED.—Since resuming operations, there have been extracted and shipped to the mill 654 tons of ore; received, 720 ounces of crude bullion, and shipped to the company this day \$5845.74.

PLUMAS COUNTY—GREENVILLE DISTRICT.

GREEN MOUNTAIN.—Fine progress is making in the main rise in the Blake chimney. It is now nearly 400 feet from the No. 6 tunnel, and is advancing at the rate of about 35 feet a week. Connection will doubtless soon be made with the No. 5 level. Rise No. 2 is 68 feet east of the main rise, and is now about 125 feet up, and is in good quartz. The Blake chimney is opening by three blind drifts, which are respectively 84, 161, and 285 feet from the No. 6 tunnel. Connection has been made in No. 1 blind drift east with No. 2 rise, and stopes are starting and ore-chutes putting in at this point. Work has been discontinued on No. 6 tunnel west, on account of air; but as soon as the rise is through to No. 5 level, the drills will be started again and work prosecuted vigorously until the Sulphuret chimney is reached, a distance of nearly 300 feet from the present face. At present, the company is running only 30 stamps, which are supplied with ore from the two rises and the blind drifts; but the 60 stamps will also be in operation in two weeks more, and the mine will be in shape for a long and profitable run.

SUNSET.—The ledge in the drift has widened out and is prospecting well. In the east and the west end of the Firmstone stope, the ledge maintains a uniform width of four feet, with a decided improvement in the quality of the ore, some parts of the ledge showing free gold.

SAN BERNARDINO COUNTY.

DAGGETT REDUCTION-WORKS.—These works, at Calico, have been opened for business, and the results of the first week's run have been highly satisfactory.

SIERRA COUNTY.

ARIZONA GOLD MINING COMPANY.—It is the intention to let a contract for running two hundred feet of tunnel.

CENTRAL AMERICA.

HONDURAS.

CAMPBELL REDUCTION COMPANY.—The annual report of the company, of which ex-Senator H. A. W. Tabor is president, has been filed in the county clerk's office at Denver, stating that the amount of the capital stock is \$1,000,000, all of which was issued in payment for property necessary for the business of the company; amount paid in cash, nothing. The debts do not exceed \$10,000.

COLORADO.

CHAFFEE COUNTY.

COLUMBUS.—After two years of litigation between this company and the owners of the Tabor mine, the suit has been ended by a compromise. It is stated that the owners of the Columbus mine will increase their force of men on the mine, and that their large 40-stamp mill that has been idle for more than six months will begin running.

EXCHEQUER.—The mine has been sold to Eastern parties, who have already begun work.

MASON.—A company has been organized to work this mine.

MONARCH TUNNEL.—Work is to be resumed on the tunnel, which is in 450 feet.

CLEAR CREEK COUNTY.

The Crown Prince and Ready Cash mines have been sold. The new owners will start up operations at once, and intend to largely develop their property. It is currently reported that a mill will be erected for the treatment of these ores.

CORRY CITY.—A body of rich ore has lately been encountered in sinking the main shaft on this lode, on Republican Mountain. The work of development and exploration goes on uninterruptedly.

TERRIBLE.—The company is making preparations for putting up a Rand steam-drill in the lower level of the mine, and an extra boiler to furnish steam.

CUSTER COUNTY.

BASSICK.—The machinery for the deep workings is now on the way to the mines.

BUFFALO.—The mill has begun crushing ore, but will not be in full running order for about two weeks.

BULL DOMINGO.—The new strike is thirty feet thick, and still in ore, solid and of good grade.

JULIANN.—The company, which for a time was somewhat discouraged, is about to start up its concentrator.

FREMONT COUNTY.

The only effort to systematically open any of the zinc ore-bodies of this State was made by Mr. E. H. Saltiel, in his mines at Cotopaxi. Mr. Saltiel for some time worked these mines, and is now trying to dispose of them to parties who will open them up on a scale sufficiently large to make them highly profitable.

GILPIN COUNTY.

CALIFORNIA.—The company will soon begin sinking an additional 100 feet in the Standley or east shaft on that vein. Quite a strong force is employed on the Hidden Treasure or westerly portion of the property. The company also has the new stamps—five five-stamp batteries—recently added to its Hidden Treasure mill in the upper portion of Black Hawk in running order and crushing. This gives at this mill a capacity of 75 stamps, which are driven by water-power.

CONSOLIDATED BOBTAIL.—Mr. Rogers has been experimenting with some of the slimes that run from his mill, and, by the mixture of oil with this refuse ore he has succeeded in making a very good quality of paint, a coat of which has been given one section of the mill, to test its durability. The slimes are so fine that one can not feel the particles of mineral while rubbed between the fingers.

FOURTH OF JULY.—A contract has been let for sinking the main shaft on the vein 50 feet deeper.

HUBERT.—The main shaft has been enlarged and straightened where needed, and the mine is now in shape for deeper development.

PRIZE.—The engine-house of this mine, near Central City, was demolished by lightning June 23d, and five miners who were at work were badly stunned, but it is thought they will recover.

GUNNISON COUNTY.

ADAMS PROSPECTING COMPANY.—Work has been resumed on the Homestake property, which shows a body of heavy galena ore over four feet in width.

BLACK QUEEN.—A strike of wire silver has been made in this mine on the south slope of Sheep Mountain. The vein, which is a contact between four and five feet wide, has a pay-streak thirty inches wide, carrying brittle silver and wire silver in a fine-grained quartz, and will mill over 500 ounces of silver to the ton. There are several locations on this vein, and work is starting on them.

CLIMAX.—Assessment-work has been done on this mine, which shows a large vein carrying copper and iron pyrites and a small streak of ore assaying high in silver.

GOOD ENOUGH.—A 100-foot tunnel will be run on the vein, which carries a heavy galena and copper ore. The present development shows mineral 5 feet wide on a large true fissure.

HINSDALE COUNTY.

CROOKS MINING AND SMELTING COMPANY.—The dry process at the concentrator has been working satisfactorily, and third-class ore is also treated by the wet process with good results. The mine is in good condition.

JEFFERSON COUNTY.

GENERAL THOMAS.—An assay made from ore taken from this mine shows 103 ounces of silver, 1½ gold, 24 per cent copper; value per ton, \$185.13. This mine is within three and a half miles of Golden.

LAKE COUNTY.

The Leadville Herald reports the following: The daily ore production of Leadville, excluding iron ore, is much larger than is generally estimated by most persons. The daily output aggregates at least 970 tons. With the advancement of the summer season, this output will increase, and it is reasonable to presume that during July the output of the Leadville mines will average at least 1100 tons a day, which, compared with last year's production for the same month, will show only a slight decrease.

The difficulty with the smelters is not so much in the lack of ore, as in the absence of ores running high in lead, without which dry ores can not be smelted. The smelters at present are paying good prices for ore running in lead, and in a short time the objection to mining lead ore on account of the low price of lead will be obviated, and most of our smelters will again have all their furnaces in blast.

At present, out of the twenty-four furnaces in the city, sixteen, or two thirds, are doing service, while a fortnight ago only one half of the whole number were in blast. We believe it is safe to estimate that by the middle of July four fifths of the furnaces in the camp will be in operation, and while the amount of base bullion produced daily will not be as great as it was at this time last year, the value of the bullion will be higher, and the value of the bullion production in excess of that of the same period of 1883.

The working of hand-jigs on Leadville waste and low-grade ore-dumps is not always a profitable occupation. A large number of jigs in operation on Carbonate Hill have stopped work, claiming that they could not make it pay. The wages paid operators of jigs is higher than that received by miners. Good jiggers receive about \$3.50 per day, an operator of only average ability \$3.25, and a limited number of very good hands at the jig get \$4 per day.

BROOKLAND.—The mine is showing up some fine sand carbonate ore, containing chloride of silver in great quantities.

CHRYSOLITE.—Mr. James Campbell's arrangement with the company, under which the bulk of underground work was done under contract, expired a few days ago, and will probably not be renewed, as the cost of mining work in all departments has been considerably reduced during the year past. While Mr. Campbell made money working under this contract, the company doubtless also saved considerable, the effects and results being much the same as are attained in leasing mines.

COLORADO & UTAH ORE COMPANY.—The company has purchased the mill-site of the old Tabor mill, and will immediately begin the erection of sampling-works of a capacity of 150 tons a day. The company, in addition to large contracts with the Salt Lake smelting-works for iron ore for fluxing purposes, has just made a contract for a year with the Colorado Coal and Iron Company for fifty tons of iron ore a day, to be delivered at the company's steel-works at Bessemer, near Pueblo. The affairs of the company in Colorado are under the management of Mr. Ellis Harris.

DUNKIN.—Considerable fine ore is found in the extreme northern portion of the claim. There is a large body of black iron ore here, through which occur good pockets and seams of galena ore of high grade.

FRYER HILL.—A number of improvements have lately been made at these smelting-works, calculated to facilitate the handling of ore, fuel, and slag, and reduce the operating expenses of the establishment.

HIGHLAND CHIEF.—The mine, which has been idle for many months, will probably be leased again.

IRON SILVER.—The company has made a contract for its ore production for the next year, beginning with July 1st, to the American Smelting Company.

LA PLATA.—The smelter, after a suspension of about two months, has resumed operations, and now has three furnaces in blast. A fourth furnace will probably be started up in a few days. The smelter during the past two months has secured a considerable stock of ore, and, together with the mineral that will be received from time to time, it will doubtless be enabled to keep in operation hereafter continuously.

LITTLE CHIEF.—The ore contract with the Fryer Hill smelter has expired, and a new contract for the output of the mine has been made with the Harrison Reduction-Works.

LOWER YANKEE HILL.—A great deal of prospect-work is at present in progress on the lower or western portion of Yankee Hill. From the May Queen mine to the head of East Sixth street, nearly a dozen shafts are worked, several of which show fair ore. The remaining ones are mere prospects, operated by leasers, all of whom seem to feel quite confident of soon striking mineral of paying grade.

MORNING STAR.—The lessees of the Buckeye Belle, a portion of the Morning Star consolidation, have struck fair iron ore. Small pockets of two thousand ounces ore have been encountered within the past few days in the "Kitchen" workings.

NEW PITTSBURG.—A valuable body of ore has been struck in this property. It is on the Pittsburg claim, adjoining the Stonewall Jackson. It is seven feet thick, and widening, and the ore assays about twenty ounces silver, and about sixty per cent lead. The ore was struck almost simultaneously in two places, about 70 feet apart, and at a depth of 185 feet from the surface. Present indications lead to the belief that the body of ore is a very large one, of low grade, with chances of improvement.

TWIN LAKES.—A letter from England states that \$50,000 more have been secured for the further improvement of this placer property.

SUMMIT COUNTY.

OHIO.—A vein of a high-grade chloride of silver ore has been struck. A large quantity has been taken out and is now ready for shipment. The strike has caused quite an excitement in the vicinity of Shock Hill.

DAKOTA.

CALEDONIA.—The main shaft, which was recently damaged by a cave-in, is repairing, and will be sunk 100 feet deeper and a new level run; 319 ounces gold were produced for the last half of May.

FATHER DE SMET.—Reports under date of the 4th inst. are as follows: I herewith inclose you express company's receipt for bar No. 184, containing 1451.10 ounces gold, the result of clean-up of mill for the last half of May, making a total of 2769 ounces for the month—a better result than has been obtained for a long time. The mine continues to look well, and there seems to be a permanency to the present character of ore that is very encouraging. Tramway header, third level, is pushed ahead at its usual rate. The face is still in a mixture of quartz and slaty matter, sampling very low. The south header shows no change as to quality of ore. The report of the mine from June 7th to June 15th shows ore extracted from the first, second, and third levels, 2060 tons. Ore milled, 2100 tons. Tramway header advanced 6 feet. Header in 36 feet.

GRAY EAGLE.—The owners of this copper mine have entered into an arrangement with some parties by which a fifty-ton smelter is to be erected for the reduction of the ore within four months from the time of signing the contract.

GREENWOOD.—The machinery for the 120-stamp mill has been purchased, and is now on the road from Chicago.

GEORGIA.

TOWNS COUNTY.

The Erwin and Moore lots have been sold for \$110,000. The company expects to erect a mill about the first of September next.

GUM LOG.—The mine is to be systematically developed. The vein is from 5 to 7 feet, and the ore is of good quality. A ten-stamp mill of the Hall patent has been purchased, and will be erected at once. This is said to be the first stamp-mill erected north of the Blue Ridge in this State.

IDAHO.

BULLION.—The machinery was to start up on the 20th. The transfer of this group to an English syndicate will take place soon, and it is expected that more vigorous operations will then begin.

MAYFLOWER.—The company for nearly two years past has been looking for a continuation of its vein on the lower level, which, owing to a fault or displacement, had been lost. After running over 130 feet from the line of the old workings, it reached ledge-matter and has just cut into an ore-vein having precisely the same characteristics as the old vein, and being evidently a continuation of it.

MEXICO.

Mr. W. H. Ellison, in an interview with a *Tribune* reporter said: To those about to invest in mines in the State of Chihuahua, I would say, Don't. I have spent some time and a great deal of money in that State, and find the mines in the vicinity of the cities of Chihuahua and Parral to be productive mainly on paper. There are a great many Californians and Nevadans down there who have mines to sell to visiting strangers; but from experience, I do not think those shrewd men of the West are the ones to sell a good thing to a stranger. One of the greatest difficulties in working mines is the scarcity of water; the next is the lack of means of transportation. It is rather slow and expensive to carry rock five or six miles down a mountain-side on the back of a burro. Boss Shepherd has some mines near Chihuahua. He comes down from the mountains every few months and unloads some of his bullion on the bankers, and it is shipped to the mint. The mines in the Parral District, about 100 miles from Chihuahua, are not nearly as good as painted in the prospectuses and by those who come on to New York to float them on the market. There is enough money in the country for all paying enterprises, and those who have good mines will not have to go abroad for money to work them. When capitalists who are on the ground are deceived by sharpers, I should think those at a distance would be especially cautious.

MICHIGAN.

GOLD MINES.

ROPES.—The mill has resumed operations. There are more than 120 tons of good rock to start on, and the mine is in shape to furnish far more than the mill can treat. In the mill run, there will be no sorting of the rock, and it will be stamped just as it is mined.

IRON MINES.

Lake shipments of iron ore from the ports of the Marquette District up to and including the 18th of June have been:

	Tons.
Escanaba, Marquette District.....	187,866
" Menominee ".....	297,491
Marquette, Marquette ".....	173,207
L'Anse, ".....	16,806
St. Ignace, ".....	10,525
Total.....	685,895

DETROIT.—The diamond drill at this mine has struck a deposit of ore, penetrating it to a depth of nearly forty feet.

ISABELLA.—This iron company is putting into place a plant of machinery at its workings adjoining the East Vulcan mine.

JACKSON.—The west pit, which has been idle for two years, and what is known as the Carbis pit, on the same side of the mine, which has not been worked for some months, are now actively worked.

MANGANESE.—This company, which has been idle for some months, has resumed operations, the company having made a sale of ore to the Joliet Iron and Steel Company.

QUINNESEC.—The machinery will be removed to the Vulcan, where it will furnish hoisting and pumping power in the sinking of a new shaft. The Quinnesec is completely exhausted. Parties exploring with a diamond drill near it report having encountered a body of lean iron ore, and think they will find a paying deposit.

MINNESOTA.

MINNESOTA IRON COMPANY.—The company is engaged in developing its mines at Tower, and will be ready to begin shipments of iron ore by August 1st, at which time the contractors on the Iron Range road agree to have the section between Two Harbors and Vermilion completed. There are 300 men on the pay-roll of the mining company, and four mines, the Tower, Stone, Breitung, and Stuntz, are now developing. The superintendent states that he will be able to mine and deliver all the ore that the railroad can haul this fall. The ore of all the mines is of the highest grade of Bessemer. The ore-docks at Two Harbors, or Agate Bay, as it was formerly called, are very extensive, and of the most substantial character. One side of the dock, with the car outfit of the railroad company, will be sufficient to handle and put in vessels 5000 tons in twenty-four hours, if necessary.

MONTANA.

MEAGHER COUNTY.

MAIDEN.—This reduction company has ordered a smelter, which will be ready for operations this fall.

SILVER BOW COUNTY.

SWANSEA.—A body of ore carrying 40 per cent copper has been struck. About two weeks ago, this property was bonded to Mr. J. P. Ewing, of San Francisco. A steam-pump was put in, and sinking begun in the old shaft. At the depth of 105 feet, the strike was made, sampling as above stated. The mine lies directly east of the Colusa.

NEVADA.

ESMERALDA COUNTY.

HOLMES.—Contracts for working the Holmes ground have been awarded. The work of cleaning out the tunnels leading to the points where the new developments are to be prosecuted has begun.

EUREKA COUNTY.

EUREKA TUNNEL CONSOLIDATED MINING COMPANY.—Certificates of incorporation have been filed. The capital stock is \$10,000,000. This is the new organization that hereafter will manage and work the ground of the old Eureka Tunnel and Mining Company.

RICHMOND.—The amount of custom ore sent to the furnaces greatly exceeds that of any previous season. The bins and platforms are full, and piles of ore are distributed all over the yard.

RUBY HILL TUNNEL.—The tunnel is in 600 feet, and in the face good indications of ore are found. The company has leased one of its claims, the Jeff. This claim is 100 feet south from the mouth of the tunnel, and was formerly prospected by an incline 40 feet down, in which favorable indications for an ore-body were discovered.

HUMBOLDT COUNTY.

CALIFORNIA NITER MANUFACTURING COMPANY.—An extensive tract of ground, covering all the niter land in this county, has been taken up and located by this company, and it is the intention to push the development of the claim at an early day.

STOREY COUNTY—COMSTOCK LODGE.

All the North End mines, except the work in the Mexican winze, the funds for which are to be jointly contributed by Union, Sierra Nevada, Mexican, and Ophir, have been shut down. The Mexican winze is now at the 3200 level, and will be extended to the 3300, from which point drifts will be run into all the mines of the series. The winze is in easy working ground, and should it so continue, the connection to the 3300 can be made within the next two months. The east side of the winze is in vein-matter that is continuous from the 2300 level down. In the other mines of the series, pumping will be continued.

John W. Mackey, in an interview with a reporter of the San Francisco *Exchange*, said that this move was in no sense a virtual shut-down, but only a concentration of work at one point. He said that if any considerable number of stockholders were dissatisfied with the move, and would guarantee money on the workings of the mines on the old plan, the management would turn the mines over to them and let them work them.

NEW MEXICO.

SOCORRO COUNTY.

The bed of marble that was discovered some time ago in the mountains about nine miles east of Socorro is to be worked by a company that has just been organized. The bed is said to be very extensive, covering more than 10,000 acres of ground. The marble is of a very fine quality, and in the different strata varies in color from an almost pure white to a dark gray.

NORTH CAROLINA.

ARLINGTON GUARANTEE.—This gold mine, located about four miles from Charlotte, has just made an issue of \$20,000 in negotiable bonds, to create a fund for working and development of the mine on a large scale.

MIKADO.—A vein three feet thick has been struck.

NORTH STATE.—Preparations are making for working this gold mine on a larger scale. They are erecting 20 head of stamps, which will soon be ready for work. On the grounds, they have over 500 tons of ore, which will be worked as soon as the machinery is completed. The Eudy shaft is 350 feet deep, and preparations will soon be made to begin work in it again. Two other shafts, 70 feet deep each, are yielding ore of first-class quality.

UTAH.

Prof. J. E. Clayton, of Salt Lake City, who recently visited the southern part of the territory, while crossing the desert in the Detroit District, noticed a mountain in the distance, which, from the formation and general surroundings, indicated the presence of white topaz. He explored the locality, and his expectations were realized by finding a number of these curiosities.

SUMMIT COUNTY.

CRESCENT.—The roads being now in good condition, ore-shipments have been resumed.

SAMPSON.—New developments brighten materially the prospects of this company.

BULLION PRODUCTION FOR 1884.

Table with columns: MINES, States, Month of May, Year from Jan. 1st, 1884. Lists various mines like Alice, Belmont, Bodie, etc., with their respective production values.

Total amount of shipments to date. \$7,113,495. * Official. † Assay value. ‡ Not including value of lead and copper. G. Gold; S. Silver; L. Lead; C. Copper.

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate of discount, and it remains at 2 per cent.

METALS.

NEW YORK, Friday Evening, June 27.

Copper.—The market remains quiet without any features of special interest and only a small business doing. It would probably be possible to procure round lots of lake copper at 4 1/4 c.

English cables put Chili Bars down to-day at £54, and some report as low as £53 17s. 6d., with Best Selected at £60 10s.

The following are the British Board of Trade returns for the first five months of the year:

Table showing trade returns for 1884 and 1883, categorized by Imports (Pure in Pyrites, Precipitate, Ore, Regulus, Bars, cakes, etc.) and Exports (Raw (English), Sheets, Yellow metal, Brass, Foreign, Total).

Tin.—The market has declined since our last, and is now fairly steady at about 19c. for spot, while futures range between 18 1/5@18 5/8c.

Lead.—The market is quiet and dull, the sales aggregating a few hundred tons, the last sales being yesterday 200 tons at \$3.62 1/2 for July and August delivery.

From St. Louis, Messrs. John Wahl & Co. report to us as follows to-day by telegraph:

Our market is sluggish, and Refined for the moment will not bring more than Common lead. We may quote both Hard and Soft lead nominally 3 40c.

From Chicago, Messrs. Everett & Post telegraph us on the market there:

The market remains the same, if any thing a shade weaker, the demand being moderate only, with but very little doing. Offerings, however, are light.

Spelter.—The market is dull and a shade weaker. We quote 4 50@4 60c. for Common Domestic. England cables £14 7s. 6d. for Silesian.

Antimony.—There has been no change.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, June 27.

The following are the statistics of the exports of Great Britain to this country during the first five months of the years 1884, 1883, and 1882:

Table showing iron exports from Great Britain to the US for 1884, 1883, and 1882, including categories like Pig-iron, Old iron for re-manufacture, Steel, unwrought, Tin-plates, Hoops and sheets, Bar, angle, bolt, and rod, and Railroad, all sorts.

American Pig.—A repetition of last week's brief report would fully cover the case now, since there has been no change even in minor points.

Scotch Pig.—It seems difficult to move even small quantities, and considerable pig is going into stock.

We quote ex ship and to arrive: Coltness, \$21.50; Langloan, \$21.50; Summerlee, \$21; Dalmellington, \$20; Gartsherrie, \$21.25; Eglinton, \$19.50@20; and Glengarnock, \$20.50.

At the Metal Exchange, the following cable quotations have been received: Coltness, 57s.; Langloan, 58s. 6d.; Summerlee, 50s. 6d.; Gartsherrie, 51s. 6d.; Glengarnock, at Ardrossan, 49s. 3d.; Dalmellington, 47s.; and Eglinton, 44s. Warrants, 41s. 3d.

Steel Rails.—There have been some heavy transactions in steel rails since the announcement of low quotations, though the mills are not willing to concede them for late delivery.

Old Rails.—Business has been done on the basis of \$18@18.50.

Philadelphia. June 27.

[From our Special Correspondent.]

Pig-Iron.—The demand for pig-iron continues very steady, but of very small proportions, consumers only taking what they want for immediate use.

Merchant Iron.—The amount of business coming in is small; but, in view of the indications of an early improvement, is satisfactory to mill-owners.

Foreign Irons.—There is no movement in English Bessemer, which is quoted at \$19@19.50.

Blooms.—A light demand is presented, and prices paid range from \$53@56 for Charcoal, and \$43@45 for Anthracite.

Muck-Bars.—A number of small sales are reported at from \$30@31.50.

Plate and Tank-Iron.—Quotations for Plate and Tank iron are as follows: 2'10@2'15c., with 2'75c. for Shell, 3'75c. for Flange, and 4'75c. for Fire-Box.

Structural Iron.—For months past, there has been talk about the large requirements of structural iron for the Brooklyn Elevated Railroad.

Wrought Pipes and Tubes.—Quotations are as follows: 30 per cent discount on Butt-Welded Black Pipe; 20 per cent on Butt-Welded Galvanized; 50 per cent on Lap-Welded Black Pipe; and 35 per cent on Galvanized. Boiler Tubes are unchanged at 47 1/2.

Nails.—Good buyers can get all the nails they want at \$2.35@2.40, while \$2.50 is asked for small lots.

Steel Rails.—Quotations are \$30@32, according to size of order. Some companies are holding a little higher and have sold small lots at \$31@31.50.

Old Rails.—Small lots of rails are selling at \$19, and less would be taken for large lots, but there are no buyers.

Scrap-Iron.—Prices are declining still lower, and best No. 1 has been offered at \$21@20.50.

Four thousand tons angle iron are wanted by the builders of the Brooklyn Elevated road.

The Detroit Bridge Company ordered several hundred tons through Eastern structural mills.

Pittsburg. June 26.

[From our Special Correspondent.]

Pig-Iron.—A very fair movement in pig-iron characterized the trade in this vicinity for the past week, and was doubly welcome from the fact that it came somewhat unexpectedly and was much wished for.

Table listing prices for various iron products: Extra No. 1 charcoal, Cold blast, Gray forge, native ore, Foundry, Gray forge, lake ore, Foundry, Bessemer.

Nails.—This trade is also slightly better, and a good many small orders have been received, making a fair aggregate business.

past. The week just ended has been like three weeks ago, in the fact that cars were very scarce, being locked up again at Cleveland and the Harbor, unable to discharge their loads. This caused a number of pits to shut down entirely for a day or two, and correspondingly reduced tonnage. The region could be fairly averaged, however, by the statement that all pits are working three-quarter time. The Pennsylvania Railroad and Alleghany Valley Railroad have a slightly improved trade, I am informed, while the Pan-Handle, Chartiers, Baltimore & Ohio, and Pittsburgh, Virginia & Charleston continue at work on their regular contracts. The local trade is dull and will remain so for some time yet, as repairs in the mills are yet under way. There are no sales made at less than 5 1/2 c., and the general run is 5 1/2 c. on the wall, the tribunal rate. There are no money troubles. The Midway (Pan-Handle) miners have resolved to send a representative to the Coal Trade Tribunal and place a check-weighman on their tippie. It is to be hoped, for the sake of the coal men, that natural gas will not be so active hereabouts. If it continues to grow in favor in the future as it has since the Westinghouse well was struck, there will be little use talking of local coal trade. The last big strike was made at Steubenville on the property of the Jefferson Iron Company, and it is belching forth a great body of gas almost as powerful as the now famous Westinghouse. The iron company spent quite a number of thousands of dollars boring for gas; but as it has it now, it estimates its saving for a year in coal alone at \$120,000. This is a serious item to the coal operators. Quite a number of Pittsburgh mills will have natural gas soon. I will report them in due time.

When something is least expected, it is most likely to occur. There was the coke trade, which I ventured to predict in last week's issue would not be altered by the syndicate meeting, but I was wrong. They did not change the price, but did reduce the production 10 per cent more, which, including the Thursday shut-down, curtails 38 1/2 per cent the capacity of the region. This is not of much interest, except as an indicator of dull times, as coke buyers want cheaper prices and care little what the output of the region is. The shipments are about 675 cars a day, and will hardly increase until midsummer is past.

Buffalo. June 26.

[From our Special Correspondent.]

The anthracite and bituminous coal trade presents no particular features of interest; therefore this communication will necessarily be brief. The public anticipate an advance on the 1st of July of from 15 to 25 cents in prices; but this has not caused them to become purchasers to any great extent. In fact, money is scarce, and as the inducements are small, consumers prefer awaiting developments, or else have contracted for their coal at lowest season rates privately.

Bituminous coal is gradually taking the place of hard in many of our small manufactories. This is observable from the smoky condition of our streets and the complaints of housekeepers on "washing-days" and "cleaning-house days." Every thing is begrimed with the foul soot.

The following bids were received on Monday last for coal for the Poor Department:

	Stove.	Chestnut.
	Ton.	Ton.
William E. Carroll.....	\$5.25	\$5.25
Charles Kaiser.....	5.50	5.50
William Okeley.....	5.20	5.20
Falen & Burns.....	5.24	5.24

The last three bids were informal. No award has been made yet. The bids for the School Department will be opened in a day or two.

There is nothing new in the coke trade. Prices are unchanged.

There was a break on the canal yesterday, near Palmyra. Fifty feet of the bank are gone. It will take five days for repairs and refilling the level.

A local newspaper says: "The coal market is heavy and depressed, but the combination is well organized and strong, and it looks as if it might be able to maintain, possibly advance, prices, in defiance of the laws of supply and demand. The suspension of operations at the mines during the first and third weeks of July is to prevent too large an accumulation."

The tonnage of the lakes is now well scattered, and coal and ore vessels for all south shore ports are scarce. Higher freights are expected in the near future.

Railroad companies, getting tired of low rates, advanced their charges on Tuesday last, and the near approach of the wheat harvesting season indicates that there will be another advance in their schedules very soon.

In consequence of the absence of vessels, tonnage rates were very firm and the movement comparatively light. The following were the rates at which charters were made since my last letter: To Chicago, Milwaukee, and Superior City, 80c.; to Racine, 90c.; to Toledo, 30c.; to Duluth, 75c., and on contract; to Detroit, 25c.; to Marquette, 75c.; to Bay City, 30c.; to Saginaw, 30c.; and to Kincardine, 65c. Closing strong, and vessels wanted.

Shipments by lake from June 19th to 25th, both days inclusive: 39,080 tons, namely, 16,080 to Chicago, 12,120 to Milwaukee, 5300 to Duluth, 400 to Detroit, 1100 to Marquette, 300 to Kincardine, 1580 to Superior City, 1500 to Saginaw, and 700 to Bay City.

The propeller Onoko left for Chicago on her last trip loaded with 2949 net tons of coal—the largest cargo ever taken on the lakes.

Shipments by canal for the week ended yesterday were as follows: 1 load coal to Albany, 85c. net ton; 1 load coal to Syracuse, 55c. net ton; 3 loads coal to Schenectady, 80c. net ton; 1 load coal to Schenectady, 90c. net ton; 3 loads coal to New York, p. t.; 2 loads coal-dust to Syracuse, 65c. gross ton. All free on board here except trimming, and captain to pay unloading. Nominal rate to New York \$1.30 per net ton, captain to pay unloading.

Official report from Canal Collector's office: Shipments week ended June 22d, inclusive, of bituminous coal, 2,274,700 pounds; receipts of anthracite for same period, 4,761,758 pounds.

Receipts of coal by Lake Shore & Michigan Southern Railroad for the past week were 576 tons, namely, 348 tons for Buffalo, and 228 tons for other points.

No receiver can obtain possession of the Buffalo, New York & Philadelphia Railroad for the next six months, at any rate, as money has been secured to pay the July interest. It is to be hoped that no occasion will in the future render it necessary to resort to any such arrangement. The rumor that I mentioned last week, relative to the road going into a receiver's hands, is said to have originated from a prejudiced individual for the gratification of personal interests.

It is stated that the coal haul of the Rochester & Pittsburg Railroad to this port averages 175 car-loads daily. This road has 19 canal boats run with consorts—all used in the coal traffic.

It is reported that the Philadelphia & Reading has made extensive preparations at Shamokin for shipping coal to Buffalo. Hitherto, the transfer of the coal has been made at Lyons.

Tug-owners complain that the boilers of their vessels are not constructed so that anthracite coal can be used, and if its use is continued, there is danger from explosion. This is the principal argument for non-compliance with the ordinance issued at Chicago prohibiting the burning of soft coal on the harbor tugs; and further, that in consequence of burning hard coal 13 tugs are laid up there with leaky boilers.

The receipts of coal at Duluth for the past week were 19,709 tons; total thus far this season, 86,137 tons.

The members of the American Society of Civil Engineers were presented at their meeting here with a very beautiful souvenir, entitled, "Some Things in and about Buffalo," illustrated with 14 photographs of prominent and interesting subjects. It is without doubt the handsomest work of its kind ever published, and prominently sets forth the coal interests.

In 1861, the Anthracite Coal Company started business at Buffalo, and had great difficulty in disposing of 25,000 tons during the year. The enormous growth of our trade is shown by the following figures:

Year.	Gross tons.	Year.	Gross tons.
1862.....	93,793	1873.....	254,044
1863.....	123,319	1874.....	472,262
1864.....	154,214	1875.....	750,206
1865.....	143,968	1876.....	501,175
1866.....	248,716	1877.....	759,009
1867.....	223,708	1878.....	775,162
1868.....	318,353	1879.....	1,092,134
1869.....	112,914	1880.....	943,240
1870.....	177,027	1881.....	1,246,292
1871.....	102,185	1882.....	1,933,004
1872.....	190,994	1883.....	2,079,042

A short time since, it required two working-days to load a vessel with 500 tons of coal. Increased

facilities now exist of a very extensive character for the handling of anthracite coal. The following shipping docks and coal-pockets have been constructed within a few years at this port:

NAME.	Average shipping capacity daily, gross tons.	Storage capacity of pockets, gross tons.
Buffalo, New York & Philadelphia Railroad.....	2,500	4,500
Delaware & Hudson Canal Company.....	2,500	5,000
Delaware & Lackawanna Railroad.....	3,000	4,000
J. Langdon & Co.....	500	500
Lehigh Docks.....	3,000	3,000
Eric Docks.....	2,500	3,000
Pennsylvania Coal Company.....	2,000	3,000
Total.....	16,000	24,000

The bituminous coal trade of Buffalo shows a progressive growth and an increase that would have been deemed incredible if prognosticated a few years since. The following statement of the receipts presents the figures in a condensed form:

Year.	Gross tons.	Year.	Gross tons.
1862*.....	87,502	1873.....	482,724
1863*.....	83,774	1874.....	327,407
1864*.....	100,461	1875.....	502,707
1865*.....	110,463	1876.....	374,263
1866*.....	130,314	1877.....	318,447
1867*.....	168,232	1878.....	503,327
1868*.....	165,053	1879.....	735,670
1869.....	248,432	1880.....	879,855
1870.....	308,233	1881.....	997,279
1871.....	234,177	1882.....	1,098,787
1872.....	340,379	1883.....	2,069,979

* From 1862 to 1868 inclusive, by canal and lake only.

Chicago. June 25.

[From our Special Correspondent.]

There has been no change of importance in the situation of the anthracite market at this point since my last week's letter. While the dullness and inactivity which have characterized the coal trade since the opening of the season continue without interruption, there is still a healthy feeling, and one of comparative firmness, among the trade, which would ordinarily be occasion for surprise. Shipments to the country thus far have fallen off considerably from last year's figures, and the country trade perseveres in its evident determination to keep out of the market until the stern necessity of empty yards and clamoring customers compels it to make purchases. Spite of all this, our shippers and wholesale dealers preserve a calm and apparently satisfied demeanor, offering their stock at such rates as they feel warranted in doing and evidencing very decidedly their determination to go no lower. Our coal men act as if they were masters of the situation, and they feel sure that when the country trade begins to move, it will be a large and steady movement. It is generally expected that the circular will be advanced July 1st, and the decision of the Eastern operators to suspend for two weeks during July, stiffens the backs of the agents and shippers.

Cargo receipts are quite large, but not as large as last year at this time; in fact, the figures for the first ten days of the present month show a falling off of 30,000 tons, as compared with the corresponding period last year. Considerable coal went to Duluth, Milwaukee, and other upper lake ports earlier in the season that for one reason or another was diverted from this market, which helps to make up for the falling off in the figures. No change in lake rates, 80c. being the rate from Buffalo to Chicago.

The market for bituminous descriptions is still weak and depressed, with little doing except in the way of municipal contracts. The County Board on Monday decided to use a better grade of coal than formerly at the public institutions, and accepted bids for Kincaid Brier Hill coal from Culliton, Costello & Co. for the ensuing year. J. J. Corcoran's bid for hard coal was also accepted. A moderate inquiry is reported for Hocking Valley, Indiana Block, and Wilmington. Cannel coal is dull and lifeless.

Coke is selling fairly in a small way at full prices. No new contracts are reported.

We quote as follows:

	ANTHRACITE	
	Per gross ton.	Per net ton.
Grate.....	\$6.85	\$5.93
Egg.....	6.76	6.03
Stove.....	7.00	6.25
Nut.....	7.00	6.25

BITUMINOUS.

Erie and Brier Hill	\$4.50@4.75
Pittsburg	3.40@3.50
Indiana, Block	2.60@2.90
" Slack	1.40@1.60
" Nut	1.75@2.00
Baltimore & Ohio	3.25
Hocking Valley	3.25
Blossburg	3.90@4.00
Cumberland & Smithing	4.00
Senman Smithing	3.90@4.00
Wilmington	2.25
Fountain County	2.25
Grape Creek	2.20
Clinton Sump	2.10
Morris	2.20
Streator	2.20

COKE.

Connellsville coke	5.25
Crushed coke	5.85@6.15
Pittsburg coke	4.25

Boston. June 26.
[From our Special Correspondent.]

We are having no boom in the anthracite trade at this port, but there has been considerable improvement of late. As in all other lines of business, the buying is done in a small hand-to-mouth way. But while nearly every thing else is down to hard-pan, coal could be sold and has been sold below the low figures of to-day. Any break, however, would only come from a break in the combination, and the Eastern market considers that very unlikely. Now that the Reading is in safer if more confined seas, financially, the companies present a very firm front. Their movements toward curtailment and decisions on advances will now command more attention and action, indeed, than a month ago.

Trade is done on the expectation of an advance in July as proposed, and the two weeks' restriction will help to enforce the advance. There is a feeling that now is a safe time to buy a part stock, at least. The likelihood of maintaining the advance depends upon the course of trade. It looks as if new orders would be scarce for the first weeks of the month, in this market, and that business would chiefly consist of deliveries of June orders at June prices. There has been some talk of refusing orders within a few days except at the July advance of 25 cents on stove and 15 cents on chestnut, and while this may be done in a few cases, enough coal may be had at old prices. Domestic sizes are really in short supply, however, particularly in Philadelphia, and as firm as steam sizes are weak. Ordinary hard white ash company coal continues unchanged at last week's figures. At New York, f. o. b. prices are still \$4 for Stove, \$3.65 for Broken and Egg.

At Philadelphia, f. o. b. prices are \$3.75@3.85 for Stove, \$3.40@3.50 for Broken and Egg. Fully the usual amount of individual coals is moving from New York, say at \$3.90@3.95 for Stove and \$3.50 for Broken and Egg. Special free-burning coals at Philadelphia are selling in the vicinity of \$5.50 for Stove and \$4.90 for Egg.

The proposed changes will not benefit the bituminous market to any extent, as the advances are only on domestic sizes. Bituminous trade hardly expects help, however, at this time, and it would do it no good. There is no demand for steam coal, and quotations for cargo lots, delivered, say at \$3.80@3.90, are nominal.

There is, if any thing, a slightly easier feeling in freights. Large vessels have been taken at Philadelphia at \$1.20, and at 90 cents at New York. With a larger supply of coal at shipping points and more pressure for shipments at advance, might be realized. We quote:

New York, 90c.@\$1.15 per ton; Philadelphia, \$1.20@1.25; Baltimore, \$1.40; Newport News, \$1.25; Richmond, \$1.30; Bay of Fundy, \$1.50@1.60; Cape Breton, \$1.80@1.90.

There is a fair retail movement. Retailers are inclined to welcome the prospects of an advance in July as possibly affecting their market favorably. It can not harm them at all events. We quote delivered prices:

White ash, furnace, and egg stove and nut	\$5.25@5.50
Red ash, egg stove	5.50@5.75
Red ash, egg stove	5.75@6.00
Lorberry, egg and stove	6.00@6.50
Franklin, egg and stove	6.50@7.50
Lehigh, furnace, egg, and stove nut	5.50@5.75

STATISTICS OF COAL PRODUCTION.

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 123,064 tons, as compared with the corresponding period in 1883.

Comparative statement of the production of anthracite coal for the week ended June 21st, and year from January 1st

Tons of 2240 lbs.	1884.		1883.	
	Week.	Year.	Week.	Year.
Wyoming Region.				
D. & H. Canal Co.		1,511,138	99,563	1,702,682
D. L. & W. RR. Co.	44,539	2,080,914	122,428	2,139,497
Penna. Coal Co.	8,394	511,238	37,605	600,738
L. V. RR. Co.		57,926	39,988	505,529
P. & N. Y. RR. Co.		89,192	4,403	93,805
T. RR. of N. J.		*	56,048	1,147,783
Penn. Canal Co.	11,553	132,542	14,521	151,047
North & West Br. RR.	19,135	379,436	7,302	216,355
	83,621	5,283,726	381,856	6,557,438
Lehigh Region.				
L. V. RR. Co.		1,873,538	116,291	2,217,081
C. RR. of N. J.		*	62,148	1,059,302
S. H. & W. B. RR.	5,619	98,079	1,783	23,680
	5,619	1,971,617	180,222	3,300,062
Schuylkill Region.				
P. & R. RR. Co.	1,865	4,457,850	181,762	3,138,081
Hamokin & Lykens Val.	*	*	34,874	624,543
	1,865	4,457,850	216,636	3,762,624
Sullivan Region.				
St. Line & Sul. RR. Co.		37,753	1,677	29,117
Total	91,105	11,750,946	780,391	13,649,241
Increase				
Decrease		1,898,295		

* Included in tonnage of the Philadelphia & Reading Railroad.

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1879	12,033,998 tons.
" " " 1880	10,321,876 "
" " " 1881	12,577,684 "
" " " 1882	12,892,313 "

Comparative Statement of the Production of Bituminous Coal for the week ended June 21st and year from January 1st:

Tons of 2000 pounds, unless otherwise designated.

Tons of 2240 lbs.	1884.		1883.	
	Week.	Year.	Week.	Year.
Cumberland Region, Md.				
Tons of 2240 lbs.	64,152	1,230,910	52,233	1,047,807
Barclay Region, Pa.				
Barclay RR., tons of 2240 lbs.	4,334	157,832	5,401	154,138
Broad Top Region, Pa.				
Huntington & Broad Top RR., of 2240 lbs.	3,651	91,863	2,758	95,071
Clearfield Region, Pa.				
Snow Sho.	3,019	89,061	3,600	117,258
Karhaus (Keating)	1,583	11,321		
Tyone & Clearfield.	62,850	1,452,493	58,531	1,323,046
Allegheny Region, Pa.				
Gallatin & Mountain	6,524	178,644	5,049	218,479
Pittsburg Region, Pa.				
West Penn RR.	4,715	138,077	4,886	218,788
Southwest Penn. RR.	1,763	74,301	1,249	53,328
Pennsylvania RR.	5,980	137,797	14,378	238,558
Westmoreland Region, Pa.				
Pennsylvania RR.	30,298	572,301	19,152	662,414
Monongahela Region, Pa.				
Pennsylvania RR.	2,148	72,744		
Total	191,005	4,207,434	167,225	4,128,887
Increase		78,547		

FREIGHTS.

Coastwise Freights.

Per ton of 2240 lbs.

Representing the latest actual charters to June 26th.

Ports.	From Philadelphia.	From Baltimore.	From Elizabethport, Fort Johnston, South Ambo y, Hoboken, and Weehawken.
Alexandria	.65@.70		
Annapolis			
Albany			
Baltimore	.58		
Bangor	1.20	1.40	
Bath, Me.	1.20	1.35	1.00
Beverly	1.15@1.20		1.00
Boston, Mass.	1.15@1.20	1.40@1.45	.90@.95
Bristol	1.10		
Bridgeport, Conn.		1.25	.50
Brooklyn		1.20	
Cambridge, Mass.	1.15@1.25		.95
Cambridgeport	1.20		.95
Charleston, S. C.	.60	.70@.80	
Charlestown	1.20@1.25		
Chelsea	1.15		.95
City Point			
Com. Pt., Mass.	1.25		.95
E. Boston	1.15@1.20		.95
East Cambridge	1.20		.95
E. Greenwich, R. I.	1.10		.80
Fall River	1.10	1.25	.70@.75
Galveston			
Gardiner, Me.		1.40	
Georgetown, D. C.	.65@.70		
Gloucester	1.25		
Hartford			
Hackensack			
Hudson			
Lynn	1.30@1.35		
Marblehead	1.25		
Medford			
Millville, N. J.		1.60	
Milton			
Newark, N. J.			
New Bedford	1.05@1.10	1.25	.80
Newburyport		1.60	1.10
New Haven		1.25	.50
New London		1.25	.70
New-Berne			
Newport	1.15		.75
New York		1.17	
Norfolk, Va.	.55@.60		.65@.70
Norwich			
Norwalk, Conn.			
Pawtucket			
Philadelphia			
Portland, Me.	.90	1.35	.90
Portsmouth, Va.	.55@.60		
Portsmouth, N. H.		1.40	1.10
Providence	1.05@1.10	1.25	.70@.75
Quincy Point	1.25		
Richmond, Va.	.70		
Rockland, Me.			
Rockport		1.50	
Roxbury, Mass.	1.15		
Saco			
Sag Harbor			
Salem, Mass.	1.15@1.30	1.40	1.00
Saugus			
Savannah			
Somerset	1.10		
Staten Island			
Trenton			
Troy			
Wareham			
Washington	.65@.70		
Weymouth			
Williamsbz, N. Y.			
Wilmington, Del.			
Wilmington, N. C.			
St. Thomas, W. I.			

* And discharging. † And discharging and towing. ‡ 3c. per bridge extra. § Alongside. ‖ And towing up and down. ¶ And towing. ** Below bridge.

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