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CONTENTS.

As what we believe to be a new departure in the method of running a concentrator plant, we would call attention to a notice elsewhere published, in which parties possessing a complete concentrator are offering to make a suitable arrangement to contract for the work of running the mill. As we understand it, the contractor will be furnished with the ore and for a given sum per ton agrees to deliver a minimum percentage of concentrates to the owners of mine and mill.

SINCE our last issue, when we printed an estimate of the product of the Lake Superior mines in 1883, we have had some figures which permit of a closer approximation. We were misled by an unofficial statement of the output of mineral of the Wolverine mine, to estimate its product at 300,000 pounds. Mr. E. R. PENBERTHY, Secretary of the Wolverine Mining Company, has since informed us that the quantity of mineral turned out by this mine, which is coming to the front rapidly, was 845,898 pounds, equivalent to 699,622 pounds of ingot. The product of the last month was 55 tons with one Ball head, exceptionally good work considering the amount of ground opened. The Belt Copper Mines, Limited, according to a statement from Mr. ARCHIBALD BRAND, agent, yielded 16,402 pounds of ingot. The Hancock is credited with a product of mineral of 904,890 pounds, and the yield of the National, Knowlton, Minesota, Evergreen Bluff, Adventure, Conglomerate, and Original is also reported. The Phœnix is credited with a product of 818,765 pounds of mineral, against 664,340 pounds in 1882, so that now only small producers are missing. The figures indicate that our estimate for the mines not reporting, placed at 1,300,000 pounds in 1883, against 2,143,000 pounds in 1882, was too low, and that there was only a small falling off, compensated for fully by the appearance of the Wolverine and the Peninsula as large producers. Our total for the Lake Superior mines in 1883 is now 59,950,000 pounds of ingot, or roughly, *sixty millions of pounds of copper.*

UNDER the title of the Bellevue Tunnel Company, a number of gentlemen well known in Colorado, among them LEWIS C. ROCKWELL, LAMARTINE C. TRENT, BRADFORD H. LOCKE, and ANDREW N. ROGERS, have associated themselves to undertake a work of considerable magnitude and great promise. They propose to drive a tunnel from a point on Fall River, a tributary of South Clear Creek, to tap the mines of the western half of all the mines of the great Gilpin County group of gold veins, and at the same time provide for the cheaper transportation of the ores to reduction-works through the new outlet. The past record of these mines and the present output under adverse circumstances speak for themselves. The number of patented lodes intersected by the tunnel, or within half a mile of its line, is given at 181, and it is estimated that their output per day would together reach 1815 tons. Very interesting figures have been collected by Prof. J. ALDEN SMITH on the saving which would result from the use of a tunnel as compared with the present methods, which carry the cost to $5 per ton. Professor SMITH puts the saving at $1.90 per ton, or nearly 38 per cent. The tunnel would cut the principal lodes of Bellevue, Quartz, Gunnell, and Eureka hills, the total length to reach a point under the latter being 3½ miles. Mr. LOCKE estimates that the tunnel could be advanced at the rate of a mile a year. The plan embraces the issue of 100,000 shares of preferred stock of a par value of $10 per share, payable in nine installments, aggregating $9.37 per share. A bonus of $1,000,000 of common stock will go to the subscribers of preferred stock, and $1,000,000 common stock to the promoters.

THE AMERICAN METAL MARKETS IN 1883.

Lead.—The year 1883 has been one of much discouragement to the lead producers of the country, though the first six months did not witness any movements calculated to disturb their serenity. It was not until March, after the usual winter dullness, that heavy sales were made, followed later, in May, by additional large transactions. On the whole, the lead was placed at good figures, though the feeling was not one of strength. The spring trade of the manufacturers had not, in the East, at least, shown any marked increase in volume, and they were inclined therefore to take a pessimistic view of the situation.

The second half of the year was more eventful, though not in a manner likely to cause rejoicing among producers. In July, the opinion gained ground that stocks were accumulating, and though a number of large holders were firm and showed little disposition to meet the views of buyers, the latter had no difficulty in supplying themselves through the liberal offerings of lead from many quarters. The result was a dullness which extended through the entire month of August, buyers and a good many sellers having little confidence in the future of the metal. Manufacturers were very cautious in their transactions, and a weakening tendency developed, which, however, was checked somewhat in the beginning of September. Holders of lead, knowing that the busiest season for a large part of the trade was at hand, were stiffer, and consumers, probably in some instances compelled to replenish depleted stocks, were more tractable, so that there was considerable activity and generally a better tone. As, however, the season advanced and proved a disappointment, so far as the volume of business was concerned, sellers became more anxious, and, although at one time in November pretty large sales were recorded, the eagerness to place lead became greater, precipitating a decline, which so tended to discourage buyers that even the taking out of the market by a Western agent of 1000 tons of Pueblo lead at 3·70 cents did not strengthen the market perceptibly. The fall trade had proved a disappointment, so far at least as the East was concerned, and with the usual restricted consumption of December, that month dragged along quietly.

The course of events in January of this year was erratic. In the first week, by manipulation, the market was carried up to 4 cents, and a few days later the purchase by a Western firm of 12,000 tons at 4·20 cents,

WEEKLY PRICES OF METALS FOR 1883, WITH HIGHEST AND LOWEST PRICES FOR SIX MONTHS. (THE HIGHEST AND LOWEST PRICES IN THE PERIOD OF SIX MONTHS ARE INDICATED BY HEAVIER-FACED FIGURES. ALL PRICES ARE CENTS PER POUND.)

WEEK ENDED.	Copper, ordinary outside brands.	Copper, Lake.	Tin, Straits.	Lead, Com. Dom.	Spelter, Com. Dom.	Antimony, Cookson's.
January 6th	**17·25**	18·00	21·50	**4·70**	4·50	**11·50**
" 13th	17·12	18·00	21·37	4·70	4·50	11·25
" 20th	17·12	**18·12**	21·25	4·60	4·50	11·25
" 27th	16·50	18·00	21·25	4·60	4·62	11·25
February 3d	16·50	18·00	21·00	4·60	4·65	11·12
" 10th	16·50	17·87	21·12	4·50	4·50	11·00
" 17th	15·75	17.87	20·12	4·50	4·50	11·00
" 24th	15·87	17.75	20·87	4·60	4·50	11·00
March 3d	15·75	17.75	20·87	4·55	4.60	11 00
" 10th	15·50	17.62	21·00	4·65	4·62	11·00
" 17th	15·50	17.62	21·75	4·70	4·62	11·00
" 24th	15·25	17.37	**22·12**	4·67	4·75	11·00
" 31st	15·12	17·00	21·67	4·50	4·75	11·00
April 7th	14·90	16·00	21·00	4·40	4·70	10·87
" 14th	14·37	16 00	21·75	4·40	4·70	10 87
" 21st	14·50	15·75	21·00	4·62	**4·80**	10·85
" 28th	14·75	15·87	21·25	4·60	4·75	10·85
May 5th	14·12	15·87	21·25	4·42	4·70	10·75
" 12th	14·25	15·90	21·25	4·40	4·70	10·75
" 19th	14 25	16·00	21·75	4·40	4·70	10·70
" 26th	14·25	16·00	21·50	4·40	4·65	10·65
June 2d	14·12	15·87	21·50	4·40	4·60	10·62
" 9th	**14·00**	15·62	21·37	4·45	4·45	10·75
" 16th	14·00	**15·00**	**20·75**	4·40	4·50	10·62
" 23d	14·00	15·12	20·75	4·42	**4·40**	10·62
" 30th	14·00	15·12	21.50	**4·40**	4·45	**10·50**

WEEK ENDED.	Copper, ordinary outside brands.	Copper, Lake.	Tin, Straits.	Lead, Com. Dom.	Spelter, Com. Dom.	Antimony, Cookson's.
July 7th	**14·00**	15·12	21·50	**4·40**	**4·50**	10·37
" 14th	14·00	15·12	21·00	4·35	4·45	10·37
" 21st	14·00	15·00	21·25	4·30	4·37	**10·25**
" 28th	14·00	15 00	**21·75**	4·25	**4.30**	10·25
August 4th	14 00	15·00	21·50	4·25	4·35	10·25
" 11th	14·12	15·00	21·12	4·25	4·35	10·25
" 18th	14·12	15·00	21·00	4.25	4·35	10·25
" 25th	14·12	15·00	21·00	4·20	4·35	10·25
September 1st	14·12	15·12	21·00	4·30	4·40	10.25
" 8th	14·12	15·12	21.12	4·35	4·50	10·25
" 15th	14 12	15·12	21·00	4·32	4·50	10·25
" 22d	**14.25**	**15·25**	21·00	4·32	4·45	10·25
" 29th	14·25	15·25	21·12	4·30	4·40	10 25
October 6th	14·25	15·25	21 12	4·25	4·35	10·25
" 13th	14·25	15·25	21·00	4·20	4·40	10·25
" 20th	14·25	15·12	20·87	4·12	4·40	10·25
" 27th	14·25	15·12	20.25	4·20	4·45	10·25
November 3d	14·12	15·00	20·25	4·00	4·40	10·25
" 10th	14·12	**14·87**	20·00	4·00	4·37	10·25
" 17th	14·12	15·00	19·12	3·75	4·37	10·25
" 24th	14·12	15·00	19 25	3·70	4·37	10·50
December 1st	14·12	14·87	19·00	3 70	4 37	11·25
" 8th	14·00	14·87	19·00	**3·60**	4·37	**11·25**
" 15th	14·00	14·87	**18·37**	3·60	4·37	11·12
" 22d	14·00	14·87	.....	3·60	4·37	11·12
" 29th	14 00	15·00	19·00	3·60	4·37	11·25

followed by some buying on the part of dealers and consumers to the extent of 800 tons in this market, carried the price nominally to 4·50 cents. This upward movement was, however, short-lived; the same party who had bought two weeks before at 4·20 cents selling out again at 4 cents.

The question which now more than ever agitates the many large interests dependent for a goodly share of their prosperity upon the market for lead, is whether or not the depression of the last quarter of 1883 was due to special circumstances, or whether the right level of lead is nearer that of the present day. On the one hand, we hear people who have studied our markets for many years urge that lead must go, where it went before, to export figures. They point triumphantly to copper, which they argue has successfully passed through the crisis which threatens lead. It would lead us too far to go into a discussion of the striking points of difference between the conditions affecting the two metals; but it is proper at this time to indicate the facts which make the situation of the metal market to-day differ widely from what it was in 1879, when lead dropped down to 2·87 cents. Then the great producers were Nevada, Utah, and Missouri. The Eureka District was working rich ores, easily mined, and comparatively cheaply smelted. Being near the Pacific coast, it could comparatively easily reach the only market which could give us relief, China and Japan. Now the bulk of the lead produced is from very much poorer ores at points less favorably situated for shipment via San Francisco. The margin has become a much smaller one, and a decline to low figures means cessation of work at a much higher point. We are not inclined to join in the cry that 4 cent lead means destruction. We believe that, if freights were better adjusted, the majority of the producers could stand 3·50 cents, or even 3·25 cents. But the pressure of lead at 2·75 cents would be such that, as that figure was approached, the number of idle mines would increase in geometrical ratio. While we are therefore free from taking extremist views, we believe that our miners should look the facts squarely in the face. The recent advance has much less significance than is too often attributed to it. It came in a dull season, and unless consumption in the spring is very heavy, will do more harm than good. It will give to any reaction that may come a much greater impulse. Much is said in times of a receding market of the stimulating effect of low prices upon consumption. So far as it affects long-established uses, the effect is no doubt noticeable and almost immediate. It is quite a different matter, however, with new outlets. It takes years of low-priced material to induce that confidence in moderate values which must precede any attempts to introduce a metal for use in place of other raw materials. The mainstay of our expanding producing industries is the natural growth of the country. When it has been outstripped by additions to productive capacity, nothing can for a length of time hold values until they have reached a sound basis.

It is the solution of this question, whether we have been making lead faster than the country can absorb it, that any intelligent discussion of the situation must turn to. The history of the markets during the past six months seems to answer the question affirmatively. So far as the consumption is concerned, we possess no figures to guide us; we have no means of getting at the quantity of lead held in stock now, as compared with the amounts in producers' hands a year ago. Many conflicting guesses have been made, and we are not inclined to accept the views of those who put the surplus at from 25,000 to 30,000 tons. But there can be little doubt that there has been some accumulation; though, on the other hand, it will be generally admitted that the amounts of raw material in the hands of manufacturers and dealers are much less than they have been. The only point on which we do possess some accurate knowledge is on the production. Through the courtesy of the officers and proprietors of every desilverizing establishment in the country but one, we are in a position to make a close estimate of the output of lead in 1883. The aggregate of the returns of the Selby Works, at San Francisco; the Richmond Works, at Eureka, Nevada; the Germania Works, at Salt Lake City; the Omaha & Grant Smelting and Refining Company; the Kansas City Works; the Aurora, St. Louis; the new Chicago; the Horn-Silver; the Pittsburg; the Balbach Works, at Newark; and the works at Melrose, Cal., was 118,252 net tons. Estimating the product of the refinery of the Pueblo Works at 6000 tons, we reach a total of desilverized lead of 124,252 net tons for the year 1883.

On the production of the Missouri District, Messrs. John Wahl & Co., of St. Louis, send us the following figures:

	Tons.
Southeast Missouri	11,693
Southwest Missouri and Galena	7,644
Total	19,337

As compared with 29,015 tons last year, including Iowa and Wisconsin, however, this shows a falling off of about 8000 tons. Our returns from the large smelting companies of Missouri fully bear this out. The St. Joe works were of course hampered by the fire last summer; but the decrease in the make of the other leading concerns proves that the conditions in that great lead-producing section were unfavorable. This is in part due to causes quite independent of the decline in value of the metal.

Estimating the product of Wisconsin and Iowa together at 1700 tons, we reach a grand total of 145,289 net tons as the lead production in the year 1883. This compares with former years as follows, the data for 1870 to 1882, both inclusive, being taken from the report published in the *Mineral Resources of the United States*, by the U. S. Geological Survey, under the direction of Mr. Albert Williams, Jr.:

PRODUCTION OF LEAD IN THE UNITED STATES.

	Net tons.
1870	17,830
1871	20,000
1872	25,880
1873	42,540
1874	52,080
1875	59,640
1876	64,070
1877	81,900
1878	91,060
1879	92,780
1880	97,825
1881	117,085
1882	132,890
1883	145,289

We have attempted this year to trace the source of the lead to its origin in the different States and territories, and though we have met with great encouragement in many quarters—some of the desilverizing establishments sending us very elaborate statements of the source of the bullion worked by them, and a good many of the larger smelters giving us full returns—the number of small smelters running at intervals which have not reported enables us to give only approximate data. The shipments of ore from one State to the other, and to distant refining-works, make it almost impossible to clearly trace the source of the lead, unless elaborate details of the ore-purchases of every prominent establishment are available. To give an idea of the magnitude of the business which some desilverizing establishments do as smelters of ore, we would state that one alone sends us a fully tabulated statement showing the quantity of lead in the ore bought to be nearly 1400 tons.

We estimate the production of base bullion by the smelting-works in the different States and territories as follows:

PRODUCTION OF BASE BULLION.

Colorado	66,500
Utah	28,862
Idaho	6,000
Montana	5,000
Nevada	5,000
New Mexico	2,400
Arizona	1,000
California	1,500
	116,262

The estimate for Colorado comes from a gentleman closely connected with the smelting interests of the State, and in a position better than any one we know of to collect the data necessary to reach an authoritative conclusion. The Leadville output was 36,870 tons of base bullion, and our returns from the Grant, the Colorado Smelting Company, the Royal Gorge, and the Grand View works aggregate with it a total of 57,614 tons. It is safe, and probably under rather than above the mark, to put the product of the Pueblo works and a number of small smelters at at least 9000 tons. The Utah product is taken from the figures compiled by Mr. Valentine. Arizona includes the Howell and the Tombstone works

New Mexico, the Billings and a few scattered returns; Nevada, the Richmond, and an estimate of the Eureka; Montana, the Clendenin, Hecla; California, the Melrose; and Idaho, the Wood River region. The aggregate, it will be noticed, is below the total of the desilverizers' returns. This is due chiefly to the fact that the latter do considerable ore-smelting themselves.

The production has, therefore, undoubtedly been heavy, showing an increase of at least 11,000 tons. We doubt whether the consumption in 1883 was greater than in 1882, when the country was moving along on the high tide of prosperity. The good statistical position which the close of 1882 left the metal in has, during 1883, gradually become more unfavorable, though the fact that the Richmond Company did not go into the market in 1883 to some extent counteracted its influence. Still the fact remains that there has been an accumulation, and it is the knowledge of this fact and the absence of any exact data as to its magnitude which have been and are still hanging over the market. We feel convinced that it has been much exaggerated, and that any statement of the real amount of stocks, if attainable, would strengthen rather than weaken the market. That it is not beyond attempts at manipulation, we have seen during the past few weeks. The real danger lies not so much in whatever excess may now exist, but what it may swell to during the current year. We do not look forward to any falling off in the production; on the contrary, it is likely that, with new works now under full headway, it will continue to show possibly an increase, especially if miners are deluded into putting faith in a stability of values at their present level. There is nothing discouraging in lead at 3·90@4 cents. Thus far, the general business interests of the country have shown nothing to warrant the hope that we are to have a year of great prosperity. Those who closely watch developments are far from being sanguine, though many look forward to a brief period of improvement in spring. We are inclined to look forward to the coming year as one which will witness low prices for lead: and the sooner producers prepare for that state of affairs, the better for them.

Spelter.—From partial returns, we estimate the product of the zinc-works of the United States as follows for the year 1883, as compared with 1882:

PRODUCTION OF ZINC IN THE UNITED STATES.

	1883.	1882.	1881.
Illinois	12,740	18,201	16,250
Kansas	8,980	7,366	5,000
Missouri	5,730	2,500	2,750
Eastern States	5,340	5,698	6,000
	32,790	33,765	30,000

Our returns are detailed and complete so far as Kansas is concerned; but in Illinois the largest producer has been estimated, the figure taken being 8000 tons, a heavy falling off as compared with previous years. Missouri was probably underestimated in 1882.

The total product for 1883 is heavier than anticipated, which is primarily due to the fact that, during that year, a number of new producers were added to the list, whose output largely compensated for the falling off in the make of the older works. In Kansas, the Granby Mining and Smelting Company started in, on May 1st, with 400 retort Siemens furnace, having an annual capacity of about 1250 tons. In Missouri, the Southwest Lead and Zinc Company began producing on April 1st with a block of two Belgian furnaces, and is running a Siemens gas furnace, while at Joplin another works put into use part of its plant of six Belgian furnaces. The Carondelet and Missouri companies in Missouri did not work, and the same is true of the Collinsville works in Illinois. In the East, the Edes, Mixter, & Heald Zinc Company, a Tennessee concern, with headquarters at Plymouth, Mass., entered the ranks of producers, and their output nearly made up for the decrease in the make of other works. The actual out put in 1883 of these new establishments combined was about 4000 net tons, so that the falling off in the make of the previously existing plant is fully 5000 tons. These figures are eloquent testimony of the struggle which has been going on during the year 1883 among Western smelters, which led to a condition of affairs almost unprecedented. The rush of the boom had created a desire to enter into the business; but before the new works had time to take a share in filling the sudden demand, it had been supplied by foreign competitors, and a low ebb succeeded the high flood. On the other hand, producers were embarrassed by coal strikes, and particularly by the flooding of the mines during the months of July, August, September, October, and November. The demand for ore on the part of the works in actual operation was greater than the supply, and prices were run up $3 to $4 per ton. On the other hand, the efforts of producers of new brands to gain a foothold in the market kept prices depressed, and it is hinted that some of the old established works which had long contracts were not averse to having values fall off a trifle. With the cost of production steadily advancing and a continuously weak market, smelters were burning the candle at both ends. Though there is no agreement among them to restrict production, it is tacitly understood that the wisest course is to curtail. Reports from a number of localities in the West indicate that the works are not now running at any thing like a pace which would make the product of 1884 equal to that of 1883. It will take much less of a decline in the output than would at first appear, because we are not now importing any quantity worthy of serious consideration. The following figures of the supply available for consumption during 1883 and the preceding year will prove this:

	1883.	1882
Production in the United States	32,790	33,765
Imports of spelter	4,100	12,826
" " sheet-zinc	800	2,334
	37,690	49,925
Less exports and re-exports	75	586
	37,615	49,339

The visible supply in 1882 was therefore nearly 50,000 tons, against 38,000 tons in 1883. Even taking into consideration that in the beginning of 1883 a large part of the metal imported was in stock in bond and in warehouse, say 2000 tons, which has been practically forced into consumption during the last year, we have a decline in the quantity marketed of at least 8000 tons. Let it be conceded that there has been a great shrinkage in the consumption of the metal, it will certainly not be contended that it was much more than 8000 tons. With no stocks at importing points, with no excessive stocks, so far as we can learn, in the hands of producers, with the prospect that importations will be very moderate, and with a restriction of the output partly forced, partly voluntary, it is obvious that the statistical position of the metal is slowly getting into better shape. It is true it will take very little pressure to keep it where it now is; but, on the other hand, the slightest improvement in the demand would carry it upward unless purposely held back. Unless there is an early adjustment of the prices of ore as compared with the market value of the metal, we look to a further decline in the quantity produced. If left to its merits, spelter can not long maintain its present low level. It is just to remark, however, that the reserve capacity is so large that any marked upward movement would promptly be checked by an inflation of production, accompanied with its usual sharp contest for ores.

Reports of the markets during the year have been a monotonous reiteration of the statement that business was dull and values unchanged, except within very narrow limits. A very large share of the business is done directly or through resident agents, and very few transactions are closed in such a manner that they reach the public.

NEW PUBLICATIONS.

THE MINES AND METALLURGICAL WORKS OF FREIBERG. (*Freiberg's Berg- und Huttenwesen.*) Published by the Bergmännische Verein zu Freiberg. For sale by Craz & Gerlach, Freiberg, Saxony.

Once every two years, if we remember correctly, an association of German engineers and mine officials meets at the center of some prominent mining district. Such a meeting, which the Germans call the Deutsche Allgemeine Bergmannstag, and which appears to be quite a ponderous affair, was held at Dresden this year. An elaborate programme of visits to mines, works, and points of general interest was carried out, and, to judge from numerous elaborate drawings in some of the German illustrated papers, received a greater share of public attention than the more modest gatherings in this country. Business, however, appears to be a matter of secondary consideration, if we apply to the doings of the meeting the test of inquiring into the merits of the papers presented, and the meeting would probably be speedily forgotten by all except, possibly, the fortunate participants, had it not been the occasion for the publication of a work which will be welcomed, even by many here. Although Freiberg has been the training-school of generations of European and American mining engineers and metallurgists, German literature, otherwise so full and comprehensive, did not possess a single good series of papers on the mining and metallurgical industry of that renowned district. The book was written simply as a guide to the expected visitors, a number of the members of the local society contributing each a chapter on the department with which he is identified. Thus, Oberbergrath C. H. Müller discusses the topography, the climate, the geology, and the ore-deposits of the district, and contributes a chapter on its history, a large plate facilitating the task of following his description of the complicated net-work of veins. His researches show that from 1163 to 1882 the Freiberg mines produced 9,587,427 pounds, or 4793 metric tons of silver, or more than two hundred and fifty millions of ounces of silver, besides an unknown quantity of lead and copper. Now its total product of silver, lead, copper, nickel, zinc, arsenic, and sulphur reaches a total value annually of about a million dollars, the mines and works of the district giving employment to 247 officials and 6339 men. Herr A. T. Tittel gives brief accounts, containing nothing worthy of special mention, on the work of driving shafts, levels, etc., on timbering, hoisting, and ventilation. Bergrath K. R. Bornemann treats the more interesting topics of the supply of water-power and its utilization, both of which have been developed on a grand scale in the course of centuries. Herr Bornemann's description of the machinery used is unfortunately little more than a sketch, probably prepared in a brief time—a matter to be regretted, because he has done so much to aid progress during the past decades. Berginspector C. A. Sickel's detailed description of the methods of timbering and underground masonry has evidently been written with much care, but the subject is not one that is likely to impress American readers much. Judging from the formidable diagrams which accompany E. W. Neubert's paper, ore-dressing in Freiberg must be a bewilderingly complicated subject. This is due to the fact that the ores delivered to the dressing-works come from a large number of mines, and that in addition the same veins furnish at different times ores varying in character. The composition of the raw material is therefore very complex and very poor. Herr Neubert states that the average amount of the metals obtained from the rock as stoped is from 0·015 to 0·03 per cent of silver, from 1·5 to 4 per cent of lead, from 0·15 to 0·4 per cent of zinc, from 0·02 to 0·6 per cent of arsenic, from 0·0 to 0·02 per cent of copper, and from 2·3 to 5·7 per cent of sulphur. This, we presume, is arrived at by comparing the final returns of the smelting-works with the quantity of rock blasted out of the veins.

The work also contains papers on the administration of the mines and a number of trusts, on the school of mines, and a valuable report on the smelting-works by K. Merbach. We shall take occasion to refer to the latter at greater length.

A CABLE announces that an explosion occurred January 27th in a colliery in the Rhondda Valley, Wales, killing eleven persons. A rescuing party of three men, including the manager of the colliery, who subsequently descended into the mine, was also killed.

AN explosion due to fire-damp occurred in a colliery at Rowley, Staffordshire, January 28th. Five miners were badly burned.

STATISTICS OF IMPORTS AND EXPORTS.—The excess of the value of exports over imports of merchandise was as follows: Month ended December 31st, 1883, $21,593,142; six months ended December 31st, 1883, $61,988,665; twelve months ended December 31st, 1883, $108,071,684. The total values of the imports of merchandise for the twelve months ended December 31st, 1883, were $687,020,122, and during the twelve months ended December 31st, 1882, $752,843,507.

TECHNICAL ESTIMATION OF ZINC.

Written for the Engineering and Mining Journal by Malvern W. Iles, Ph.D.

A quick and reliable method for the estimation of zinc has been a want long felt by many chemists and metallurgists.

The ores containing this metal are not unfrequently associated with lead, arsenic, copper, manganese, lime, and other elements which are apt to give rise to difficulties.

The good old-fashioned method we have generally resorted to was: first, decompose with a mixture of nitric, hydrochloric, and sulphuric acids; then remove silica; then, in the filtrate, remove the elements precipitable with hydrogen sulphide; then use the well-known method of precipitating the iron and alumina as basic acetates; and in the filtrate precipitate the zinc as a sulphide, and estimate as usual.

To facilitate the above long mode of procedure, I would suggest the following scheme, which seems to have many advantages:

Take one gram of the finely powdered substance, and treat in a covered casserole with fuming nitric acid, boil, and slightly evaporate, replacing acid once or twice. Now throw into the covered vessel a few crystals of potassium chlorate, which will precipitate the manganese. (*See* article by Mr. S. A. Ford, Proc. American Institute of Mining Engineers). Dilute very slightly, and filter. The residue will contain silica, plumbic sulphate, some basic nitrate of iron, etc. Wash the residue with cold water. To this filtrate, add a few drops of sulphuric acid, and also a small amount of potassium dichromate, to insure complete precipitation of the lead. Now, if the copper is absent, add to the filtrate an excess of ammonic hydrate, filter off the iron and alumina, and estimate the zinc volumetrically with potassium ferrocyanide. (*See* Fahlberg, *Zeit. Anal. Chem.*, 1874, page 379; Lyte, *Chem. News*, xxxiii., page 222; also volumetric works by Hart, Sutton, and others.) If copper be present, add potassium hydrate instead of ammonia, and estimate the zinc by the Fahlberg method.

ON THE COMPOSITION OF CHAMBER GASES IN THE MANUFACTURE OF SULPHURIC ACID.

Written for the Engineering and Mining Journal by William Martyn, Boston, Mass.

At some sulphuric acid works, it is customary to test both the ingoing (burner) and the outlet-gases of the chambers; the former for sulphurous anhydride, the latter for oxygen. I propose to show that this is entirely unnecessary, and that, if one test is made, the other may be omitted, since a variation in the composition of the gases in either case is accompanied by a corresponding variation in the other which can be calculated.

In order to show this, we will take, for example, a brimstone burner-gas containing 12 per cent of SO_2. The problem we wish to solve is this: What percentage of oxygen may we expect to find in the outlet-gases from the last chamber?

First of all, we must find the composition of our burner-gas:

	Volume per cent.
We have found by test SO_2	12·0
Now we want to find the volume of nitrogen which was originally (in the air) associated with the oxygen now contained in the 12 volumes of SO_2; and as SO_2 contains its own volume of oxygen, the oxygen contained in the 12 volumes of SO_2 will be 12 volumes. Taking the composition of air by volume as nitrogen 79·2; oxygen, 20·8, we find that the nitrogen originally associated with the 12 volumes of oxygen contained in the 12 volumes of SO_2 was	
$12 \times \frac{79{\cdot}2}{20{\cdot}8}$ = nitrogen	45·70
The difference to make up the 100 volumes is air $100 - (45{\cdot}70 + 12) =$ air	42·30
Total	100·00

The percentage of oxygen in our burner-gas will be:

$$42{\cdot}30 \times \frac{20{\cdot}8}{100} = 8{\cdot}80 \text{ per cent O.}$$

In passing through the chambers, 2 volumes of SO_2 will combine with 1 volume of O to form SO_3; therefore, 12 volumes of SO_2 will combine with 6 volumes of oxygen:

$$12 \times \tfrac{1}{2} = 6.$$

Deducting these six volumes of oxygen from the total volumes of oxygen in the burner-gas (namely, 8·80), we have 2·8 O remaining in the outlet-gases.

But the 100 volumes of burner-gas will become reduced in passing through chambers from condensation of SO_2 and O (SO_3) to 82 volumes,

$$100 - (12 + 6) = 82,$$

and the percentage of oxygen in the outlet-gas will therefore be

$$2{\cdot}8 \times \frac{100}{82} = 3{\cdot}405 \text{ per cent.}$$

Now, let us begin with the outlet-gas, and work backward: Assuming 3·405 volumes per cent of oxygen in outlet-gas, what is the corresponding percentage of SO_2 in burner-gas?

The percentage composition of our outlet-gas will be:

Air	$\left(3{\cdot}405 \times \frac{100}{20{\cdot}8} =\right)$	16·37
Nitrogen	- - -	83·63
		100·00

The oxygen originally associated with the 83·63 volumes of nitrogen would be $83{\cdot}63 \times \frac{20{\cdot}8}{79{\cdot}2} = 21{\cdot}69$ volumes = O which has been used to oxidize S to SO_3. And as 3 volumes of oxygen in SO_3 correspond to 2 volumes of SO_2, 21·69 volumes of O will = 14·46 volumes of SO_2.

$$21{\cdot}69 \times \tfrac{2}{3} = 14{\cdot}46,$$

and the original volume of the burner-gas equal to 100 outlet-gas would be:

$$100 + 14{\cdot}46\ SO_2 + 7{\cdot}23\ O \text{ for oxidizing } SO_2 \text{ to } SO_3 = 121.69.$$

The percentage SO_2 in burner-gas would, therefore, be:

$$14{\cdot}46 \times \frac{100}{121{\cdot}69} = 12 \text{ per cent.}$$

Now let us see how the matter stands when burning pyrites. Take, for example, a burner-gas from burning of pyrites containing 8 volume per cent SO_2; what is the corresponding percentage of oxygen in outlet-gas?

The composition from burner-gas will be:

			Vol. per cent.
Found by test,		SO_2	8·0
O in SO_2	8·0		
O in Fe_2O_3 * $8 \times \frac{4}{8} = 3$	3·0		
	11·0		
$11{\cdot}0 \times \frac{79{\cdot}2}{20{\cdot}8} =$		Nitrogen,	41·9
		Air,	50·1
			100·0

The percentage of oxygen in our burner-gas will be:

$$50{\cdot}1 \times \frac{20\ 8}{100} = 10{\cdot}42 \text{ per cent.}$$

In passing through the chambers, 2 volumes SO_2 will combine with 1 volume O to form SO_3; therefore, 8 volumes of SO_2 will combine with 4 volumes of $O - 8 \times \frac{1}{2} = 4$.

Deducting these 4 volumes of O from the total oxygen in the burner-gas, we have 6·42 volumes of O remaining in the outlet-gas.

But the 100 volumes of burner-gas will become reduced in passing through the chambers from condensation of SO_2 and O (SO_3) to 88 volumes at the outlet:

$100 - (8 + 4) = 88$, and the percentage of oxygen in outlet-gas will therefore be:

$$6{\cdot}42 \times \frac{100}{88} = 7{\cdot}30 \text{ per cent.}$$

Reversing our problem, we have the query: Assuming 7·30 per cent oxygen in outlet-gas, what is the corresponding percentage SO in burner-gas from pyrites? The composition of our outlet-gas will be:

Air	$\left(7{\cdot}30 \times \frac{100}{20{\cdot}8} =\right)$	35·10
Nitrogen	- -	64·90
		100·00

The oxygen originally associated (in the air) with the 64·90 volumes of nitrogen would be:

$$64{\cdot}90 \times \frac{20{\cdot}8}{79{\cdot}2} = 17{\cdot}04$$

And as 15 volumes of oxygen (in SO_3 and Fe_2O_3) correspond to 8 volumes of SO_2,† 17·04 volumes will = 13·63 volumes SO_2.

$$17{\cdot}04 \times \frac{8}{15} = 13{\cdot}63.$$

The original volume of burner-gas equal to 100 outlet-gas would be:

$$100 + 8SO_2 + 4O \text{ to oxidize } SO_2 \text{ to } SO_3 = 112.$$

And the percentage of SO_2 in burner-gas would therefore be:

$$13{\cdot}63 \times \frac{100}{112} = 8 \text{ per cent.}$$

There are always various sources of error which will cause slight differences between the actual tests and the calculated ones, such as (with pyrites) oxidation of sulphides of copper and zinc, formation of sulphates of iron and of magnetic oxide in the cinder, presence of SO_3 in burner-gas, oxidation of SO_2 by HNO_3, dilution of gases by nitrogen oxides, and leakage of air into chambers; but none of these will affect our calculation very appreciably, and may generally—with approximately pure pyrites—be neglected.

If it be admitted that the testing of both burner and outlet-gases is superfluous, the question arises: Which is it most convenient and best to test? I would say, undoubtedly the outlet-gas. It is altogether free from such violent fluctuations as are caused in the burner-gas by opening of burner-doors, etc.; and moreover, it is possible to take a continuous sample of it which shall represent twelve or twenty-four hours' work, and thus have a thoroughly reliable average sample. The testing for oxygen by means of a solution of ammonia-chloride of copper in Orsat's apparatus is simple, quick, and reliable, and requires no standard solutions for the use of a balance.

I append a table showing percentage of sulphurous anhydride in burner-gas—with brimstone and with pyrites—for varying percentages of oxygen in outlet-gas.

TABLE SHOWING PERCENTAGE SO_2 IN BURNER-GAS AT VARYING PERCENTAGES OF OXYGEN IN OUTLET-GAS.

	Per cent O_2 in burner-gas.			Per cent SO_2 in burner-gas.	
Per cent oxygen in outlet-gas.	With brimstone.	With pyrites.	Per cent oxygen in outlet-gas.	With brimstone.	With pyrites.
3·0	12·23	9·79	8·0	9·28	7·42
3·5	11·95	9·56	8·5	8·99	7·17
4·0	11·67	9·35	9·0	8·61	6·91
4·5	11·38	9·10	9·5	8·31	6·66
5·0	11·09	8·87	10·0	8·01	6·40
5·5	10·80	8·64	10·5	....	6·14
6·0	10·50	8·40	11·0	....	5·87
6·5	10·20	8·16	11·5	....	5·60
7·0	9·90	7·91	12·0	....	5·33
7·5	9·59	7·67			

* From the equation $FeS_2 + O_{11} = Fe_2O_3 + 4SO_2$, we see that the oxygen combined with iron is to the oxygen in the SO_2 as 3 : 8.

† O in SO_2 8
O in Fe_2O_3 3
O to oxidize SO_2 to SO_3 4
15

THE GENESIS OF THE CRYSTALLINE IRON ORES.*

By Alexis A. Julien.

In an age which admits its special indebtedness for material advancement to the industries connected with the manufacture of iron and in a country in which these industries have been so vastly developed as in this, the question of the origin of that metal has long possessed, and must always retain, a high degree of interest. So far as relates to the limonites, turgites, and bog-ores, the question has met with a satisfactory answer in the theory of the concentration of these ores by the percolation of organic acids, as fully presented in the writings of Bischoff, Hunt, and others; especially as the process can be actually observed and studied in progress in the lakes, marshes, and bogs of the present day. But the mode of genesis of the crystalline ores—hematites, magnetites, menaccanites, and their mixtures—enveloped partly in the sedimentary strata and chiefly in the still more ancient crystalline rocks of Archæan age, can be only inferred from analogies. Nor can the problem be considered as solved by any or all of the numerous theories which have so far been advanced. These theories may be naturally divided into two classes, as they may refer the iron ores, inclosed in the subterranean strata, to an extraneous or to an indigenous origin.

A. THEORIES OF EXTRANEOUS ORIGIN.

To begin with the former, we have

1. *Meteoric Fall.*—This startling theory has been suggested to account for the enormous mass of martitic specular iron ore, claimed to be the most extensive known single deposit of iron ore on the continent, that of the Cerro de Mercado, two miles from Durango, Mexico. "Cerro de Mercado is a mountain one mile long, one third of a mile wide, and from 400 to 600 feet in hight. The ore surface of the mountain aggregates over 10,000,000 square feet; but there are indications that the ore is not all above ground, and the engineer's report declares it to be an enormous aërolite half imbedded in the level plain on which it lies." Such a view is sufficiently controverted by the mineralogical constitution of the mass and its structure—"immense veins of specular iron ore standing nearly vertical."†

2. *Eruption as Dikes.*—According to this genetic view, the crystalline iron ores have been extruded from the interior in a pasty condition, like a lava, through fissures in the superficial strata.‡ This theory has been recently further developed in reference to the banded jaspery iron ores of Michigan, and it has been advanced that the banding and lamination of these ores are similar in character and origin to those strongly marked in rhyolytes, furnace slags, etc.§ The mineralogical constitution and infusibility of these ores, their distinctly sedimentary lamination, etc., ‖ clearly testify to the unsoundness of these hypotheses.

3. *Sublimation into Fissures.*—The inconsiderable crusts of specular oxide which have been observed in the vicinity of volcanoes, such as Vesuvius, have certainly no relation to the enormous *bedded* masses distributed throughout the world at a distance from volcanic centers.

B. THEORIES OF INDIGENOUS ORIGIN.

The theories of this class differ in ascribing the origin of iron ores to either chemical or mechanical agencies. Nine chemical theories have been proposed.

4. *Concentration from ferriferous rocks or lean ores* by the solution and removal of the predominant constituent; for example, silica, by means of thermal solutions. Indeed, it has been shown ¶ that a concentration, in a similar way, of the ferriferous constituent in the lower carboniferous limestone and dolomites of the Mississippi basin, through the removal of the more soluble calcium carbonate by carbonated waters, has apparently produced extensive deposits of limonite, *in loco originali*. But there is no evidence of the relation of any of the crystalline iron ores, inclosed in sediments of plainly submarine origin, with any such subaërial process. Even were the theory satisfactory in regard to the pure ores, the essential question remains unanswered, namely, the genesis of the original "ferriferous rocks or lean ores" themselves.

5. *Saturation of porous strata*, for example, of sandstone, by infiltrating solutions carrying iron oxide.** This theory, however applicable to certain rock-masses rich in hydrated ferric oxides, can account neither for the concentration of the huge and pure bodies of the true ores, nor for the alteration of siliceous and ferriferous laminæ and layers in the lean ores.

6. *Infiltration into subterranean chambers and channels*, depositing pipe-ores and limonites in widened crevices and joints of the more recent limestones or other sedimentary rocks, or in cavities overlying impervious strata.†† The lenticular form, laminated structure, intercalation of the material of the matrix, inclosure of the ore-bodies in the bedding-planes, and other facts, markedly distinguish the crystalline ores from the limonites formed by such a process.

7. *Decomposition of pyrite*, and other ferruginous minerals, inclosed in decaying schists, and transfer of the iron oxide in solution as ferrous sulphate.‡‡ The precipitation of the iron oxide has been sometimes attributed to simple oxidation, more usually to the production of ferrous carbonate, by reaction between the ferrous sulphate and the calcium carbonate of the limestone, afterward converted into limonite by oxidation and hydration.§§ This theory has had only local application, even to the limonites, and its connection with the crystalline ores is rendered improbable by the absence of associated limestones, or, if present, of evidences of their erosion, etc.

8. *Derivation from original deep-sea deposits* of hydrous ferric oxide, or of ferrous carbonate, dehydrated by subsequent heat, and deoxidized by hydrogen.* By a modification of this theory, the jasper ores have been connected with the ferruginous and manganiferous nodules which have been dredged from the surface-layer of the deep-sea ooze of our present ocean-bottoms.† All the evidence so far gathered, however, shows no correspondence between the phenomena, the ferriferous contents of the ooze consisting of irregular crusts and nodules, never continuous nor interlaminated with silica. On the other hand, there is abundant evidence that the strata associated with the crystalline iron ores are mostly shallow water or shore-deposits, in large part conglomeritic.

9. *Deposit from springs*, by oxidation and precipitation from solutions of ferrous carbonate, on exposure to the air at their issue.‡ Such deposits, it is admitted, are local and limited, and the theory can have no bearing on the ordinary wide-spread crystalline ores.

10. *Alteration of diffused ferric oxide*, disseminated through sediments, into ferrous carbonate, in presence of vegetable matter, and its accumulation in particular layers by processes of filtration and segregation.§ The vague processes thus invoked to account for the accumulation of ores are not accepted as satisfactory, even for the carbonates of the coal measures, lying in definite planes. Nor do the sheets and beds of crystalline ores usually show the irregular characteristics which may be attributed to processes of segregation.

11. *Metamorphism of Ancient Bog-Ores.*—The reference of the crystalline iron ores to this origin has been thus stated by Dr. Hunt: "I see no reason for assigning any other than a sedimentary origin to the magnetic and specular iron ores of the crystalline schists; nor do I conceive that the conditions under which they were deposited differed essentially from those which at the present day give rise to beds of limonite and ocher."‖ Again he observes: "The organic matters reduce the peroxide of iron to a soluble protoxide, and remove it from the soil, to be afterward deposited in the forms of iron ocher and iron ores, which by subsequent alteration become hard, crystalline, and insoluble."¶

Le Conte also states: "Therefore we conclude that both *now* and *always* iron ore is, and has been, accumulated by organic agency."**

Prof. J. D. Dana remarks,†† concerning the Upper Silurian deposits: "The beds of argillaceous iron ore . . . could not have been formed in an open sea; for clayey iron deposits do not accumulate under such circumstances. They are proof of extensive marshes, and therefore of land near the sea-level. The fragments of crinoids and shells found in these beds are evidence that they were, in part at least, salt-water marshes, and that the tides sometimes reached them." In reference to the Laurentian deposits, he states: "Limestone strata occurred among the alternations, and argillaceous iron ores, though vastly more extensive. . . . The argillaceous iron ore has become the bright hematite or magnetite, and it is banded by, or alternates with, schist and quartz, etc., which were once accompanying clay and sand layers."

Dr. Kitchell long ago opposed the theory of the igneous or eruptive origin of the magnetic iron ores of New Jersey, maintaining that they "were of sedimentary origin, and had been deposited just as the gneiss and crystalline limestone had."‡‡ With this view, Professor Cook coincides, in the following statement: "The magnetic iron ores of this State have originated from chemical or mechanical deposits, just as our hematites and bog-iron ores do now."§§

In opposition to this theory, in its reference to subaërial bogs or marshes, it must be considered that the inclosing and associated strata bear universal testimony, both in their contents and the form of their superficies, to their submarine mode of deposit. On the other hand, if the bog-ore theory were applicable to these ores, every ore-bed would imply a terrestrial plane for the reception of the subaërial bog deposit, that is, for every ore-lens a corresponding elevation above the sea-level and ensuing subsidence of the entire underlying stratum. On the contrary, no evidence has been shown in the Archæan strata of any subaërial surface; all appear to be submarine sediments, and that still more ancient rocky terrane which formed the coast whose *débris*, poor in iron, was deposited or strewn over the ancient Laurentian sea, and upon whose surface bog-deposits may have rested, seems to have been entirely buried up beneath later sediments. Again, the strongly marked lenticular form and laminated structure of all deposits of crystalline iron ores—and even of the numerous smaller lenses, parallel or overlapping, which make up the large deposits—are unmistakably characteristic of marine accumulation, Neptune's own royal stamp. A bog-ore deposit is almost always irregular in outline, concretionary and cavernous in structure, and commonly characterized by concentration in pockets and groups of isolated lumps. One can rarely fancy any traces of such peculiarities in the compact symmetrical lenses which make up ordinary deposits of magnetite.

The complete dehydration and partial deoxidation of the hydrated iron oxide of a bog-ore, necessary for its conversion into a magnetite, must have produced an enormous contraction; but of this there is rarely any evidence, such as might be expected, in the disturbance of the lamination of the ore, and of the stratification of the surrounding rock.

It is of common occurrence that a bed of crystalline iron ore overlies a bed of limestone, in immediate contact (for example, at the Baldwin-Forsyth mine, Hull, Canada); and yet the surface of the latter is perfectly plane, presenting no trace of the pitting and erosion‖ to which so soluble a material would have been subjected by the action of the organic acids supposed to have been concerned in the concentration of the ore in a bog.

Although graphite does often occur in intermixture with the crystalline ores, its general absence seems to prove that it can not be chiefly derived from organic matter (1 to 36 per cent) contained in all limonites, but rather, it may be, from the algæ and marine plants sometimes finding

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* From the Proceedings of the Academy of Natural Sciences of Philadelphia.

† B. Silliman, Am. Jour. Sci., 1882 (iii.), xxiv., 375; and J. Birkinbine, Chicago Min. Jour., 1882, ii., No. 4, p. 184.

‡ J. D. Whitney, The Metallic Wealth of the U. S., p. 433.

§ M. E. Wadsworth, Proc. Bost. Soc. Nat. Hist., 1880, xx., 470; and Am. Jour. Sci., 1881 (iii.), xxii., 403.

‖ J. D Dana, Am. Jour. Sci., 1881 (iii.), xxii., 320, 402; J. S. Newberry, School of Mines Quarterly, November, 1880.

¶ J. P. Lesley, Report on Brown Hematite Deposits of Nittany Valley, Pennsylvania; R. Pumpelly, Geol. Surv. Mo., Prelim. Rep. on Iron Ores, 1872, 8, *et seq.*

** Emmons, Nat. Hist. N. Y., iv., 94.

†† F. Prime, Jr., Am. Jour. Sci., 1875 (iii.), ix., 433.

‡‡ T. S. Hunt, Nat. Ac. Sci., Nov. 1874.

§§ G. Bischoff, Chem. and Phys. Geol., i., 238; F. Prime, Jr., *loc. cit.*; W. B. Rogers Geol. Penn., 1858, ii., Pt. ii., 722, 729.

* J. P. Lesley, The Iron Master's Guide, p. 374.

† W. O. Crosby, Proc. Bost. Soc. Nat. Hist., 1879, xx., 168

‡ G. Bischoff, Chem. and Phys. Geol., i., 155-157, 166-167.

§ W. B. Rogers, Geol. Penn., 1858, ii., Pt. ii., 737.

‖ Letter of Dr. T. S. Hunt, 1858, quoted in Lesley's Iron Master's Guide, p 385. See also Vanuxem, Nat. Hist. N. Y., Geol., 3d District, p. 267.

¶ T. S. Hunt, Chem. and Geol. Essays, 22.

** J. Le Conte, Elements of Geology, 375.

†† J. D. Dana, Manual of Geol., p. 231 and 155.

‡‡ W. Kitchell, Geol. Surv. N. J., 2d Rep., 1855, 155, 229 etc.; and 3d Rep., 1856.

§§ G. H. Cook, Geol. of N. J., 1868, 61.

‖ B. Von Cotta, Ore Deposits, 249, 284.

their growth and entombment in the sands, even of iron oxide, in shallow water. To the deoxidation produced in the decomposition of the remains of such plants, the content of sulphur in many iron ores may be due.

12. *The metamorphism of ancient lake-deposits* of limonite passing into hematite, corresponding to the oolitic "fossil ore" of the Clinton group of the Upper Silurian, to the "mustard seed" ore described by Sjörmalm, which is deposited near the banks of the present Swedish lakes, * etc. This "lake ore" theory† seems to be valid for a large number of huge deposits of the crystalline ores, and also satisfactorily accounts for the abundant presence of apatite in many ore-beds. It may be fittingly applied, therefore, in explanation of the phenomena seen in those deposits which contain a notable amount of calcium phosphate; most of those which consist of hematite, or of magnetite passing into or occasionally inclosing hematite, namely, in this country those of Cerro de Mercado, of Southern Utah, of Port Henry, N. Y., etc.; and the beds of magnetite which present the botryoidal and concretionary aspect and radiated structure of limonite, for example, in Southern Utah.‡

On the other hand, the poverty or almost entire absence of phosphorus and sulphur in certain ore-beds, and the extreme abundance of titanic acid, free alumina, garnet, olivine, etc., in others, demand some other explanation.

Two mechanical theories are yet to be considered.

13. *Violent Abrasion and Transport.*—This theory may be best stated in the words of its author:

"That the Azoic period was one of long-continued and violent action can not be doubted, and while the deposition of the stratified beds was going on, volcanic agencies, combined with powerful currents, may have abraded and swept away portions of the erupted, ferriferous masses, rearranging their particles and depositing them again in the depressions of the strata." §

This theory of Whitney was supplementary to his main theory of volcanic eruption of the ferriferous masses, rich in native iron. But to this Lesley properly objects that such secondary deposits would be conglomeritic and also contain metallic iron.

14. *Concentration and Metamorphism of Iron-Sands.*—The work of the ocean as a grand abrading agent, and in the transport of the abraded *detritus*, has been largely studied and described by many authors; but less attention has been paid to the action which goes on, during the shorter or longer period of transport of the *detritus*, in sorting out the various constituents in reference to specific gravity. Almost every sheltered bay and cove afford instances, not only of local deposits peculiar as to size, for example, gravels, sands, or fine silt, but concentrated gatherings of the grains of certain minerals, whose separation has been due to the relation of their specific gravity and form to the force of the surf or of local currents. The Tertiary sands which border our Atlantic coast present everywhere examples of this continuous and delicate jigging action of the ocean, in the gathering together—now of black iron-sands, either magnetic or titaniferous, now of red garnet-sands, often of the two intermingled, and, still more abundantly, deposits of pure white quartz-sand. The iron-sands become very prominent in certain localities, for example, in this country at Killingsworth, on the Connecticut shore of Long Island Sound, on the north shore of the lower St. Lawrence, on the coasts of California and the shores of Lake Huron and Lake Erie, Oregon, etc., and abroad, along the coast of Great Britain, the shores of the Baltic and Mediterranean, New Zealand, Madagascar, and Hindostan. Special attention has been given to the deposits of the lower St. Lawrence, which lie about three meters above high-water mark, and comprise layers of black iron-sand, often nearly pure, from 1·5 to 15 centimeters in thickness.

"An inspection of the iron-sands, from the various localities above mentioned, shows that they all contain, besides the ores of iron, a small proportion of red garnet, and more or less of fine siliceous sand. The latter of the two substances it is possible to remove almost entirely by careful washing of the crude ore."¶

The frequent purity of these sands may be inferred from the following determinations by Dr. Hunt of their content of *quartz and siliceous residue:*

Rivière du Loup (in Chaudière Valley)	4·80 per cent.
Sorel **	5·92 "
Quogue, Long Island, N. Y. (quartz and red garnet)	17·00 "

In other parts of the world, especially where volcanic or crystalline rocks compose the coast-line, other minerals, such as olivine (in the Sandwich Islands), hornblende, augite, volcanic glass, etc. (on the Mediterranean), often constitute the sands along the shores. Beach-sands, where non-calcareous, consist chiefly of the following minerals,†† which are arranged in the order of their specific gravities:

	Specific gravity.
Quartz (and chert)	2·5—2·8
Olivine	3·3—3·5
Garnet	3·1—4·3
Chromite	4·3—4·6
Menaccanite	4·5—5·0
Magnetite	5·0—5·1

It is a significant fact that in the metamorphic, crystalline rocks of our continent, from Canada to Alabama, we find the same minerals concentrated also in rock-form, namely:

Quartzite (siliceous schist, jasper, etc.): common everywhere.

Chrysolite (or dunite. Largely converted into serpentine, etc.): Canada, Michigan, North Carolina, Georgia, Alabama, etc.

Garnetite (or garnet-rock. Sometimes made up of manganese-garnet): Canada, New York, North Carolina, etc.; in close association with magnetite at Franklin and near Andover, N. J., in Grenville, Canada, etc. Doubtless in some cases the origin of this mineral (as well as of olivine), especially if crystallized, must be assigned to indigenous development in the course of metamorphism. But, at the Buckhorn mine, Harnett County, N. C., my own examination of the section, 61 meters in hight, confirms the statement of Prof. Kerr,* who notes the following series (from above downward):

Specular ore (11 meters).
Manganesian ore.
Slaty manganese-garnet.
Feldspathic gneiss.
Manganese-garnet.
Gneiss.

Here the garnet certainly occurs in ancient sedimentary layers, whose partial decomposition has saturated the ore with manganese oxide; while the small admixture of magnetite, frequently dispersed through the hematite, points to the original sediment of iron-sand.

Chromite: Massachusetts, Pennsylvania, North Carolina, etc.

Menaccanite: Canada, New York, New Jersey, Pennsylvania, etc.

Magnetite: common everywhere.

Compound varieties also occur in abundance, which correspond closely to the mixtures of the same minerals in the sands along the coast, namely:

Magnetic quartzite (martitic and hematitic jasper-schists, etc.): common everywhere.

Magnetitic garnetite (also hematitic and *manganesian*): Buckhorn mine, N. C.

Chromitic dunite: Canada, North Carolina, Alabama, etc.

Chrysolitic menaccanite (with magnetite): Cumberland, R. I.†

Chrysolitic magnetite: O'Neil mine, Monroe, Orange County, N. Y.‡

Garnetiferous magnetite: mines in Saratoga and Washington counties, N. Y., etc.

Similar allied rocks occur abundantly in foreign countries: dunite and chrysolitic rocks in Europe, New Zealand, etc.; chrysolitic magnetite, at Taberg, Sweden;§ magnetite and menaccanite, in many localities.

Garnet, together with hornblende, augite, cassiterite, apatite, etc., has been observed in admixture with the magnetites of many foreign deposits, for example, of the Thorbjörnsbo mine at Arendal, Sweden; of Traversella, in Piedmont; of Berggieshübel, in Saxony; of Schmiedeberg, in Silesia, etc. F. Wöhler relates:

"We spent a day in the large iron mines of Langbanshytta. The gangue of the fine magnetic iron ore is frequently brown garnet, which is found in large quantities at the mouth of the mine, and often serves as flux for the reduction of the ore."‖

As the rock strata, associated with all these varieties, are undoubtedly of marine origin, and indicate deposition in shallow water, it is natural to infer their correspondence in origin, in many cases, with the unconsolidated shore-deposits of the present day. In a recent search through the scientific literature of the subject for any similar view, the following statement was found concerning the crystalline iron ores of Canada, in which this theory has been, with some reserve, associated with the bog-ore theory:

"It seems possible that, in some cases, beds may have been formed by the accumulation of iron-sands, just as they are forming in the Gulf of St. Lawrence to-day, the material being derived from the disintegration of pre-existing crystalline rocks. Such beds we should expect to contain, not only magnetite, but ilmenite, and it is well known that, in many cases, ores, on being pulverized, may be more or less completely separated into a magnetic portion, containing little or no titanic acid, and a non-magnetic portion consisting essentially of ilmenite. It seems, however, probable that in general their origin has been similar to that of the modern bog and lake ores. Deposits of magnetite, as a rule, do not continue of uniform thickness for any great distance like the inclosing rocks; and this is just what might be expected if we suppose them to have originally occurred as bog or lake ores, which accumulated in local hollows or depressions."¶

The thinly laminated martitic and hematitic jasper-schists of the Huronian age, always remarkably free from both sulphur and calcium-phosphate, at once present themselves for explanation. Professor Dana, in a criticism on other views,** has attributed the origin of these iron ores to "metamorphism from original marsh-made beds." More probably, in my opinion, the conditions consisted of a shore of some quartzose rock, rich in magnetite, whose *débris* the waves and currents strewed over the sea-bottom, alternately with thin sheets of quartz granules and magnetite crystals, partially concentrating the one or the other material in numerous heaps or thicker layers. In the progress of the metamorphism and contortion to which the layers were subjected, their compact and lenticular forms were further developed, the magnetic oxide was further oxidized, partially as martite, or completely as specular ore (as already suggested by Brooks, Credner and others), and assumed, at points where the contortion or pressure became intense, the micaceous structure and brilliant luster of micaceous iron ore, by a process similar to that which produces "slickensides."

The concentration of nearly pure magnetite in the deposits inclosed in the Lower Laurentian strata of Canada and the Adirondacks, and of titaniferous magnetite or menaccanite in the huge ore-beds associated with the anorthosites of the Upper Laurentian in both regions, point unmistakably to mechanical separation of ferriferous sediments from different terranes; that is, in the one case from the magnetitic gneiss, in the other from the traps and anorthosites, rich in menaccanite. An examination of thin sections of diabase from dikes cutting pure magnetites in Essex County, New York, showed this rock to be rich in menaccanite and a possible source of such sediments.

No concentration of titanic acid has ever been found in limonites or bog-ores. These facts seem significant of the insufficiency of any chemical theory to account for the origin of all the iron ores.

In conclusion, it may be inferred that the mode of genesis of a bed of

* B. Von Cotta Ore Deposits, 461; The Geologist, 1863, 36.
† Dr. J. S. Newberry, "The Genesis of Our Iron Ores," School of Mines Quarterly, Nov., 1880, and "On the Genesis of Crystalline Iron Ores," Trans. N. Y. Acad. Sci., vol. ii., Oct. 23, 1882.
‡ J. S. Newberry, *loc. cit.*, 12.
§ J. D. Whitney, Met. Wealth of the U. S., 434.
¶ Dr. T. S. Hunt, Rep. Prog. Geol., Can., 1866-69, 261-269; also, Canad. Nat., 1872, vi., 79.
** The washed iron-sand contains 0·70 per cent of sulphur, and 0·007 per cent of phosphorus.
†† In regard to pyrite, its ready decomposition has usually prevented its concentration in sands. As to hematite, its foliated texture seems to have resulted both in its wide transport and distribution, resisting concentration, and in its after conversion into hydrated peroxide.

* Geol. N. C., 1875, i., 222.
† M. E. Wadsworth, Bull. Mus. Comp. Zool., 1881, vii., 183.
‡ J. D. Dana, Am. Jour. Sci., 1881 (iii.), xxii., 152.
§ A. Sjören, Neues Jahrb. für Min., 1876, 434.
‖ F. Wöhler, Early Recollections of a Chemist, Am. Chem., 1875, vi., 131.
¶ B. J. Harrington, Geol. Surv. Canada, Rep. Prog., 1873-1874, 195.
** Am. Jour. Sci., 1881 (iii.), xxii., 402.

magnetic iron ore may be determined with some probability by the following diagnosis:

When the ore retains structural characteristics allied to those of limonite, or incloses masses of hematite, or contains a notable amount of calcium phosphate, a chemico-organic origin is probably indicated.

When the ore is exceptionally free from phosphorus, or is rich in titanic or chromic acid, or is closely associated or mixed with granular garnet or olivine, a mechanical origin may be inferred.

THE INGERSOLL SINGLE "STRAIGHT-LINE" AIR-COMPRESSOR.

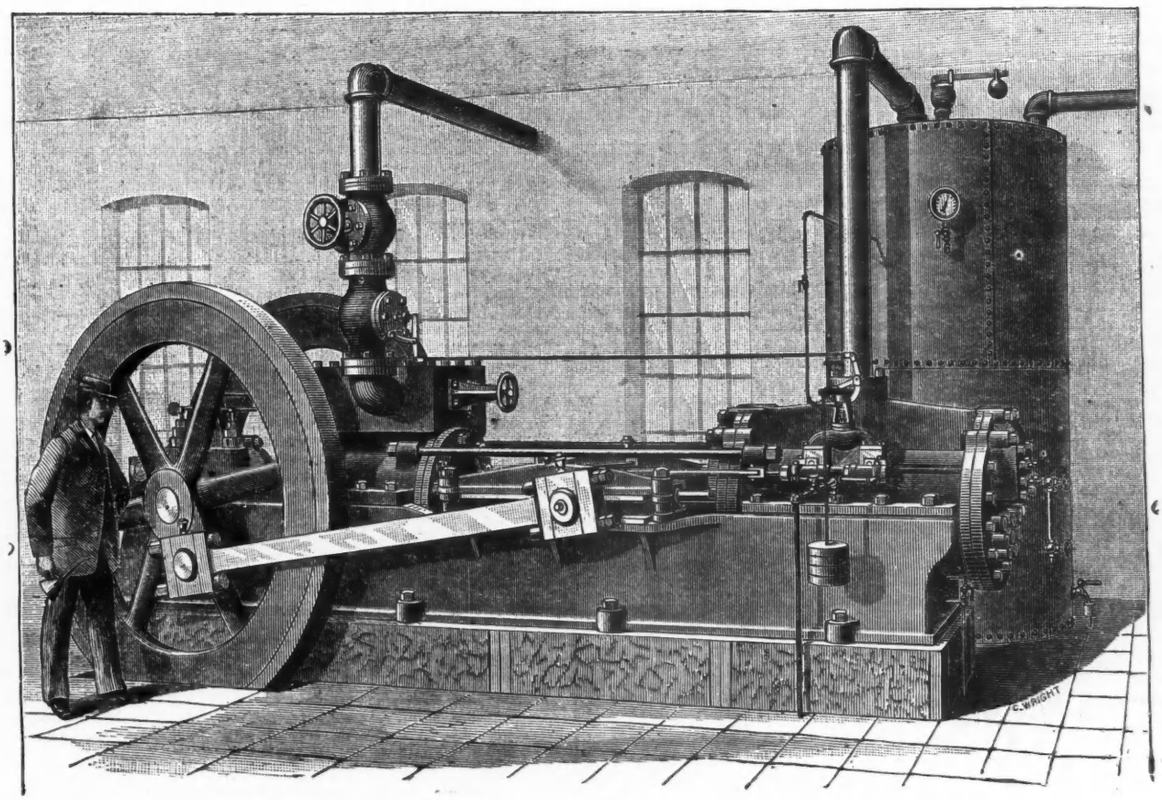
The air-compressor shown in our cut has taken its position as a standard machine among the Eastern mining public, particularly where a large volume of air is required, it being considered safer to depend upon one or more single compressors, the following reasons being advanced in favor of that view:

Each machine is complete in itself and independent. The steam and air-cylinders are in line, and, with the fly-wheels, are carried on one continuous frame, making it impossible for any part to work out of line. All strains are direct, and the line of resistance passes between two heavy balance-wheels, which store the power during the first half of the stroke and release it at the end or point of greatest resistance. If two single compressors are running together, and one is temporarily disabled, it can be cut out instantly without affecting its mate, by simply closing the throttle-valve, and the speed of the other safely increased from forty to fifty per cent. The underground work will not be interrupted nor the compressor injured by its short term of hard duty. Should the engine stop on its center, it is thrown off by the perfected regulating device, so that no "barring over" is required. It is urged that with a duplex compressor the main shaft is subjected to a torsional strain every revolution, which increases the friction and is apt to cause some part to work out of line, so that it is difficult to safely run at a high speed. If one side becomes disabled, all work is stopped, while it is disconnected, and the other side is then left in a crippled condition to do what it can—like a locomotive with one of its cylinders gone.

The system of cooling by injecting water into the interior of the cylinder against pressure, that is, in a spray, while the heating due to compression is going on, maintains the air at nearly its normal temperature; then it is discharged into the receiver, under water, at a sufficiently low temperature to prevent vaporizing this water, and from which it rises robbed of moisture, and passes into the conducting pipe practically dry, if the proper quantity of water is used in the cylinder, and if the receiver is properly constructed and arranged. The inner surface of the cylinder is cool when the free air passes in, and consequently the air is at atmospheric pressure when compression begins. The water lubricates, fills all clearance spaces, and passes into the discharge-valves after the air; thus clearing the cylinder of the entire volume of air compressed. The correctness of this system is proved by the well-known fact that the absorbing capacity of air is greatly increased by every degree its temperature is raised.

Those who have adopted the spray system contend that in the water-jacket system the water circulates more or less regularly between an inner and outer cylinder, keeping only the outer shell cool, and that it is difficult with any system of water circulation to effectually absorb the heat developed by compression; and in proof of this they point to the hot discharge-pipes found on compressors of this type. They argue that therefore the inner surface of the inside cylinder is generally hot, ready to expand the incoming air and prevent the filling of the cylinder with air at atmospheric pressure; the clearance spaces are filled with air at high pressure which is not discharged, but expands back as the piston reverses. This operation, it is urged, is repeated each revolution, and results in a large aggregate loss. Air always carries more or less moisture, which is deposited in the receiver, where it comes in contact with and is vaporized by the hot air, and passes out to condense and freeze, either in the pipes or exhaust-ports of the machines.

The Ingersoll Single "Straight-Line" Compressor has been adopted by such concerns as the Franklin Iron Manufacturing Company, Clinton, New York; the J. & J. Rogers Iron Company, Ausable Forks, New York; and the Mount Hope Mining Company, Mount Hope, New Jersey (one of the Lackawanna Iron and Coal Company's mines). After careful examination of all compressors now in the market, four of these machines, with 24 by 30-inch cylinders, were selected for the Washington (D. C.) aqueduct tunnel, 4·75 miles long. The compressor plant is located at a central point, and the air is carried five miles through 12, 10, and 6-inch pipe, to the head of four shafts, where it is received by four-inch pipes, and supplied to twenty-eight Ingersoll drills, necessary hoisting-engines, pumps, etc. When the tunnel is completed, the air will have been carried through ten miles of pipe. This plant is the largest ever erected for a similar purpose, consisting of six one hundred horse-power boilers, four 24 by 30-inch Single "Straight-Line" Compressors, twenty-eight 3¼-inch "Eclipse" drills, engines, pumps, pipe, etc., the whole being furnished by the Ingersoll Rock Drill Company, of New York.



THE INGERSOLL SINGLE "STRAIGHT-LINE" AIR-COMPRESSOR.

PROGRESS OF THE BASIC PROCESS.—During the last year, the progress made by the Thomas-Gilchrist process, says the *Ironmonger*, has been fully maintained, both in England and on the continent. In England, the Northeastern Steel Company, Middlesboro', commenced in last June with four 10-ton converters, and are now fully at work, regularly producing both rails and soft material, of which the average composition is: Carbon, from ·12 to ·15 per cent; sulphur, under ·05 per cent; phosphorus, under ·04 per cent; manganese, under ·4 per cent, with a tensile strength of 54,000 pounds, and an elongation of 24 per cent, the scrap from which is piled up either by itself or in admixture with iron scrap. In addition to rails, the basic steel has been largely employed for the production of soft material for conversion into plates, sheets, tubes, sleepers, angles, and wire, which latter, from its great purity, has been employed for electrical purposes. The total output of Thomas-Gilchrist Bessemer and Siemens steel for the year ended September 30th, 1883, was 634,373 tons, of which the different countries contributed as follows: England, 122,380 tons; France and Belgium, 67,106 tons; Germany and Austria, 410,052 tons; other countries (including America), 34,835 tons. The make for the month of October last is estimated at about 64,000 tons.

THE PRODUCTION OF PIG-IRON IN 1883.

Mr. James M. Swank, Secretary of the Iron and Steel Association, has published the following figures in the *Bulletin*: The total production of pig-iron in the United States in 1883 was 5,146,972 net tons, against a total production of 5,178,122 net tons in 1882, showing a decrease in 1883 of only 31,150 net tons. We said, at the close of 1883, that the production of the year would be about equal to that of 1882, and now we have proof that it was. The production of pig-iron in 1883, taken in connection with the statistics of the production of Bessemer steel in the same year, which we publish elsewhere, shows that 1883 was not the bad year for the American iron trade that it is sometimes represented to have been. It was a year of low prices, but not of greatly reduced production.

The production of pig-iron in the last five years was as follows, in both net and gross tons:

Years.	Net tons.	Gross tons.
1879	3,070,875	2,741,853
1880	4,295,414	3,835,191
1881	4,641,564	4,144,254
1882	5,178,122	4,623,323
1883	5,146,972	4,595,510

In the following table, we give details of the production of pig-iron in 1882 and 1883 according to fuel used, and also a comparative statement of the number of furnaces in blast on January 1st, 1883, July 1st, 1883, and January 1st, 1884:

FUEL USED.	In blast Jan. 1, 1883.	In blast July 1, 1883.	Furnaces Jan. 1, 1884.			Production. Tons of 2000 pounds.	
			In.	Out.	Total.	1882.	1883.
Anthracite	161	125	118	104	222	2,042,138	1,885,596
Charcoal	129	98	84	156	240	697,906	571,726
Bituminous	127	111	105	116	221	2,438,078	2,689,650
Total	417	334	307	376	683	5,178,122	5,146,972

At the close of 1882, there were in the United States 687 completed blast-furnaces, and at the same time there were 27 furnaces in course of erection. During 1883, there were 13 new furnaces completed—10 coke, 2 charcoal, and 1 anthracite, and 17 furnaces were either burned or abandoned—12 charcoal, 4 anthracite, and 1 bituminous. At the close of 1883, we had 683 completed furnaces in the country, and the information which we have received shows that at that time there were in course of erection 19 furnaces—12 coke, 3 charcoal, and 4 anthracite, some of which are included above in the furnaces under construction at the close of 1882.

Statistics of the stocks of domestic pig-iron on hand and unsold in the hands of the manufacturers or their agents on the 1st of January, 1884, have also been fully reported to us. These statistics we give in comparison with corresponding statistics for other recent periods. On the first of January, 1883, the stocks of unsold pig-iron amounted to 429,694 net tons; on the 1st of July following, to 592,020 net tons; on the 1st of November following, to 484,236 net tons; and on the 1st of January, 1884, to 533,800 net tons. There was an increase of 162,326 tons from January 1st, 1883, to July 1st; a decrease of 107,784 tons from July 1st to November 1st; and an increase of 49,564 tons from November 1st to January 1st, 1884. The following table shows the fluctuations in stock, in the four periods mentioned, according to fuel used:

STOCKS—NET TONS.	Jan. 1, 1883.	July 1, 1883.	Nov. 1, 1883.	Jan. 1, 1884.
Bituminous	157,196	219,631	144,290	171,802
Anthracite	107,259	209,143	177,543	178,020
Charcoal	165,239	163,246	162,403	183,978
Total	429,694	592,020	484,236	533,800

THE MINERAL STATISTICS OF GREAT BRITAIN IN 1882.

Through the kindness of Mr. C. Le Neve Foster, of Llandudno, we have received a copy of the mineral statistics of the United Kingdom for 1882, the work of compilation having been retarded to some extent this year, owing to special circumstances. The following summary gives the figures:

Bauxite	8,389 statute tons.
Alum shale	8,442 " "
Arsenic	7,469 " "
Arsenical pyrites	12,564 " "
Barytes	23,308 " "
Bog-iron ore	5,872 " "
China clay	308,077 " "
China stone	35,737 " "
Fire-clay	2,512,462 " "
Coal	156,499,977 " "
Copper ore (containing 3401 tons copper)	52,810 " "
Copper precipitate, " 63 " "	427 " "
Gold	226 ounces.
Gypsum	101,872 statute tons.
Iron ore (containing 6,513,281 tons iron)	18,031,957 " "
Iron pyrites	25,403 " "
Lead ore (containing 50,328 tons lead)	65,001 " "
Manganese ore	1,548 " "
Ochre, umber	8,873 " "
Oil shale	1,030,915 " "
Phosphate	49,550 " "
Salt	2,135,499 " "
Silver in lead ores	372,449 ounces.
Slates and slabs	504,780 tons.
Tin ore (containing 9158 tons tin)	14,045 "
Wolfram	58 "
Zinc ore (containing 16,130 tons zinc)	32,539 "

The total value of the entire mineral product at the mine is given at £54,879,507.

The report goes into the details of the source of every item of the list and the manner of its distribution. That of coal is particularly interesting:

PRODUCTION OF COAL IN GREAT BRITAIN IN 1882.

County.	No. of collieries.	Production.	Average price at mine. s.	d.
East Breconshire	7	56,256	5	6
West Breconshire	5	87,497	5	6
Carmarthenshire	46	486,796	5	6
Cheshire	38	755,000	6	3
Cumberland	34	1,747,317	5	6
Denbighshire	43	1,586,554	5	3
Derbyshire	245	8,358,936	6	0
North Durham	62	7,458,006	..	..
South Durham	209	21,760,808	4	8¾
Flintshire	39	834,577	5	3
East Glamorganshire	24	788,393	..	..
West Glamorganshire	315	15,604,860	5	10
Bristol (Gloucester)	21	469,394	7	0
Forest of Dean	56	781,789	7	3
North & East Lancashire	309	9,749,863	6	2
West Lancashire	158	10,031,282	5	5
Leicestershire	32	1,182,922	6	0
Monmouthshire	166	5,721,961	5	10
Northumberland	114	7,060,783	5	0
Nottinghamshire	50	4,957,725	6	0
Pembrokeshire	6	71,615	8	0
Shropshire	66	894,500	6	8
Somersetshire	33	780,239	6	11
North Staffordshire	136	4,892,000	7	0
South Staffordshire	345	8,996,198	7	3
Warwickshire	44	1,066,741	6	0
Westmoreland	3	1,421	4	6
Worcestershire	65	1,123,802	7	3
Yorkshire	454	18,530,331	6	6
Total England	3,125	135,857,066		
Argyle and Dumfries	5	112,534	4	2
Ayrshire	136	3,266,992	4	0
Clackmannan, Kinross, Perth, and Sutherland	7	282,648	4	6
Dumbarton	22	219,432	5	0
Edinburgh	15	830,423	8	0
Fife	31	2,052,732	4	3
Haddington	7	250,899	5	0
East Lanark	242	9,351,066	4	2
West Lanark	64	2,353,491	4	2
Linlithgow	16	507,204	6	0
Renfrew	18	114,324	5	0
East Sterling	19	866,043	5	0
West Sterling	28	287,346	5	0
Total Scotland	610	20,515,134		
Connaught	8	6,691	7	0
Leinster	8	82,714	9	0
Munster	4	22,963	9	11½
Ulster	4	15,409	8	4
Total Ireland	24	127,777		
Grand total	3,759	156,499,977		

Under copper, we find very detailed statements of the export and import movement of bars, regulus, and ore; but as they cover the year 1882 only, they are of value chiefly for reference. To give an idea, however, of the magnitude of the copper smelting industry of Great Britain, the following figures may be quoted:

	Quantity.	Metal in ore.
Copper ores and precipitate from mines in U. K.	52,702	3,425
Colonial foreign ores	103,410	8,800
Copper precipitate and regulus	48,658	22,000
Burnt ore from pyrites	434,427	15,300
Total	639,197	49,525

On iron ore, the following summary is suggestive:

Under Coal Mines Regulation Act:	Quantity.	Average. Per cent.
England and Wales, stratified ironstone	9,101,270	30.00
Scotland, stratified ironstone	2,404,177	32.50
Under Metalliferous Mines Regulation Act:		
England and Wales:		
Cornwall	5,749	46.28
Cumberland	1,725,478	55.00
Denbighshire	1,171	45.00
Devonshire	11,481	52.40
Durham	83,724	30.00
Flintshire	1,300	45.00
Glamorganshire	77,162	41.17
Gloucestershire	80,672	44.55
Lancashire	1,408,653	54.70
Leicestershire	267,802	34.50
Lincolnshire	1,190,564	30.00
Northamptonshire	1,333,085	38.00
Oxfordshire	12,753	.....
Somersetshire	36,067	34.65
Wiltshire	99,176	40.00
Ireland:		
Antrim	189,724	36.00
Scotland:		
Ayrshire	1,907	.....
Total	18,031,957	

During the year 1882, the imports of ore were 3,284,946 tons, the principal ports of entry being Cardiff, with 599,330 tons; Fleetwood, with 100,538 tons; Middlesborough, with 497,884 tons; Newcastle, with 306,696 tons; Newport, with 738,319 tons; Stockton, with 113,994 tons; Swansea, with 143,755 tons; and Glasgow, with 251,130 tons. The total amount was imported from the following countries: Algeria, 91,097 tons; Australasia, 2519 tons; Italy, 89,231 tons; Spain, 3,072,955 tons; Turkey, 13,057 tons; and other countries 16,087 tons.

The total quantity of iron ore available for the blast-furnaces of Great Britain in 1882 was:

Production of United Kingdom	18,031,957 tons.
Foreign ores imported	3,284,946 "
"Purple ore" from imported pyrites	408,000 "
	21,724,903 "
Ore exported	21,973 "
	21,702,930 "

The make of pig-iron during the ten years ended in 1882, and the quan

tity of coal used in producing it, including that converted into coke, is given in the following table:

Year.	Pig-iron made.	Coal used.
1873	6,566,451	16,718,562
1874	5,991,408	15,292,201
1875	6,365,462	15,645,774
1876	6,555,997	15,598,381
1877	6,608,864	15,342,445
1878	6,381,051	14,112,005
1879	5,995,337	13,117,411
1880	7,749,233	16,982,629
1881	8,144,449	17,484,990
1882	8,586,680	17,796,301

In 1882, there were 335 iron mills and forges in Great Britain possessing a plant of 5707 puddling-furnaces and 917 rolling-mills.

The total quantity of iron pyrites imported into Great Britain was 627,700 tons, of which 114,132 tons came from Portugal and 497,807 tons from Spain. The quantity treated at English metal extraction works was 434,427 tons, according to Mr. T. V. Bird, of Liverpool, which, according to Mr. John A. Phillips, yielded 15,300 tons of copper, and by the Claudet process 1500 ounces of gold and 400,000 ounces of silver.

The imports of manganese ore were distributed as follows:

IMPORTS OF MANGANESE ORE.

	Tons.
From Australasia	1,349
" British North America	1,188
" Italy	1,255
" Portugal	13,493
" Spain	5,468
" Turkey	1,205
" United States	1,948
" Other countries	3,860
Total	29,766

The principal sources of supply of phosphate for the English market were as follows:

ENGLISH IMPORTS OF PHOSPHATE.

	Tons.
From Belgium	18,248
" France	9,764
" Portugal	42,878
" United States	106,197
" Dutch West Indies	4,952
" British North America	8,187
" British West Indies	6,699
" Other countries	2,503
Total	199,428

An attempt has been made to collect the mineral statistics of the world and two large tables are printed. They contain many gaps, however and we must express surprise that the figures for the United States are so meager, and in many cases decidedly erroneous.

PHOSPHOR-COPPER.

The largely increasing use of phosphor-copper in the manufacture of copper and copper alloys, says Dr. W. G. Otto, of Darmstadt, Germany, in *Engineering*, makes it advisable to give a few particulars as to the mode of its application in this paper.

It is well known that the action of phosphorus (that is, phosphor-copper) consists principally in its reducing properties, by virtue of which the oxygen which was absorbed by the molten metal, or rather the oxides thereby produced, are removed, and there is consequently imparted to the metal that degree of homogeneity, strength, and toughness which is peculiar to the chemically pure metal.

The phosphorus, by producing these effects, is converted into cuprous phosphate which floats on the surface of the molten metal in the shape of an exceedingly fluid slag, while the superfluous quantity combines with the metal.

Considering this effect of the phosphorus on the metal, it appears, to say the least, unnecessary to add to the liquid metal a larger quantity of phosphor-copper than would suffice to reduce the oxide present. Indeed, on chemical analysis of phosphor-bronzes of very best quality, one finds as a rule such infinitesimal proportions of phosphorus that these only tend to show that the metal had been subjected to treatment with this substance.

The impression is frequently met with that the phosphorus itself imparts to the metal certain valuable properties, more especially that it increases the hardness and strength, and that consequently a proportion of phosphorus in the metal is of value. In reply to this idea, it must be stated that a small quantity of phosphorus certainly is less detrimental to the properties of the metal than many other bodies by means of which the same results are sought to be obtained, but in no case does the presence of phosphorus in metal improve it. It must be admitted that, although a certain amount of phosphorus increases the hardness of the metal, it certainly does so at the expense of its toughness; if, for instance, an alloy, say a bronze of greater hardness, is required, it is much better obtained by increasing the quantity of tin, which does not affect the toughness of the metal to the same extent as if an equal degree of hardness were to be obtained by a larger addition of phosphorus.

Assuming the correctness of the views expressed in the foregoing, all products should be excluded from use which offer no guarantee for the quantity of phosphorus, which by their agency would be conveyed to the metal, more especially mixtures which liberate the phosphorus in the molten metal, or also free phosphorus which, as a necessary sequence, entails that at one time a greater and at another time a less proportion remains in the metal.

A sure sign that the reduction of the oxide present in the liquid metal has been completed, is shown by the appearance of the surface, which in this case will be perfectly clear. Experience shows that this is obtained as a rule by an addition of 0·1 per cent of phosphorus, or 0·66 per cent phosphor-copper of 15 per cent phosphorus; should such an addition not produce this result, or should the surface of the metal again have become covered during the time which lapses till the metal can be poured, and providing that it should meanwhile have not become too cold, small quantities of phosphor-copper should gradually be added till the surface again becomes quite clear, after which the metal should be poured at once.

THE PRODUCTION OF BESSEMER STEEL IN 1883.

Mr. James M. Swank has received complete statistical reports from the companies owning the 15 Bessemer steel-works which were in operation in the United States in 1883. From these reports, we learn that the quantity of Bessemer steel ingots produced in the United States last year was 1,654,627 net tons, against 1,696,450 tons in 1882, showing a decrease of only 41,823 tons. This is a much smaller decrease than has been generally supposed. It was, however, the first decrease that has occurred in the history of the Bessemer steel industry of this country. The production of Bessemer steel ingots in the United States from 1874 to 1883 has been as follows, in net tons:

1874	191,933	1879	928,972
1875	375,517	1880	1,203,173
1876	525,996	1881	1,539,157
1877	560,587	1882	1,696,450
1878	732,226	1883	1,654,627

The quantity of Bessemer steel rails produced in 1883 by 14 of the works above referred to (one of the companies not producing rails) was 1,253,925 net tons, against 1,334,349 net tons similarly produced in 1882, showing a decrease of 80,424 tons. It will be seen that in 1883 a much larger proportion of the ingots produced passed into miscellaneous steel products than in 1882.

Changing to gross tons the net tons of steel rails produced in our Bessemer steel-works in 1882 and 1883, we have 1,191,383 gross tons produced in 1882 and 1,119,576 gross tons produced in 1883.

The figures given for 1882 do not cover the total production of steel rails in the United States in that year, as there were 103,806 net tons of Bessemer rails rolled in iron rolling-mills, chiefly from imported steel blooms, and there were also 22,765 net tons of open-hearth steel rails rolled, making a total production in 1882 of 1,460,920 net tons of steel rails. In 1883, we rolled very few tons of Bessemer steel rails in iron rolling-mills, either from imported or domestic blooms, and we probably made fewer open-hearth steel rails in 1883 than in 1882; in the absence as yet of complete statistical returns, we estimate the total production from these two sources at considerably less than 50,000 net tons. Adding say 46,075 tons from these sources to the 1,253,925 net tons of Bessemer steel rails ascertained to have been rolled in 1883 by our Bessemer steel-works, we have a probable total of 1,300,000 net tons of steel rails rolled in the United States in 1883, or 160,920 tons less than in 1882.

A NEW METHOD OF TREATING HARD WATER.

From Germany comes the report that, in some of the dyeing establishments there, water containing lime has been softened successfully by a new process.

The principle of the inventor is based on the fact that oxide of magnesia made red-hot easily absorbs, after hydration, the free carbonic acid of natural water; and by thus depriving the water of the gas dissolved in it causes the carbonate of lime in solution to be precipitated. The magnesia itself is then dissolved, and joins the bicarbonate of magnesia which is in the water. Professor Strohmann, of Leipsic, has carefully examined the reaction, and explains the action of the hydrate of magnesia on the bicarbonates of lime and magnesia in the following way:

$$2CaH_2(CO_3)_2 + MgH_2(CO_3)_2$$

gives with

$$Mg(OH)_2 = 2CaCO_3 + 2MgH_2(CO_3)_2 + 2H_2O.$$

The purification of the water is, however, also based on the decomposition of the gypsum (sulphate of lime) which is generally associated with carbonates of lime as in natural waters. Now it may be noted that without the presence of gypsum the hydrate of magnesia remains without effect on the bicarbonate of magnesia, while, when it is present, this effect takes place at once, and the bicarbonate is transformed into the carbonate by the absorption of the hydrate of magnesia to the extent required for the decomposition of the gypsum, as is shown by the following equation:

$$2CaH_2(CO_3)_2 + MgH_2(CO_3)_2 + 4CaSO_4$$

gives with

$$3Mg(OH)_2 = 6CaCO_3 + 4MgSO_2 + 2H_2O$$

If, besides the given quantity of the bicarbonates of lime and magnesia, only 2 instead of 4 equivalents of gypsum were present, the reaction would be according to the following formula:

$$2CaH_2(CO_3)_2 + MgH_2(CO_3)_2 + 2CaSO_4$$

gives with

$$2Mg(OH)_2 = 4CaCO_3 + 2MgSO_4 + MgH_2CO_3 + 3H_2O.$$

These reactions are of importance in the purification of waters, as they adjust the process to the fluctuations in the composition of the water according to the weather and the seasons, so that, if there is only a sufficient amount of magnesia in the receptacles, and this is well stirred, the purification takes place without any extra attention on the part of the attendants. This, it seems, has already been well proved by practice. At first, the water cleaned in this way was blamed for attacking old boilers which were fed with it and filling them with mud. It was, however, found that sulphate of magnesia in the pure water, when heated to a high degree, acted upon the carbonate of lime of which the deposit in the boilers consisted, and formed gypsum and oxide of magnesia, so that the hard deposit was gradually transformed into mud. When this was blown off, it not unfrequently happened that weak parts in the plates were exposed which previously were kept tight by the deposit, and this gave rise to the opinion that the plates were attacked. How erroneous this supposition was, is clear from the fact that the always present hydrate of magnesia is alkaline, and counteracts the effects of acid, which would act corrosively. At first, stirring was considered indispensable, but it was found that by taking an excess of a mixture of hydrate of magnesia with a proper substratum serving as a filtering medium, through which the water could pass continuously, the desired effect was obtained without any trouble. When proportionate quantities of finely-powdered oxide of magnesia and sawdust are mixed with water, it will be found that, under the action of heat, hydrate

of magnesia is formed throughout the whole mass. After cooling, the hydrate of magnesia will be discovered so firmly united with the sawdust, so to speak crystallized into it, that it can not be removed by mechanical means. This preparation possesses thus the quality of filtering matter in a high degree. By tightly filling cylinders of metal with this mixture, and forcing dirty water through, the water, it is said, leaves the first cylinder not only deprived of all lime, but quite clear, the carbonate of lime crystallizing directly upon the sawdust. The action is so rapid that even water saturated to the fullest extent with lime or gypsum leaves the apparatus with these substances perfectly removed after ten minutes' action.

FURNACE, MILL, AND FACTORY.

Messrs. Copeland & Bacon, of New York, have lately completed what is claimed to be the most perfect plant for phosphate mining and washing there is in South Carolina. It consists of an eighteen-inch double-cylinder, double-drum hoisting-engine, 175 horse-power boiler, pumps, washers, etc., the total weight of which required twelve railroad cars to transport. It is the largest plant in the South, and works very well.

From Easton, comes the report that a "disintegrator and separator," invented by Elijah Warne, of that city, is doing good work. One of the machines is at work at the boiler-works of Messrs. Tippet & Wood, Philipsburg, New Jersey.

A miner's safety-lamp has been patented by John L. Williams, of Shenandoah, Pa. There is a sleeve or tube on the wick tube and a wire extending from it into a recess in the lamp, the wick tube having a flange with a notch for the other tube, and the whole so arranged that the lamp may be extinguished very quickly without opening.

Of the furnaces in the Hocking Valley, Ohio, but three are now in blast—the Gore, Baird, and Fanny—and there appear to be no prospects of the others going in soon. Those out are the Floodwood, Helen Buchtel, Lee, Crafts, Winona Bessie, New York, XX, one stack of Fanny, and Maxhibala.

After the election of officers of Brown, Bonnell & Co., January 23d, the following resolutions were introduced and adopted:

Resolved, That the action of the officers of this company in allowing judgments to be entered in the Court of Common Pleas of Mahoning County in favor of the Second National Bank of Youngstown and other creditors of this corporation, is hereby in all things ratified, approved, and confirmed.

Resolved, That the officers of this corporation be and they are hereby instructed and authorized to employ counsel and take any and all proper and legal steps to procure the vacation and annullment of the decree of the Circuit Court of the United States for the Northern District of Ohio, whereby Fayette Brown was appointed receiver of this company, in a suit brought by the Lake Superior Iron Company *et al.*, and if necessary to appeal said case to the Supreme Court of the United States.

A resolution was also adopted that the corporation did not recognize John H. Clarke as its attorney; that he had never been authorized to act in any capacity for it; and that any action taken by him was without the consent or authority of the company.

Of the ten large blast-furnaces at Sharpsville, Pa., but three—the Mabel, Douglass, and Speerman—are now in blast, with no apparent prospects of the other seven going in soon. The Sharon furnace, between Sharpsville and Sharon, is still in blast.

The contract for furnishing elevators for the Custom-House at Albany, N. Y., has been awarded to Crane Brothers, of Chicago.

The Mellert Iron Company's pipe mill at Reading, Pa., closed January 28th for the remainder of the winter, throwing 300 men out of employment. There is no lack of work, but the mill was stopped because of interference with the working due to the cold wave.

Work was resumed January 28th in the Allentown Rolling-Mill Company's little mill, after a long period of idleness. This gives employment to one hundred persons.

The Sheridan furnaces, under the management of Charles I. Rader, are crowding the records of some of the anthracite furnaces which are equipped with fire-brick stoves. The *Bulletin* has been informed that, for the week ended January 19th, No. 2 furnace produced 408 gross tons of pig-iron, 82 per cent of which was of foundry grades. The fuel was three fourths anthracite and one fourth coke, and the consumption of fuel was 1·24 gross tons to a ton of pig-iron produced. The furnace is 14 feet 6 inches in diameter at the boshes, and has a working hight of 57 feet. It has iron-pipe stoves. The stoppages during the week aggregated 5 hours and 27 minutes.

The Troy Iron-Works resumed work January 28th, after a period of idleness. The works will employ 1500 men.

A dispatch from Chicago states that an opinion of the Supreme Court of Illinois, just published, sustains one by Judge Gardiner, of the Superior Court, sixteen months ago, in the case of the Chicago Galvanized Wire Fence Company against the Washburn & Moen Company. The complainant in the bill was manufacturing barb wire, under a license from the Washburn & Moen Company; one of the covenants of the license providing that, in case any other licensee should be required to pay less license than did complainant, then the latter and all other licensees be allowed a rebate to that extent. It was shown on a hearing that the Washburn & Moen Company, in order to reach a settlement with Jacob Haish, an inventor of a valuable patent, made a secret stipulation to allow him to make 4000 tons of barb wire annually free of royalty. Judge Gardiner decreed that the complainants should be allowed the same privilege.

Two furnaces of the Allentown Iron Company are blowing out.

New iron-works are to be erected at Spring City, Chester County, Pa., by a stock company.

The Macungie Iron Company's furnace, Reading, Pa., was blown in last week, after a month's idleness, caused by chilling.

The Gautier steel department of the Cambria Iron Company, at Johnstown, reports that it turned out more steel and wire the past year than ever before in the history of the institution, the increase alone amounting to over four thousand tons. This is an extraordinary showing, in view of the prevailing dullness of trade generally.

The Montour Iron and Steel Company, Danville, has resumed operations. The mill is owned and operated by the Reading Railroad Company. A new spike-mill has been added, and is turning out a large quantity of work. Several furnaces are in operation in both mills, and the outlook is more favorable than for a year past. The Glendower Mill, Danville, is in operation also.

The dumping of the sands of the Calumet & Hecla stamp-mills at Lake Linden, Mich., having become a troublesome matter, a large scoop-wheel was ordered. A correspondent of the *Times* describes it as follows: There is now standing in the main machine-shop of the Dickson Manufacturing Company, Scranton, Pa., one of the largest wheels in the world, and the second of the kind ever made, the first having been already shipped for service to the copper mines of the Calumet & Hecla Mining Company, on the borders of Lake Michigan. The combined weight of both wheels is 124 tons, and their cost in place will not be less than $50,000. The titanic wheel, which occupies a position in the center of the lofty and admirably equipped machine-shop, is a marvel of mechanical ingenuity, strength, and skill, and has been made from original designs furnished by E. D. Leavitt, Jr., of Cambridgeport, Mass. The spur gear in the center is 43 feet in diameter at the pitch-line, 4⅝ inches pitch, 12-inch face, the teeth of which have all been milled or cut epicycloid, and are mathematically correct. There are 352 of these teeth on each wheel, and its circumference at the pitch-line is 135 feet. On each side of the spur-gear there are 25 double elevating buckets or pockets inverted, making in all 100 buckets, which are stationary on the inside of the periphery of the wheel, and are capable of scooping up at a single revolution nearly 2000 gallons. The wheel will make four revolutions per minute, lifting 8000 gallons in that space of time, or 480,000 gallons an hour. The office of this wonderful wheel is to lift the tailings. It will be set in solid masonry, with arches, through which the launders used for washing the ore will pour their contents, to be taken up by the buckets already referred to, and deposited in outlet launders, placed at an elevation of 40 feet, which will afford a sufficient impetus to carry the waste into Lake Michigan.

The shaft upon which the wheel revolves is 30 inches in diameter, and is made of gun-iron. It rests in ponderous pillow-blocks having universal bearing. The centers of the wheel are octagon, and its mighty arms are made of wrought-iron lattice-work. They are pyramidal in shape, and, jutting out from a common center, present an imposing appearance even in repose. The ends of the arms, which are called the bucket segments, are of cast-iron, and the spur segments and buckets are bolted to them. The entire affair is put together with turned bolts driven in reamed holes. The most important feature of the wheel is the manner in which the spur has been constructed. The teeth were milled and cut by an ingenious device suggested by such a herculean task, and especially planned and patented by Mr. Sidney Broadbent, the superintendent of the Dickson Works. The mean time occupied in milling and cutting the teeth of one wheel, 352 in number, was 215 hours, and the probability is that, with the old mode of milling, it would take four times as long. The same process was used in the construction of the Brooklyn Bridge machinery, the company having received both orders at the same time. This big wheel will be driven by a steel spurt-pinion, the shaft of which is actuated by an engine of 175 horse-power.

The Dickson Works are also building for the same company two of the largest locomotive fire-box boilers ever made, being 1000 horse-power each. These boilers are made of steel plate 9-16 inch thick. Each boiler will contain 199 3-inch diameter lap-welded tubes 16 feet long. These boilers, when complete, will weigh 61 tons each, and will be used to work the mammoth machinery of the Calumet & Hecla Mining Company.

James H. Lancaster, 26 Dey street, New York (President of the Lancaster Manufacturing Company), has purchased the entire plant, patterns, and good-will of the business of J. H. Darlington (Harlem Railroad Depot), corner of Center and Franklin streets, New York City. This business was founded by Mr. J. H. Darlington some thirty years ago, and has been in successful operation ever since. The present plant and patterns cost Mr. Darlington upward of thirty thousand dollars, and to this Mr. Lancaster will add considerable machinery, including universal milling machines, Monitor lathes, and a complete set of emery grinding and polishing machinery. In addition to the general work hitherto carried on at these works, Mr. Lancaster will build his new patent caloric motors and caloric pumping-engines, drop and trip hammers, dynamo machines, arc lamps, steam-engines, and also such work of the Lancaster Manufacturing Company as this plant is suited for. New floors (120 feet × 25½) are laying, and every preparation is making for increasing the manufacturing facilities of the concern. About fifty men will find employment at these shops. At present, the business is conducted solely by James H. Lancaster; but it is intended by him to organize a stock company, capitalized at $500,000, and styled the J. H. Lancaster Engineering Company. This business will be conducted distinctly from that of the Lancaster Manufacturing Company, founded by Mr. Lancaster some eighteen months ago.

It is stated that a portion of the Philadelphia & Reading Rolling-Mill, which suspended at New Year's, will start up February 1st. Most of the machinery had been shipped to Danville, but will now be returned to Reading. The cause of this new move was trouble with the hands at Danville, who refused to work at the wages offered.

The blast-furnace at the steel works at Pueblo, Colo., will start up in full blast about the 4th of February.

The firm of Henry R. Worthington, of this city, manufacturer of the well-known water meter of the same name, has decided to reduce the price of the meter. It announces also that it has lately secured the services of Mr. S. A. Welch, who has long been identified with this department of hydraulic engineering, and who will hereafter represent the interests of the Worthington meter.

The burning of the Park Theater has obliged J. A. Beidler & Co., Cleveland, Ohio, to change their office for the present to No. 50 Wilshire Building.

The annual meeting of the stockholders of the Cambria Iron Company was held at the office of the company in Philadelphia on Tuesday, January 15th. No change was made in the officers of the company for the present year except that Mr. Philip E. Chapin, of Johnstown, was unanimously elected general manager of the company's works, in place of Hon. Daniel J. Morrell, who declined a re election.

A correspondent writes to the *Iron Age* as follows, on the work of Isabella Furnace No. 1: Through the courtesy of Mr. Hugh Kennedy, general superintendent and founder of Isabella Furnaces, near Pittsburg, Pa., we examined the records of the three years' blast of No. 1 furnace, now out of blast for repairs. The product has been as follows, 2268 pounds to the ton:

	Tons.
Iron made in 1881, 324 days	37,437⅞
" " 1882, 365 "	59,032
" " 1883, 365 "	66,408⅛
" " 1884, 19 "	3,927
Total	166,805

Average per week, 1062 tons.
Blast put on, February 10th, 1881.
Blast taken off, January 20th, 1884.
Duration of blast, 2 years 11 months 10 days.
Total stock used, 667,220 tons (gross).

Shortly after starting, a heavy freshet in the Alleghany River flooded the works and stopped the furnace with a full burden on for ten days. On starting again, the furnace was found badly scaffolded, which required fourteen days' fighting before the furnace began to operate fairly. The first year's product was also lessened by not having sufficient capacity in the hoist to elevate the stock rapidly enough. An additional hoist has since been erected. The ore mixture ran practically the same the whole blast; 4 tons stock made 1 ton of iron. The iron averaged Nos. 2 and 3. Maximum volume of blast by engine measurement, 30,800 cubic feet per minute. Average volume of blast, 23,640 cubic feet per minute. Pressure in engine-room, 7 pounds average. The lining, now in process of removal, is from the bosh to the top well glazed and worn uniform, leaving about 6 inches of fire-brick remaining. A piece of this wall, about 12 feet below the top, fell in, which allowed the gas to heat the shell red-hot and caused them to go out. From the bosh down, the furnace is in fair order, and would have run longer. The furnace is 20 feet bosh, 75 feet high, 11 feet hearth, 14 feet stock line, and has 7 tuyeres, 7 inch. The furnace is equipped with three of the largest size Whitwell stoves, which have given little trouble during the blast. The three engines have 7-foot blowing cylinders by 4-foot stroke, and were built by Mackintosh, Hemphill & Co., the well-known builders. No effort was made to make fancy days or faucy weeks, but the furnace has been held to an even, steady course, relying on the gross results at the end of the year as being better than a large week and irregular running. The furnace worked as well the last week as any previous week. The entire blast has been run without an accident of any kind, which shows the care and good judgment exercised by the general superintendent. This blast is now placed on record as the most remarkable yet made.

RAILROAD NEWS.

Representatives of the Erie, Alleghany Valley, Rochester and Pittsburg, New York Central, Buffalo, New York & Philadelphia, and other railroads carrying coal from Northwestern Pennsylvania, recently met and appointed a committee to confer with a committee of the producers of bituminous coal in that section of Pennsylvania, in order to agree upon a schedule of rates.

Argument was resumed at Philadelphia, January 28th, in the United States Circuit Court, before Judges McKennan and Butler, by Samuel Dickson, counsel for Sulzbach Brothers, of Frankfort-on-the-Main, in their suit against the estate of J. Edgar Thomson, William Dennison, and Benjamin E. Smith, of Ohio, and Andrew Carnegie, of New York, to recover damages for an alleged overissue of $1,000,000 in bonds of the Davenport & St. Paul Railroad Company.

The special meeting of the stockholders of the Philadelphia & Reading Railroad Company to vote upon the question of a dividend was held at the company's general office at Philadelphia, January 28th, E. S. Wheeler, presiding. After the meeting was called to order, ex-President Gowen stated that it had been expected that something would be said or done now with regard to the collateral trust loan; but that the sole object of the meeting was to vote upon the desirability of declaring a dividend after certain obligations had been disposed of. He said that the loan had not been offered to any body; that it was not wise to attempt to place it in the present disturbed condition of the stock market; that he had no doubt of the ability of the company to get the money. The papers for the loan have not even been withdrawn, and the matter will not be acted upon by the directors for two or three weeks. It was the object at present to know whether or not the stockholders desire to have a dividend if the loan shall be negotiated.

The following resolution, which was offered at the annual meeting was then voted upon: "That it is the opinion of the shareholders that upon the successful issue of the collateral trust loan referred to in the report of the managers, and the realization of the proceeds thereof by the managers for the purpose of retiring the outstanding income mortgage bonds and paying the floating debt of the company and paying the balance of the purchase-money due upon 50,000 shares of the Central Railroad Company of New Jersey stock, a dividend of 21 per cent, representing the arrears due, be made in cash upon the preferred stock of the company, and a dividend of three per cent in cash be made upon the common stock of the company."

The resolution as read was defeated, 193,283 votes being cast in its favor and 195,447 votes against it. Of the majority, 28,925 votes were cast in favor of a dividend upon the preferred stock, making the vote on that point 222,207 in favor of and 166,522 against it.

The Columbus & Eastern Railroad, extending from Columbus to the coal-fields in Muskingum and Perry counties, Ohio, has been opened for traffic.

A. M. Cannon, President of the Bank of Spokane Falls, Wyoming Territory, and J. J. Browne, attorney, of the same place, are in New York as a committee to perfect arrangements for building a railroad from that place eighty miles east into the Cœur d'Alene gold and silver fields. Work on the road is to be begun by March 1st.

LABOR AND WAGES.

The cases against the Bethlehem Iron Company, instituted by about sixty employés, who sue for money deducted from their wages for store bills, which were to be tried in the Lehigh County Court at Allentown, Pa., this week, have been continued, the company having changed its pleadings. The sum of $25,000 is involved, and should the suit of the men be successful, other suits involving about $50,000 will be brought against the company.

At Martin's Ferry, Ohio, the coal miners have been reduced ten per cent, and only those who rent of the company are employed. The price is 85 cents a ton. The Mahanoy Valley mines are running on half-time. At McCluney, half the men are idle. A good many Hungarians are employed. In the fourth pool, near Pittsburg, the miners agreed to the award of three cents for digging. The operators refuse, and will shut down, throwing 2000 men out.

The miners who struck at the Buena Vista mines of Messrs. Rafferty & Dewees have decided to institute a suit to recover damages sustained by the reduction of the price of mining from 3½ to 3 cents. The miners claim that they had a considerable amount of coal already mined, but were prevented from filling it out unless they accepted pay at the rate of three cents per bushel. They preferred to allow the coal to remain rather than accept the reduction.

The Miners' Amalgamated Association of Iowa has been in session at Des Moines discussing measures of relief to be laid before the Legislature. About twenty delegates are present. A bill has been prepared by State Mine Inspector Wilson, but its provisions are held secret. Most of its provisions have been indorsed, and a clause added making the salary of the inspector $1500 a year, the State to pay his traveling expenses.

The annual meeting of the Knights of Labor, District No. 3, was held at Pittsburg, January 24th. Mr. Rankin was re-elected Master Workman. Some sixty delegates were present. District Master Rankin read the annual report, which showed that, although the past year had been full of reverses to the order, it was nevertheless in a growing condition. During the first half of the year, there had been a period of stagnation and a marked falling off in membership. The latter part of 1883, however, witnessed a revival, and during the past six months 1500 new members had been initiated. Altogether, Mr. Rankin claimed that the organization was in good working condition, and although there was a large arrearage in membership fees, he did not regard it as the result of decreased interest in the order, but owing to the frequent reductions in wages, which have been recently made.

The meeting of the Ohio Coal Miners' Association, with President John McBride in the chair, and 40 delegates in attendance, took place at Columbus, January 23d. A resolution was offered asking the Legislature to create a board of arbitration to settle differences between employers and employés, but no action was taken thereon. A committee on the "truck" and two weeks' pay systems was appointed, and reported as follows:

Whereas, The truck system has been proved, by investigation of the Ohio Mining Commission, to be degrading to the people of the communities in which it is practiced, both morally and intellectually, and contrary to the fundamental principles of political economy, a fosterer of monopoly, throwing the business into the hands of a few, keeping the producing population in a state of destitution; be it

Resolved, That we, representatives of miners, assembled, urge upon the legislative body the amending of the present law to prevent the paying of wages in scrip, so that the words "higher prices" will not allow the evasion of the true intent of the law, and prevent the issuing of scrip, checks, and tokens in lieu of lawful money of the United States.

It was also resolved to favor two weeks' pay as an aid to destroy the yoke of the truck system. The meeting adjourned January 24th, after the re-election of the old officers.

The Executive Committee of the Ohio Coal Exchange met at Columbus, January 26th, and appointed a committee to confer with the miners as to prices. The members say the miners will not be asked to take a reduction in prices, and say there are no real differences between the operators and employés. Although no definite action was taken, the operators in the Exchange, with one exception, favored a cut in the price of mining to 60 cents on March 1st. W. P. Rend, of Chicago, favored a cut to 70 cents on that date.

The officials of the Miners' Association have issued an appeal to the public for an unbiased judgment and expression of opinion on the troubles between the e na Vista miners and their employés. They invite Messrs. Rafferty, Dewees & Co. to prove the equity and honor of their policy or conduct before the tribunal of employers and miners or through the public press.

At a recent meeting of the coal operators of the various companies throughout the State of Ohio, it was determined to reduce the price of mining about March 1st, from 80 to 60 cents. Representative McBride, President of the Ohio Mining Association, says that the action is entirely unwarranted, and will, no doubt, create a strong feeling of antagonism among the miners. It is claimed that this system of reductions in all sections is wrong. He said that "coal being more valuable in some sections than others, of course the labor of mining would be correspondingly greater," and he thought the miners would not be willing to concede a reduction of 10 cents per ton; but should this reduction be insisted upon, the miners would in all probability inaugurate a general strike, which would be detrimental to the interests of all.

He has written to the different sectional organizations in the State, saying that if the plan which they had agreed upon should fail, then he would strongly favor an inter-State convention, including delegates from Pennsylvania, Ohio, Indiana, Illinois, and West Virginia to decide upon the matter, and secure to the miners justice. By the operators reducing the price of mining, they simply rob the miners of so much money, as the price of coal is not reduced in the least, and the consumer derives no benefit.

James Campbell and John G. Slicker, of the Window-Glass Workers' Association, Pittsburg, have gone to Washington to present Congressman Faran a petition containing 75,000 signatures, asking that the bill to prevent the importation of foreign contract labor be adopted.

COAL TRADE NOTES.

CANADA.

The figures of exports supplied by the Trade and Navigation returns for 1883 show that 430,081 tons of Canadian coal and 38,409 tons of non-Canadian coal were exported. Canadian coal is exported from British Columbia to the States (172,863 tons), to Mexico (4574 tons), to China (8340 tons), to Sandwich Islands (7708 tons); total for British Columbia, 193,485 tons. Nova Scotia sent out 216,805 tons, as follows: To Great Britain, 4029; United States, 110,150; Newfoundland, 68,847; British West Indies, 824; Spanish West Indies, 21,398; French West Indies, 286; Danish West Indies, 1053; Mexico, 2466; Brazil, 159; St. Pierre, 4693; France, 500; Germany, 1950; Russia, 250; Holland, 200. New Brunswick is represented as exporting 17,670 tons to the United States, and this, too, would be Nova Scotia coal. There were exported 38,409 tons, value $109,996, "not the produce of Canada," chiefly from Ontario to the States. The total of Canadian coal exported was 468,490 tons, valued at $1,195,407.

The imports of coal and coke for 1882 and 1883, for home consumption, compare as follows:

	Tons.	Value.	Duty.
1882	1,283,275	$4,696,007	$705,288
1883	1,683,617	6,389,804	930,966
Inc. in 1883	400,342	$1,693,797	$235,678

The imports of coal for 1883, for home consumption, may be divided into:

Anthracite	754,891	$3,344,936
Bituminous	911,629	2,996,198

PROVINCE OF BRITISH COLUMBIA.

Messrs. Homer and Gordon, British Columbia members of Parliament, will oppose the bill to ratify the agreement between American and British Columbia in settlement of the claims of the latter. They hold that valuable coal lands which have been locked up by the government for ten years have now been handed over to the United States capitalists in addition to a subsidy of $75,000 for the construction of sixty-nine miles of railroad on Vancouver's Island.

PROVINCE OF NOVA SCOTIA.

The Montreal capitalists who are interested in the Nova Scotia coal mines intend adopting measures to develop the output to a much larger extent than has hitherto been reached. The deposits are stated to be capable of yielding an annual supply of 500,000 tons.

DEBERT.—Work has been suspended. The mine, which is situated about 3½ miles from the Intercolonial Railroad, is on a seam of coal about 4 feet 3 inches thick, and to all appearances of a very fine quality. A shaft about 100 feet deep has been sunk. The shaft, it is expected, will be used in time as an air-shaft. The company has suspended operations until the proper site for the main slope has been fixed upon. The company early in the spring will set about erecting the necessary hoisting machinery.

SCOTIA.—This mine, at Maccan, Cumberland, is reported to be on fire. The seam worked has frequently given trouble by taking fire. As the works in the crop have been extended, the refuse coal, fallen roof, etc., gradually heat and ignite. The eastern portion of the mine has thus been in a state of slow combustion for several years, and the seat of fire has gradually traveled to the westward as the workings were extended in that direction. The presence of fire was felt during the summer, and the old works built off, and it was hoped that the precautions then adopted would have made the mine secure during the winter. A series of similar fires occurred about a year ago in the Bennett level of the same mine, but the fires were successfully extinguished. The last one caused the death of several persons and resulted in the sealing and flooding of the level, which still remains closed. The operations are on a limited scale, being confined to a small land sale in the winter months.

VALE.—The miners at this colliery, Pictou County, have been notified to stop work, for the purpose, it is reported, of laying the mine idle for six or eight weeks, while the main slope is repaired by putting timber where necessary, increasing the hight of the slope by taking up the pavement and laying the track anew. These repairs will probably give employment to about twenty-four men.

COLORADO.

COLORADO COAL AND IRON.—Since the arrival of the State Mine Inspector at the scene of the disaster which occurred in the mine of this company January 24th, no one has been allowed to enter the mine, except those employed in searching for the bodies. The thirty-four bodies recovered were brought out during the night and placed in the blacksmith-shop, where they will remain until the others are found, when all will be brought to town and placed in the City Hall. Workmen will explore chamber No. 2. Fifty-nine coffins have been ordered by the company and are now on the way to the mine. There is a large crowd of men yet at the mine, but there are no signs of any disturbance. Mine Superintendent Gibson's house has been strongly guarded and the streets were patrolled. The excitement appears to have entirely subsided. Right-thinking men hold that the officers of the mine are blameless, and anticipate no serious trouble with the Molly Maguire element. Inspector McNeil is still in the mine.

ILLINOIS.

The Fisher Coal Company, of Canton, Fulton County, has been incorporated with a capital stock of $50,000.

NEW MEXICO.

The New Mexican *Review* announces the remarkable discovery of a vein of natural coke at Los Cerrillos. The vein of coke is three feet thick. The coke has the appearance of a manufactured article, and burns with a clear, bright light.

OHIO.

The excitement in the new oil district in Noble County continues. A new well

of Mecca oil was struck January 26th. The flow was so strong that nearly every body in the little town turned out to see what they called "the big strike." The first day's product of the well was from fifty to sixty barrels.

George W. Phillips, mine superintendent of the Sippo mine at Massillon, Ohio, has been appointed State Mine Inspector, to succeed Andrew Roy, whose term of office expires next month. Thomas Isaac Jones, of Palmyra, will be the Assistant Inspector.

Both the banks at East Liverpool are running steadily, but they are so crowded with men that the men are not getting many cars.

Two veins of coal have recently been discovered near Zaleski, Vinton County. The upper vein shows a thickness of 5 feet 8 inches. A small layer separates the upper from the lower vein, which is 4 feet 3 inches thick. The coal has been thoroughly tested, and is pronounced to be of first-class quality.

Since the cold weather set in, there has been quite a revival in the coal trade throughout the Sandy Creek Valley.

PENNSYLVANIA.

ANTHRACITE.

Thomas O. Richards, superintendent of the Bull Run colliery of the Lehigh and Wilkes-Barre Coal Company, while crossing a bridge over the mouth of the slope on the evening of January 29th, fell to the bottom, a distance of 200 yards, and was instantly killed.

Sinking continues for the Buck Mountain seam at Reno colliery. There are already 3½ feet of fine coal, and the depth gained is 100 feet.

The leases of Miller, Graef & Co., operators of the Lower Rausch Creek colliery, and Levi Miller & Co., operators of the Lincoln colliery, expired on January 1st. These parties have been operating for the last fifteen or twenty years, and during that time it is said they have not missed paying upon the appointed time. They have always maintained the best of feeling with their employés, many of their workmen who started in with them at the opening of their works remaining with them until the present time. Quite a number of their hands will be employed at the new works in course of erection at North Lincoln by Mr. Miller.

The casualties in the mines of the anthracite region of this State during 1883 have been furnished by the several mine inspectors, from which it is learned that there was a total of 1676 accidents. Of these, 323 resulted fatally, making 153 widows and rendering fatherless 512 children. These accidents are distributed among the various districts as follows: Pottsville, Samuel Gay, inspector, 78 injured, 18 killed. Shenandoah, Robert Mauchline, inspector, 185 injured, 47 killed. Shamokin, James Ryan, inspector, 168 injured, 64 killed. Hazleton, James Roderick, inspector, 171 injured, 40 killed. Wilkes-Barre, G. M. Williams, inspector. 400 injured, 88 killed. Scranton, Patrick Blewitt, inspector, 351 injured, 66 killed. Estimating 31,000,000 tons as the total production, it gives an average of 96,000 tons to each death, 200,000 tons to each widow, and 60,000 tons to each orphan caused in the development of the anthracite industry of Pennsylvania during the year. Falling roofs and gas explosions caused about fifty per cent of the casualties. In the Wilkes-Barre District, eighteen deaths were caused by persons falling down shafts that had not begun to produce coal. There was a noticeable increase in the number of door-boys killed during the year over the year 1882. Many accidents are due to direct carelessness of employés caused by the neglect of mining regulations which, if properly enforced by mining bosses, would no doubt save many of the lives now annually lost. Under the present system, the mining bosses have too many duties upon their hands, which it is hoped the Board of Commissioners appointed by Governor Pattison to revise the mine and ventilation laws of the anthracite region will take cognizance of at their meeting and make such changes as have long been found wanting. During the last ten years, 2463 lives have been lost in this district, 1274 women made widows, and 4195 children made fatherless.

Pleasant Valley, a small town on the Philadelphia & Reading Railroad, a few miles from Wilkes-Barre, was the scene of an extensive cave-in January 25th. Fissures six and eight inches wide were made across the main street. The cave-in was caused by the rotting away of props in old mines of the Pennsylvania Coal Company, 150 feet below. Other settlings are anticipated, and many of the dwellers above the old workings are moving their household goods to safe quarters. No one was injured.

The owners of a tract of coal lands in Plymouth township, containing a fraction over forty acres, have leased it to the Kingston Coal Company. The lease states that it shall continue in force until all the marketable coal the tract contains has been worked. In consideration of this lease, the coal company is to pay the lessors for 4000 tons of coal annually at twenty-five cents per ton, the sum to be paid in quarterly installments. This is to be paid each year, whether so many tons of coal are mined or not. For all surface land used by the company in laying of railroad tracks or the erection of air-shafts and depositing of culm and refuse dirt from such development, two hundred dollars per acre is to be paid. The working of this valuable piece of coal territory will undoubtedly be entered upon at an early day.

BITUMINOUS.

The extension of the Shenango & Alleghany Railroad from Shenango station, on the Erie & Pittsburg Railroad, through Mercer and Butler counties, 58 miles to Butler, connecting there with the West Penn road, has been the cause of the development of important and valuable coal-fields in these two counties, says a correspondent of the Pittsburg *Telegraph*. There are now in operation or almost ready to go into operation, six new mines within two miles of Grove City; and over the line in Butler County, a number of new openings are also making, although the depression in the iron and coal business has somewhat retarded shipments from this new field. There are twenty-three mines operated in Mercer County, giving employment to 1186 men, but mention is made only of those in the vicinity of Grove City and over the line in Butler County.

Two miles west of Grove City, Westerman, Filer & Co., of Sharon, have sunk and are operating what is known as the Chestnut Ridge shaft. The coal-seam here averages about four feet in thickness. It is reached by a shaft opening 90 feet deep. Good machinery, large tipple, pumps, etc., have been placed at this work. The company has built twenty-seven comfortable houses for the accommodation of its men. About 60 men are employed, receiving 65 cents per ton for coal screened over an inch and a quarter screen. The mine has done very well this winter.

A few hundred yards from the above works, the Sharon Coal Company is operating what is known as the Wheeler shaft. This shaft is but 44 feet deep, the coal averaging about 3⅛ feet. It has also erected good machinery for operating the shaft, but has not been running as steadily as could be desired, although it has done reasonably well this month. The general dullness in the iron trade, and the suspension of the Middlesex mill and furnace, in which this company is interested, have partially been the cause of the lost time at this work. There are a number of company houses and about fifty men. These two shafts are reached by a branch three quarters of a mile from the junction with the Shenango & Alleghany road.

Mr. Jesse Hall, of Hubbard, Ohio, has purchased 350 acres of fine coal property and opened up a fine work which will be operated as the Hubbard Mining and Manufacturing Company. A fine slope opening 500 feet in length has been made into the coal, which averages five feet in hight. A large tipple and good steam-power for mining the coal have been erected. Every thing is about ready for beginning operations on an extensive scale as soon as the weather will permit the laying of the track on the branch already graded to the mine from the Shenango & Alleghany road. The Lake Shore road is also grading a branch from Stoneboro', over into this district, giving these new works two outlets for their coal. The main entry is in about 3000 yards, and several butt entries are driving, giving employment to about 20 men.

A half-mile east of town, on the main line of the road, the Pine Grove Coal Company has a new mine in operation. This is also a shaft opening, 80 feet deep, into the coal, averaging from four and a half to five feet in thickness. It has erected substantial machinery and buildings for hoisting and loading coal rapidly. At present, it is averaging about two thirds time, employing about 25 men, but no doubt will increase the force in early spring. The price of mining in these new mines is 65 and 70 cents per ton screened coal.

On a little branch back from the main line, about one mile east of town, the Trout Coal Company has driven a shaft 90 feet in depth into this seam of coal, and is busy driving entries getting ready for a large spring trade. The machinery is all in position, branch built and all nearly in readiness to begin shipments. About twenty men are employed.

Near by is also the Black Diamond shaft, operated by Filler & Sutliff, of Sharon. This is a new shaft, 90 feet in depth, and is about ready to begin shipments. About 25 men are at work driving entries and getting the mine in good condition for putting out a large amount of coal this spring and summer.

At Harrisville, five miles east of Grove City, across the line in Butler County, the Mercer Mining and Manufacturing Company has a large and well-developed mine, from which many tons of excellent coal have been shipped. Like other works, this has also felt the depression, and the mine has not run steadily. The coal is reached by a drift opening. About 100 men are employed. Eight miles east of Grove City, at Branchton, three different branches are run from the main line back to large and new openings into the Butler County coal.

The Mahoning Valley Iron Company, of Youngstown, Ohio, has purchased a large tract of this Butler County coal property and opened up a large mine, built substantial tipple, houses, etc., at Gomersall, which is reached by a branch road running back four miles from Branchton. These works have been opened up. A drift opening is made into the coal, averaging three feet four inches in thickness. This mine has probably been kept running steadier than any other in the Butler District, losing but little time this winter. About 130 men are employed. The price of mining is 65 cents per ton for coal run over an inch and a quarter screen. The prospects for steady work this spring are encouraging. The coal is shipped over the Shenango & Alleghany Railroad, much of the coal going to the mills in the Mahoning Valley.

Three miles from Branchton, at Coaltown, the Union Coal and Coke Company, Limited, has planted large coke-works and opened up a fine mine. It owns a large tract of coal property here, and has built a large number of comfortable houses for its men. The mine is reached by an inclined plane up the hill 500 feet, where the opening is made into a three-foot seam of coal. At the tipple below, a large crusher and washer have been erected for preparing the slack and nut coal for the coke-ovens. The company has built 50 fine bee-hive ovens, 34 of which are now in blast, manufacturing a good quality of coke. Work has been reasonably fair since the close of the strike in July last. The miners receive 70 cents for 2240 pounds of coal over an inch and a quarter screen. About 150 men are employed.

The little mining village of Hilliard, which was formerly the terminus of this road, is ten miles from Branchton, on the main line now running to Butler. Here the Alleghany Coal Company, of Youngstown, Ohio, has a large drift mine opened into a three-foot four-inch vein of coal. It employs about 75 men. Work has been a little slow.

The Ackbar mine, operated by Mr. Enders, of Jamestown, Pa., has about 40 men employed, but is not working full-time.

The Turner & Card mine employs about 40 men, but has been idle several weeks.

The Burnet mine here is doing but little.

The Mercer Mining and Manufacturing Company is also opening a new drift opening near the main line, and has arrangements about completed for beginning shipments.

Blair & Steel have opened a slope known as the Kildoo mine, and will begin shipping as soon as their switch is put down.

The Van Duzen Brothers' Houtzdale slope, which was stopped for a short time for repairs to the boiler, is again in full blast. From the inside operations of this colliery, which began working less than a year ago, on land re-leased to its owners by former lessees, it is now proved to have double the amount of coal, and of the very best quality, that even its known and sanguine young operators supposed it to have when they first made the lease. Work at the Phœnix colliery has reached into the hill where the vein is now over five feet in thickness, and the coal of good quality. P. Gallagher, Reed & Co., of the Philadelphia colliery, are talking of erecting ovens and breakers for the purpose of manufacturing coke for home and domestic purposes. At the Black Diamond colliery, extensive improvements are making in the inside as well as outside workings.

The coal-works at McDonald station and along the Pan-Handle road are doing pretty well. Rend's mine employs about 250 men, and is running both night and day. There are twenty machines at this mine, and they turn out coal pretty rapidly. John Rend is superintendent, and Thomas Andrews is bank boss. Forty cents per ton is allowed for mining, fifteen cents per ton for machine work. There is an improvement going on here, which will facilitate the work considerably. The surveyors are already at work preparing the grade for a locomotive to draw the coal out of the mines.

The mining situation at Du Bois remains somewhat depressed as yet. Nothing unusual to note from this place at this writing. Every thing looks gloomy, and some of the mining companies are drawing out their single men and giving the preference to the men of families.

Around Pittsburg, mining matters are dull, in the river pits particularly so, with probably a dozen of these pits only at work. Railroad pits will not average half-time. At Buena Vista, on the Baltimore & Ohio, and at Tom's Run, on the Chartiers & Youghiogheny Railroad, work is going on at 3 cents in spite of the efforts of both operators and miners. The umpire's award is adhered to elsewhere, and will rule until April 1st.

The Hanlon Coal Company, at Hanlon station, is employing about 25 men in a four-foot vein of coal, and pays three cents per bushel for mining over an inch and a half screen. Preparations are making for shipping coal by river the coming summer. There has been some trouble about this mine, but it is stated by the Pittsburg *Telegraph* that it has been adjusted, and operations are likely to be carried on on a much more extensive scale.

COKE.

The indications are brightening in the coke trade. The Pittsburg *Telegraph* says: Two weeks ago of the 9695 ovens, 878 were idle. This week, there are 20 idle ovens less, being a little less than 7 per cent of the ovens in the region, the lowest percentage known for several years. Of these idle ovens, the Mount Braddock works, 127 ovens, and the Pennsylvania works, 92 ovens, have been idle for many months on account of the failure of A. O. Tintsman; and the Mahoning works, at Dunbar, 100 ovens, have also been idle for a long time pending the settlement of the financial troubles of the owners, who were identified with the Brown, Bonnell & Co. failure. The ovens idle for lack of orders number 523. Though shipments continued at 600 cars per day, the prospects are bright for increased orders. The Joliet Steel Company, North Chicago Rolling-Mill Company, St. Louis Ore and Steel Company, and the Calumet Steel Company, all large buyers of Connellsville coke, have entered this market again within the past few days, and their orders can not fail to brighten trade in some degree. Labor is plenty, but trouble is anticipated between the Hungarian and the American and other workmen, who have been displaced by the former.

Papers were filed at the State Department giving notice that the Loyalhanna Coal and Coke Company, of Pittsburg, had increased its capital stock from $100,000 to $150,000.

The Southwest Coal and Coke Company, situated at Tarr's station, on the Southwest Pennsylvania road, is running five days in the week, as by late agreement of coke manufacturers. It has sixty-six ovens, turning out some five

cars of coke per day. It also mines two cars of custom coal daily, and coals the locomotives for the railroad. This company owns 1200 acres at this point, as yet untouched by pick or shovel. It also owns seventy-two ovens, situated at Stonerville, which are now idle. Just above the Southwest works are the works of Dillinger & Co. They have sixty-four ovens, with an average daily output, when running full, of seven cars of coke. They are running partially at present. Coal is reached by a shaft, at a depth of 60 feet. The ovens were erected some three years since, and every thing is in good order, including hoisting apparatus machinery, etc. They have some 90 acres of coal as yet untouched. Dillinger & Co. also mine coal for domestic purposes, shipping to Mount Pleasant, Scottdale, Derry, and other points. Application has been made at Harrisburg for a charter for the Jefferson Coal Company, of South Bethlehem, capital $500,000. The office of the company will be in South Bethlehem, and the principal business will be dealing in coke.

An interesting suit, which raises important questions in regard to the transfer of rebates granted by a railroad company, was brought January 29th in Common Pleas No. 2 at Pittsburg; Colonel James M. Schoonmaker, through his counsel, KNOX and Reed, entered suit against the Baltimore & Ohio Railroad Company. Mr. Schoonmaker claims that the defendant company is legally indebted to him in the sum of $3070.89, with interest from May 1st, 1880.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY—TOMBSTONE DISTRICT.

TOMBSTONE.—In the case of this company vs. the Way Up Mining Company, a new trial has been denied by the territorial Supreme Court, says the *Republican*. As the matter now stands, the Tombstone Company's only recourse from the decision of the district court lies in an appeal to the Supreme Court of the United States.

GRAHAM COUNTY.

ARIZONA COPPER.—The company is letting a large number of contracts on the tribute system. According to the tribute plan of mining, the miners receive a certain per cent of the copper in the ore which they take out, which varies according to the richness and character of the ore and the cost of reduction.

DETROIT COPPER.—The company has decided to move the two furnaces which are at present located in the San Francisco River, six miles from the mines, to the mines, which will be connected with the works by a direct series of tramways. Grading has already been commenced for the new plant, which will be erected on the same plan as the present works, with the addition of a third stack.

PIMA COUNTY.

QUIJOTOA.—According to local papers, the only trouble now experienced is in finding water. In the event that it is not discovered in abundance, the construction of a railroad from Tucson, to convey the ore to a suitable place for milling, will be necessary. Merchants from all over the territory, and from New Mexico and California, are flocking into the settlement and establishing stores. Where, a month ago, there was a population of only about 30, there are upward of 400 in camp.

YAVAPAI COUNTY.

ARIZONA QUEEN.—The last portions of machinery, which have been a long time delayed *en route*, have arrived, and the mill will start shortly. The company is running two shifts night and day, with a capacity of five tons every twenty-four hours, which can be increased to ten by putting in another concentrator, for which arrangements were made when planning the mill, if it should ever become necessary.

HOWELL SMELTING AND MINING COMPANY.—The board of directors has voted a sufficient amount to enable the management to pay off the indebtedness against the company. In last week's issue, we referred to the company's difficulties.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

The Bodie *Free Press*, in its annual review of the mines of that district, states that during 1883 there were fewer mines worked, and fewer producing bullion than in any year since 1877. The Noonday mill of forty stamps, the Spaulding mill of ten stamps, and the Miners' mill of four stamps were closed down throughout the year. The Bodie Tunnel mill of fifteen stamps was closed down the last six months of the year, and the Syndicate mill of twenty stamps the first three months. The Standard has kept fifty stamps employed constantly, and the Bodie Consolidated ten stamps. John Wagner's tailings mill was employed about six months. It produced (including scatterings) $36,883. Nevertheless the bullion shipments reached the sum of $1,582,667. The total product of the district since 1877 has been $15,520,499. There has been a marked improvement in the mining outlook of the district, commencing with the first of January of this year, owing to the valuable strikes in the Standard and Bodie. The Goodshaw, Champion, and Dudley will soon be in operation, and negotiations are in progress looking to the resumption of operations on the Belvidere and South Bulwer. As to the prospects of resumption of work at the Noonday, North Noonday, and Red Cloud mines, nothing has yet been learned.

BODIE CONSOLIDATED.—Throughout the year, the company's mill has been running steadily upon an inferior grade of ore to that which it has heretofore worked. The mill is of but ten stamps capacity, and it is situated at such a distance from the mine that it requires a high grade of ore to pay expenses. In 1882, about 5500 tons were crushed, netting in the neighborhood of $90 per ton. During 1883, a larger quantity has been worked, aggregating probably 6500 tons, and averaging about $38 per ton. The amount of bullion produced shows gold, $105,176; silver, $141,644; total, $246,820. Total production since 1878, $3,333,937.

BODIE TUNNEL.—The mill ran a portion of the time only in the early part of 1883. Since the mill closed down, the work of exploration has been in progress, and a large amount of good ore has been uncovered. The mill has all the modern improvements, and is situated, like the Syndicate, directly under the mouth of the tunnel, and it is capable of reducing ore from their own mine or the Bechtel Consolidated at very light expense. The mill has now resumed operations. The bullion production amounted to $51,742. Total production since 1881, $191,587.

STANDARD CONSOLIDATED.—About 70,000 tons of ore were crushed during the past year, averaging about $16.50 per ton. The grade of ore has been lower than in previous years, and a greater quantity has been put through the batteries. In the earlier history of the district, when the average grade of Standard rock was about $60 per ton, it would have been thought impossible to declare dividends upon ore of the grade which is now considered good. Necessarily a much greater quantity must be handled, and there is a consequent increase in expenses. There are vast quantities of ore in the mine of this grade. The company disbursed twelve regular monthly dividends and one extra dividend of $25,000 each, among its shareholders, aggregating $325,000. The amount of bullion produced shows gold, $1,015,357; silver, $139,825; total, $1,155,182. Total production since 1877, $9,662,213.

SYNDICATE.—The twenty-stamp mill has been running since about the first of April. The ore is low grade, but it has been worked at a minimum of expense. There has been a great deal of improvement in the quality of the ore of late, and with a further slight improvement the company would be able to pay dividends. The bullion production shows—gold, $85,668; silver, $6372; total, $92,040. Total production since 1879, $339,290.

NEVADA COUNTY.

From Nevada City comes the report that the North Bloomfield Mining Company has ordered all the men off the line and given instructions to have the waste-gates thrown wide open, and will this winter let its 175 miles of canals and flumes, which were constructed at a cost of over $700,000, take care of themselves. The Milton Company, having 80 miles of ditches, costing $400,000, and the Eureka Lake Company 173 miles, costing $725,000, have likewise abandoned their ditch property, and the army of white men heretofore required to keep them in repair are now without an occupation. The principal damages that will result to the property will be from snow-slides that may sweep some of the flumes away from their elevated posts on the precipitous mountain side. In case a modification of the Sawyer decision is obtained, however, the breaks will be repaired in the spring and the water turned on again.

SAN FRANCISCO COPPER.—It is stated that a vein of copper ore has been struck in the new shaft, which has attained a depth of 180 feet. The old vein had been worked out. The company's property is situated at Spenceville.

PLUMAS COUNTY—GREENVILLE DISTRICT.

GOLD STRIPE.—It is rumored that an encouraging prospect has been found in the Bidwell tunnel. This is a part of the ground that has not before been prospected.

GREEN MOUNTAIN.—In the tunnel, the same good headway is making that has continued for months past. The character of the ground has been changing recently, and is now of that appearance which indicates that the Blake chimney is not far off.

CANADA.

From the Trade and Navigation Report for 1883, we take the following figures of exports: 154,809 tons crude gypsum, 44,944 tons iron, 14,478 tons phosphates, 63,426 tons sand and gravel, 4402 tons copper, 368 tons antimony, 1194 tons manganese, 100 tons silver, 140 cwt. plumbago, 197,185 bushels Canadian salt, and 67,858 bushels foreign salt, 26,578 tons stone and marble unwrought, 148 tons slate, and gold-bearing quartz, dust, nuggets, etc., valued at $911,383. There was also a large quantity of salt not the produce of Canada. The gold quartz nuggets, etc., went to the United States, namely, $279,735 from the Nova Scotia mines, and $63,648 from British Columbia. All the gypsum went to the United States (54,809 tons), and all from Nova Scotia, with the exception of 986 tons from Ontario, and 15,742 tons from New Brunswick. The antimony ore all went from New Brunswick to the United States. Nearly all the copper ore went from Quebec to the United States. Iron ore: 42,745 tons went from Ontario to the United States; 1890 tons from British Columbia to the States, and 309 tons from New Brunswick to England. Manganese: 769 tons went from New Brunswick to England and 297 tons to the States; 128 tons from Nova Scotia to the States. This ore is valued at an average of about $25 a ton. Silver ore: 78 tons, valued at $200, went from Quebec to England and 22 tons, valued at $14,000, went from Ontario to the States. Phosphates: 12,263 tons went from Quebec to England and 1995 tons to Germany; 220 tons from Ontario to the United States. Stone and marble went to the States, largely from Ontario, but a considerable quantity from Novia Scotia and New Brunswick. A large quantity of New Brunswick red granite, resembling the Aberdeen granite, went to the Western States. The Canadian salt was exported by Ontario to the United States, and the salt, "not the produce of Canada," was shipped by Quebec and New Brunswick to the same quarter.

COLORADO.

CLEAR CREEK COUNTY.

HUKILL.—Operations are again under way. This property is now owned by J. W Mackey.

LAFAYETTE.—The superintendent answers the many inquiries made regarding the $20,000 which was raised by assessment for further development of the mine, in a letter to the stockholders, from which we take the following: Deduct $14,721.41 from $20,000, leaves $5278.59 in the hands of the treasurer in New York City. When the mine closed down work, there was due on December and January pay-rolls $1607.60, which was paid by Mr. J. W. MacCulloch, who is a stockholder in the mine. Deducting $1670.60 from $5278.59, there will still remain a balance of $3607.99 in the hands of the treasurer in New York City.

PAY ROCK.—This and the Silver Plume mining companies have consolidated. This consolidation will terminate a lot of expensive litigation, and the Pay Rock's output will be greatly increased. The company now owns ten patented lodes, all so situated as to be worked advantageously.

FREMONT COUNTY.

ROYAL GORGE.—It is stated that this smelter, at Cañon City, has been sold under a trust deed for $15,000.

GILPIN COUNTY.

CONSOLIDATED BOBTAIL.—Mr. A. N. Rogers furnishes the Central City *Register-Call* with the following information regarding the workings of this tunnel. It is now over a mile in length from its initial point up to the point where the cross-cut struck the German mine. The latter was driven a distance of 925 feet, and cut the German vein 385 feet below the surface. The cross-cut was driven as rapidly as possible, in order to obtain air for better ventilation. Considerable work yet remains to be done in widening the cross-cut before it can be driven north of the German. For quite a length of time, the miners worked two thousand feet beyond an air-shaft, and had it not been for the amount of air furnished by the air-drills, it would have been an impossibility for the miners to have attained the present distance. But a few weeks ago, in driving the cross-cut, the miners were prostrated. Fortunately, their condition was discovered in time to save their lives. This tunnel and cross-cut will prove of more benefit to miners and mine-owners generally than many who have never visited its working would concede. It will drain the whole section of country passed through to its present depth, and has cut not only the Mammoth lode, but ten smaller veins by means of the cross-cut, all of which can be worked to better advantage through this enterprise. These veins intersected are now idle for the most part. A great saving in hoisting and transportation of ore to the stamp-mill is afforded by means of the cross-cut striking them. The Mammoth lode where cut by the tunnel is twenty feet wide, but the crevice is of too low grade to treat to a profit at the present time. It is the intention to resume work in the breast of the cross-cut shortly, which will be continued north until the Kip mine is reached, which vein will be worked through the cross-cut and the ore trammed to the 125-stamp mill of the company in Black Hawk. In driving the tunnel and cross-cut to its present heading, a rise of 35 feet was made for proper grade to facilitate the transportation of the ore mined.

GUNNISON COUNTY.

The contractor has begun work on his contract for Shaw & Patrick's new smelter at Gunnison. Work is pushed with all possible speed.

LAKE COUNTY.

The Leadville *Herald* gives the following items: After a heavy run, the Merchants & Mechanics' Bank of Leadville suspended January 30th. The property was immediately attached for $37,000. More attachments will follow. No estimate of the liabilities or of what the bank will probably pay is at present obtainable. This leaves but one bank in Leadville.

ARKANSAS VALLEY.—Two of the large furnaces at this smelter are idle. The furnaces were blown out to permit the addition of matte-taps. The treatment of sulphide ore had made the addition a necessity.

CASTLE VIEW.—The parties who are working this mine, on Carbonate Hill, east of the Evening Star, are meeting with success, and are making daily shipments of good ore. Since beginning work on the property, only a short time

ago, considerable exploration-work has been done, and three lots of ore have been extracted, shipped to the smelters, and settled for. The ore-bins at the mine contain about forty tons of mineral that will run from fifty to sixty per cent in lead and from ten to twenty ounces in silver to the ton.

CHRYSOLITE.—The Finn lease has been temporarily closed down, considerable water having been encountered.

COLORADO & CALIFORNIA.—This tunnel piercing, Carbonate Hill from the southwest, is reported to be in about one thousand feet, and almost directly under the office buildings of the Leadville Consolidated mines. The vertical depth of the head of the tunnel is stated to be 450 feet.

COLORADO No. 2.—The report that the owners had filed articles of incorporation is denied. The owners have authorized the purchase of a complete mining plant for the new shaft, to consist of at least a forty horse-power engine, boilers, pumps, and other necessary machinery. Negotiations for this equipment are pending. No time will be lost in securing the machinery and getting it in working position.

LITTLE PITTSBURG.—Exploration-work on the northern portion of the company's property continues. The sinking of No. 10 Little Pittsburg shaft is continued. This shaft has a depth of about 225 feet. Nos. 10 and 6 shafts, and the workings radiating from the latter, are the only ones worked by the company. No. 1 shaft, on New Discovery and neighboring workings, and No. 4 shaft, on the Little Pittsburg claim, are leased. During the past two months, the mine has paid expenses.

LOUISVILLE VS. IRON SILVER.—This case, which has been before the District Court at Leadville for two weeks, has been decided in favor of the Louisville Company. No damages were awarded, since none were proved.

MATCHLESS VS. DOLPHIN.—This suit is now before the District Court.

MIKE & STARR.—About one hundred tons of oxidized ore have recently been shipped to the Harrison Reduction-Works, which, it is expected, will run quite well. This mineral was discovered above the old workings of the mine, about fifty feet from the main shaft.

NEW PITTSBURG.—Nearly all the shafts on this group are worked. Among those recently started up are the Lent and Joe Bates shafts. The Heytrosser shaft has so far proved the most productive, having shipped large quantities of good iron ore.

ROBERT E. LEE.—Some new move is said to be on foot. The shipment of low-grade ore from the dumps, which has been in progress nearly all winter, has been suspended. The mine is producing only about ten tons of ore a day. The purpose of this reduced output is not stated. A short time ago, drifting was begun on the 340-foot level of the new shaft, and encouraging advance made until recently, when a large volume of water was encountered. The water rushed in with such force that the miners with difficulty collected their tools and escaped from the drift. Since this occurrence, nothing further has been done, and it will be necessary to provide additional pumping facilities before operations can be resumed.

SECURITY LAND, MINING, AND IMPROVEMENT COMPANY.—All the properties in this county, formerly owned by J. Whitaker Wright, have been transferred by him to this company. The list embraces the Leavenworth, Ohio, Iron Clad, Ocean Wave, Bevis, Hidden Treasure, Fairmount, and Schuylkill lodes.

SILVER CORD.—It is more than probable that this mine will resume operations within the next fortnight.

PARK COUNTY.

EAST LEADVILLE.—No. 7 workings have reached a depth of over two hundred feet, where the rock is furnishing an assay value quite satisfactory to the interested parties.

PUEBLO COUNTY.

NEW ENGLAND & COLORADO MINING AND SMELTING COMPANY.—Mr. Hiram Blaisdell, president of this company, in an interview with a reporter of the Leadville *Herald*, announced that the Colorado Coal and Iron Company had given a most eligible site for a smelting plant about three quarters of a mile east of the Bessemer steel-works, at Pueblo, and that this gift had been supplemented by a satisfactory subsidy from the citizens of Pueblo, and that both offerings had been accepted by his company, and ground would be broken not later than the fifteenth of March. Denver had the same inducements offered her to secure these works, but respectfully declined to accept them. This new company is composed principally of a Boston syndicate of bankers with a sprinkling of Colorado capitalists. The officers are: Hiram Blaisdell, of Boston, President; Mark Hodgson, of Denver, Vice-President and General Manager; George H. Drew, of Boston, Secretary; John G. Anderson, Jr., of Denver, Assistant-Secretary; John G. Anderson, Sr., of Denver, Treasurer; and C. H. Worth, of Boston, Assistant-Treasurer. Among the directors are Edward R. Tinker, of North Adams, Massachusetts; Edward Howard, President of the Howard Watch and Clock Company, of Boston; Albert Palmer, Mayor of Boston; and other prominent bankers of that city and section. The capacity of the new works will be three hundred tons daily, with stacks of not less than fifty tons capacity. Water-jacket furnaces will be used, and calcining ovens for desulphurizing refractory ores. Satisfactory contracts for ore and bullion transportation have been effected with the Denver & Rio Grande, the Atchison, Topeka & Santa Fé, and the Burlington railroad, and amicable terms arranged with the Colorado Coal and Iron Company. All points in Colorado, New Mexico, Arizona, Utah, and Montana will be sought as sources of ore supply, and the company become a cash competitor for ore of all kinds and grades. Bids are solicited for the brick and iron work and for the general plant of machinery. As soon as these have been submitted and accepted, the work of construction will at once be entered upon and pushed rapidly to completion.

DAKOTA.

CALEDONIA.—According to reports, this mill will start up by the first of February. A little work has been done in the mine; but a larger force is to be engaged when active operations are resumed.

FATHER DE SMET.—The report for the week ended January 22d shows: Ore extracted from first, second, and third levels, 2000 tons. Ore milled, 2000 tons Golden Gate south header, third level, advanced 6½ feet. Justice uprise advanced 4½ feet.

KING SOLOMON.—It is reported that this company will redeem its property sold by the sheriff last fall.

STAND-BY.—The mill has been shut down until spring.

IDAHO.

Recent dispatches from Idaho indicate that as soon as the snow disappears from the valleys of the Cœur d'Alene Mountains, there will be a great rush to the rich gold placers which are alleged to exist in that country. The New York *Tribune* states that Prof. J. M. Tiernan, who has been engaged for several years, under the direction of the Northern Pacific Railroad Company, in exploring and testing the mineral formation of the country from Puget Sound along the line of that road eastward as far as Helena, Mont., is in Washington. He has thoroughly explored the Cœur d'Alene country, and gives an interesting account of it. He says: "Most of the published statements respecting the richness of the placer deposits are greatly exaggerated, and some of them are the productions of the fertile imaginations of men who have never been on the ground when it was bare of snow. I prospected the region two years ago, and again in October last. The supposed placers cover a territory about twelve miles wide and fifty long, roughly estimated. This district is in the Cœur d'Alene Mountains, which in that vicinity are about 2500-feet high. That the placer deposits are quite extensive there is no doubt; but whether they are as rich as reported, or whether gold will be found in paying quantities, can only be demonstrated by working them. The reports from there at this season as to the richness of the deposits are, of course, untrustworthy; for the ground is covered with two or three feet of snow. Some men have pushed into the country since winter began, and are in camp there, waiting for the snow to melt. Some twenty miles in an easterly direction are extensive and rich veins of gold quartz. I had a shaft sunk about thirty feet into one of these veins, and the ore yielded from $80 to $125 per ton. This was the actual yield after the rock had been put through the reduction-works, and was not the result of a mere assay. An assay of some specimens of the rock will show $10,000 to the ton, but, of course, such tests are of little practical value."

Professor Tiernan exhibited maps made by him, which show the geological formation of Cœur d'Alene and Pend d'Oreille districts. The newly discovered placers are situated about eighty miles in a southeasterly direction from Spokane Falls, on the Northern Pacific Railroad. A branch road is to be built the coming summer from Spokane Falls to Cœur d'Alene Lake, a body of water forty five miles long. The Cœur d'Alene River, which flows into this lake, is navigable for a considerable distance. The government has a small steamer on the lake now, and individuals are building two others, in expectation of a large trade as soon as navigation opens. From the nearest point on the Cœur d'Alene River to the new placer mines is about eighteen miles, and from the same stream to the rich quartz lodes described by Professor Tiernan the distance is about sixteen miles. The latter are near Wessner's Peak, which rises to the hight of 13,200 feet, and is a well known landmark in that region.

Professor Tiernan's maps show extensive deposits of hematite iron, galena, marble, silver, and other minerals in Cœur d'Alene and Pend d'Oreille districts. He has sent to New York during the last two years great quantities of specimen minerals from the country through which the railroad passes, and these are shortly to be arranged and placed on exhibition in the new Broadway office of the company.

MAINE.

DOUGLAS.—Large quantities of ore are hoisted daily. For the last six weeks, the No. 2 ore has averaged from 3 to 3·4 per cent copper, and No. 1 ore 8 per cent. As sinking is continued in the shaft, a vein of good ore is exposed which grows better each day. This is a branch vein coming in from the West. It is stated that a quantity of copper has been sent to the American Tube-Works, and the company has used it satisfactorily in making tubes.

MASCOT.—Work progresses smoothly at the mine. The winze, 68 feet in length, connecting No. 1 level with No. 2, exposes a vein of galena fully three feet wide. The ore extracted during the process of sinking has paid all the expenses of this work. In continuing the second level, another vein of galena has been found, about 2¼ feet wide and as rich as the former. There are at present 32 tons of dry concentrates at the mill, worth $55 per ton net, containing 70 to 75 per cent lead and 20 ounces silver to the ton. Stoping will be commenced immediately, so that the output will be largely increased, and the superintendent is now in New York making arrangements for the sale of the concentrates while the market is favorable.

STEWART.—Under date of January 21st, Superintendent Dunn reports No. 3 shaft to be 223 feet deep and the vein to be looking very well at the bottom of the shaft. He proposes soon to run his second level, which will open up a large amount of stoping ground.

MEXICO.

Chihuahua is to have a smelting company for custom-work.

The Concordia company's smelter at Chihuahua is making good runs of copper. Several car-loads of ore are brought from the mine to the furnace daily.

MICHIGAN.

Cheaper rates by rail will be one thing in favor of the Lake Superior mines next season. Last year, the C. & N. W. Company taxed the mine-owners $1.15 per ton upon ores hauled from Marquette and the Menominee range, the tariff having been $1.25 previously. It is now announced that this company will haul ore from the mines of both ranges next season for eighty cents per ton, a reduction from the rate charged last season of thirty-five cents.

HANCOCK.—A decided improvement is noted underground in a direction that heretofore has shown little if any copper. The betterment in question manifests itself in a drift going north at the 10th level, which is the deepest point that has been reached in the mine. There is still a large piece of unexplored territory ahead of this gallery.

NANAIMO.—At the annual meeting, the old organization was voted in for another year. A report submitted covering the last year's operations was so satisfactory that it was decided to add very considerably to the machinery equipment of the mine, with a view to an increased production in 1884. The company will endeavor to raise and ship 100,000 tons of ore the current year.

NATIVE COPPER.—According to the *Mining Gazette*, this company has, during the last two months, sold several lots of the ingot refined by it in New York. The copper is pronounced by manufacturers equal to any they ever handled. Last week, the Detroit rolling-mill gave the company an order for a large invoice of plates and bar copper.

TAMARACK.—The combination shaft, upon which work was begun less than two years ago, is down a distance of 1200 feet. During the second year, 715 feet were sunk, besides cutting out three plats, or stations.

NEVADA.

EUREKA COUNTY.

It is reported that the Richmond and Eureka Consolidated mining companies have formed a combination for the purpose of working the Locan shaft.

STOREY COUNTY.

ORIGINAL KEYSTONE.—Operations are to be resumed, and preparations are making to fire up the furnaces and to hoist the water out of the shaft, which is 436 feet deep and is filled with water to about 50 feet of the surface.

UTAH.

BEAVER COUNTY.

FRISCO.—The company is considering the question of the erection of a new and extensive smelter at Franklyn, south of Salt Lake City. The mines of the company in this county are yielding large quantities of ore, enough, in fact, to keep a number of stacks constantly running, and as smelting can be conducted near Salt Lake to greater advantage than in Southern Utah, the smelter will probably be built this spring. Fuel is cheaper there, and all necessary fluxes are at hand. The works will be on an extensive scale.

SUMMIT COUNTY.

CRESCENT.—The annual report shows that ore to the amount of $346,148.89 was sold up to November 1st, 1883, of which $150,000 were paid out in dividends and $17,252 35 expended for improvements and supplies now on hand. Mr. Ferry, the president, recommends that a tramway be constructed from the mine to the sampling-works, to be erected near the mouth of Thayne's Cañon, and that a concentrator be erected in the cañon below the mine, and his suggestions will be acted on during the coming spring and summer.

WASHINGTON COUNTY—SILVER REEF.

It would be difficult to imagine a more dull and lifeless mining camp than this place at the present time, says the Salt Lake *Herald*. The Barbee and Christy mills are both lying idle; the result is, a great many workmen are out of employment. The officers of the Christy state that the mill will resume work shortly, but the general belief is, that it will not start up again until it can start with reduced wages. The Stormont alone continues running.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Feb. 1.

While the aggregate of the transactions reaches a large amount, the business in the mining market this week was of but little interest, and was mostly confined to the low-priced fancy stocks. Large blocks of these stocks were sold, but no material change in their price was made. Such stocks as Sonora, Decatur, and American Flag were very largely dealt in. Rappahannock was also very actively dealt in and the stock was stronger than for some time past. The Bodie stocks continue to be the feature of the market, and are still selling at very strong figures. Northern Belle suffered a further decline this week, and is now quoted at a very low price. A complete summary of the market is given below. The total number of shares sold aggregates 144,087, as against 132,809 last week.

The Comstock shares were very quiet at steady prices. California sold at 5c., assessment unpaid. Consolidated Virginia was quiet and weak, selling from 27@21c. Sierra Nevada was steady, with a small business, selling at $2.60. Best & Belcher sold at $2.60. Sutro Tunnel was quiet and steady at 16@17c.

The Bodie stocks continue strong, and were moderately active. Bodie Consolidated was very strong, with a fair business, selling from $7.25@$11. Bulwer was moderately dealt in at strong prices; it sold from $1.70@$2.@$1.85. Standard was quiet and steady, selling from $7@$6.75. Goodshaw sold at 10c., assessment unpaid. Consolidated Pacific was very strong, with a fair business; it sold from 45@60c. Tioga sold at 25c., under a small business.

The Leadville stocks were but moderately dealt in and were steady. Amie was quiet at 9c. Chrysolite was irregular, under a small business, selling from $1.05@$1.2(@$1.10. Iron Silver rallied and was strong, selling from $2 05@$2.20 with a fair business Leadville was moderately dealt in and was strong; it sold from 50@55c. Little Chief was quiet and steady at 50@47c. Climax sold from 6@5c., with a small business.

The Tuscarora stocks were almost entirely neglected, only 100 shares each of Grand Prize and Argenta being sold, the former at 20c. and the latter at 10c. 300 shares of North Belle Isle were sold to-day at 35c.

In the miscellaneous list, Alice was weak, declining from $2.25@$2, under a small business. Eureka Consolidated sold at $2, and Father de Smet at $3. The transactions in both were small. Green Mountain was actively dealt in, and was a little stronger early in the week, but declined toward the close; it sold from $2.10@$1.95. Hall Anderson was quiet and strong, selling from $1.05@$1.50@ $1.20. Horn-Silver was fairly dealt in at strong prices. It sold from $7.50@$7.25@$7.38. Northern Belle was very weak, owing to the company having levied an assessment of $8 per share in order to pay the Holmes Company's judgments; it sold from 43@4@6c. Robinson Consolidated was quiet and steady, selling from 29@32c. Sierra Grande was a little weaker, selling at 78c., under a small business.

American Flag was very active at steady prices, selling from 4@3c. Barcelona sold at 14c. Central Arizona declined from 30@26@27c., with a small business. Decatur sold from 3@4c., with a very active business. Harlem was quiet and steady, selling from 12@10c. Oriental & Miller sold from 13@10c., with a small business. Rappahannock was very active and was quite strong; it sold from 8@15@12c. Sonora Consolidated was also very largely dealt in and was steady; it sold from 12@10@11c.

MEETINGS.

The Stein's Pass Mining Company, No. 2 Wall street, New York City. Annual meeting of stockholders and election of trustees, February 14th, at three o'clock P.M.

DIVIDENDS.

The Atlantic Mining Company, of Michigan, has declared a dividend of one dollar per share, payable February 1st.

The Horn-Silver Mining Company, of Utah, has declared a dividend (No. 12) of $300,000, payable on and after February 15th.

The Paradise Valley Mining Company has declared a dividend (No. 1) of ten cents per share, payable January 28th, at San Francisco.

DIVIDENDS PAID BY MINING COMPANIES DURING THE MONTH OF JANUARY AND FROM JANUARY 1ST, 1884.

NAME OF COMPANY.	Location of mines.	Paid during month of January.	Since January 1st, 1884.
Bonanza King Cons., s...	Cal	50,000	.....
Bulwer Consolidated, G...	"	10,000	.....
Calumet & Hecla, C.....	Mich	550,000	.....
Copper Queen, C....	Ariz.....	100.000	.....
Hecla Cons., S....	Mont	15.000	.....
Homestake, G	Dak	25.000	.....
Idaho, G.....	Cal.....	15,500	.....
Iron Silver, S.	Colo.....	100,000	.....
Kentuck, S	Nev.....	3,000	.....
Little Chief, S. L.....	Colo.....	20,000	.....
Ontario, S.	Utah	75.000	.....
Original.....	Mont	3,000	.....
Oro Grande	Cal	6,000	... .
Oxford, G	N. S	5,000	....
Plymouth Cons., G.....	Cal.... .	50,000	.....
Quincy, C.....	Mich	180,000	.....
Standard, G.....	Cal	25,000	.....
		$1,182,500	.....

G., gold; S., silver; L., lead; C., copper.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows for the week:

Saturday, the 26th, was dull, with but slight fluctuations, the highest price being $1.11⅝, and the lowest $1.10¼. On Monday, the market opened at $1.11¼, closing at $1.10⅛, which was within ¼ of the lowest of the day. On Tuesday, there was really no market, the extreme range of fluctuations being from $1.10⅜ @$1.09¾.

Wednesday, the market in the afternoon developed great strength and buoyancy, selling up from $1.10⅜ at the opening to $1.12⅝ at the close.

Thursday, this advance was lost, closing at $1.11.

To-day, the market was very dull until late in the day, when it weakened to $1.09⅛ on rumors of Grandin well No. 19 coming in, closing $1.09¾.

The trade does not appear to be loaded with oil, and the holding seems to be good; but it goes down or up easily and without much apparent reason.

The exports for January of this year average 30,800 barrels daily, against 23,023 average in January, 1883. The average daily exports for the year 1883 were 1600 barrels greater than in 1882, when refined and crude oil were much cheaper. This shows that the foreign demand is increasing.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Jan. 26	$1.10¼	$1.1 9⅝	$1.10¼	$1.11⅛	3,441,000
28	1.1 ¼	1.11¼	1.09⅞	1.10⅜	4.005,000
29.....	1.09¼	1.10⅜	1.09¾	1.10⅜	2.774,000
30.....	1.10⅜	1.12⅝	1.10¼	1.12⅝	4,382,000
31.	1.12½	1.12⅝	1.10¾	1.11	4,586,000
Feb. 1.....	1.10⅞	1.10⅞	1.09½	1.09¾	4,1 9,000
Total sales					23,297,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, January 31.

We have but little change to note in the market the past week. There is but little doing in speculative stocks, and about the only business is in the leading dividend-paying copper stocks, which are bought for investment and only in a small way. The market is, however, quite firm, and any active demand would materially advance prices. Calumet & Hecla declined $1 a share, but quickly recovered, and sold at $232½, same as last week. Franklin is in good demand, and advanced $1 from last week, with sales at $10. At this price, the stock is undoubtedly cheap, and on its merits ought to sell at higher prices. The superintendent of the mine writes, under date of January 25th, that the mine continues to show as well as ever, and every thing about it seems to run like a charm. The product for this month will be about 175 tons, which is a gain of 42½ tons on January, 1883. Quincy sold at $44½@ $44, and later at $40, ex dividend $4½ per share; but is now $40½ bid, and no stock offered. Pewabic is in moderate demand at $1⅝@$1¼. Huron sold at $1¼@$1⅝. The reports from the mine are to the effect that the No. 8 shaft is showing better than at last reports. The mill continues to do well, and it is expected that the product for the month will be at least 65 tons. Allouez sold same as last week, at 50 cents, just the amount of the assessment lately levied.

In silver stocks, Catalpa finds buyers at 30c., and Harshaw is steady at 50c. Its assets are now above ground, where they can be valued.

At the Mining Exchange, there is but little activity, and prices are inclined to droop. Bowman Silver holds its position at 15@17c., with sales occasionally at 16c.; but there is no vim to it, and outsiders are disposed to let it alone. Empire is dull, and declined from 37½@32c. The news from the mine is of a very favorable character, and if correct should advance the price of the stock to much higher figures. A sale of a block of about 10,000 shares treasury stock of the Continental Mining Company, one of the Empire group, was made this week at 4c. per share. It is rumored that a reorganization of the company is in contemplation, and an assessment levied to work the mine. Dunkin Silver is steady at 24@25c. There is but little of the stock in the market, and it is difficult to fill orders except at an advance.

3 P.M.—At the afternoon call, Quincy sold at $41; Osceola, $14. The rest of the list is without material change.

BULLION MARKET.

NEW YORK, Friday Evening, Feb. 1.

The India exchanges in London and our own sterling exchange market have, since our previous postings, unexpectedly advanced, and with the result upon silver rates as given in the accompanying table:

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Jan. 26	50 15-16	111	Jan. 30	50 15-16	111⅛
28	50⅞	111	31	50 15-16	111¼
29	50 15-16	111⅛	Feb. 1	51	111⅜

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 3 per cent. During the week, the bank lost £56,000 bullion, and the proportion of its reserve to its liabilities was reduced from 41¾ to 41 9-16 per cent, against 47 13-16 per cent at this date last year. The weekly statement of the Bank of France shows an increase of 1,862,000 francs gold, and a decrease of 1,056,000 francs silver. The Bank of England, January 31st, lost £55,000 bullion on balance.

United States Assay-Office at New York.—Statement of business for the month ended January 31st, 1884:

Deposits of gold:		
Foreign coin...	$40.000	
Foreign bullion.....	45,000	
United States bullion..... ...	650.000	
United States bullion (re-deposits)..	146,000	
Jewelers' bars.....	20,000	
Refined gold.....	127,000	$1,028,000
Deposits of silver:		
Jewelers' bars.....	18,000	
United States coin.....	300	
Foreign coin.....	3,600	
Foreign bullion.....	26,000	
United States bullion (contained in gold)	6,700	
United States bullion (re-deposits) .	800	
Arizona.	300	
Colorado ...	100	
Dakota..	7,500	
Lake Superior.	1,000	
Montana.....	69,000	
Nevada.....	1.000	
New Mexico..	18.200	
Utah.....	256,000	
Refined silver.....	195,500—	604,000
Total deposits....		$1,632,000
Gold bars stamped.....	$1,760.357	
Silver bars stamped.....	515,800—$2,276,157	

United States Mint at Philadelphia.—The coinage executed at the Mint during January aggregated 4,623,980 pieces, valued at $1,361,023. This amount was made up of 30 double-eagles, 30 eagles, 30 half-eagles, 30 three-dollar gold pieces, 30 quarter-eagles, 30 gold dollars, 1,200,000 silver dollars, 550,000 dimes, 1,901,000 five-cent pieces, and 972,800 cents.

METALS.

NEW YORK, Friday Evening, Feb. 1.

Copper.—There is a firmer feeling, and orders at 14¼c. for small lots of Lake can not now be filled at that figure. Fully 15c. will have to be paid. There

DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Shares. Par value.	Assessments. Total levied to date.	Assessments. Date and amount per share of last.		Dividends. Total paid to date.	Dividends. Date and amount per share of last.			Highest and Lowest Prices per Share at which Sales were Made. Jan. 26. H.	Jan. 26. L.	Jan. 28. H.	Jan. 28. L.	Jan. 29 H.	Jan. 29 L.	Jan. 30. H.	Jan. 30. L.	Jan. 31. H.	Jan. 31. L.	Feb. 1. H.	Feb. 1. L.	Sales.	§
1	Alice, s. c.	Mont	$10,000,000	400,000	$25	*			$400,000	Dec.	1881	.10			2.25	2.05	2.00						2.00		500	
2	Amie Con., s. l.	Colo.	5,000,000	500,000	10	*			330,000	Oct	1883	.05							.09						850	B.
3	Atlantic, c.	Mich	1,000,000	40,000	25	$280,000	Apl.	1875	220,000	Feb.	1883	$2.00														
4	Argent), s	Nev.	10,000,000	100,000	100	25,000	Jun.	1883	40,000	Feb.	1880	.20											.10		100	
5	Barbee & Walker, s.	Utah	1,000,000	100,000	10	*			60,000	Nov	1880	.10														
6	Bassick, G. s.	Colo.	10,000,000	100,000	100	*			300,000	Nov	1883	1.00														
7	Belle Isle, s.	Nev.	10,000,000	100,000	100	100,000	Jan.	1884	300,000	Dec.	1879	.25														
8	Belcher, G. S.	Nev.	10,400,000	104,000	100	2,588,800	Apl	1883	.25	15,397,000	Apl	1876	1.00													
9	Birdseye, G.	Cal.		15,000						Dec.	1882															S.F
10	Black Bear, G.	Cal.	3,000,000	30,000	100	15,000	Sept	1879	.50	895,000	May	1883	.20													
11	Bodie Con., G.	Cal.	10,000,000	100,000	100	275,000	Dec.	1883	.50	1,295,000	Nov	1882	.20	7.25		7.75		9.00		8.50				11.00	8.50	870	S.F
12	Bonanza Developm't	C&M	3,000,000	300,000	10					135,000	Oct.	1882	.15														
13	Bonanza King, Cons.	Cal.	2,000,000	200,000	10					160,000	Jan.	1884	.25														
14	Boston & Mont. G.	Mont.	5,000,000	200,000	25	*				310,000	Jan.	1883	.05														P.
15	Breese, s.	Colo.	5,000,000	200,000	25	*				2,000	Feb.	1880	.01														
16	Bulwer, G.	Cal	1,000,000	100,000	100	30,000	Dec.	1877	.50	175,000	Jan.	1884	.10	2.00	1.70	1.75	1.70			1.85		1.85	1.80	1.85	1.80	3,315	B.
17	California, G. s.	Nev.	54,000,000	540,000	100	1,070,000	Jan.	1884	.20	31,320,000	Dec.	1878	.50					.05								600	
18	Calumet & Hecla, c.	Mich	2,500,000	100,000	25					24,850,000	Jan	1884	5.00														
19	Carbonate Hill, s. l.	Colo.	2,000,000	200,000	10	*				60,000	July	1883	.05														
20	Carbon Con., s.	Colo.	1,000,000	100,000	10	*				50,000	Mch	1880	.10														
21	Carolina Queen, c.	N. C.	200,000	100,000	2					8,000	Oct.	1882	.02														B.
22	Castle Creek, G.	Idaho	100,000	100,000	1					51,000	Oct	1883	.03	.15										.20	.15	2,900	
23	Catalpa, s. l.	Colo.	3,000,000	300,000	10	*				240,000	Jun.	1883	.10														
24	Central, c.	Mich	500,000	20,000	25	100,000	Sept	1861	.06	1,670,000	Feb.	1883	3.00														B.
25	Christy, s.	Utah	6,000,000	60,000	100	24,000	Dec.	1883	.20	90,000	Jan.	1883	10														
26	Chrysolite, s. l.	Colo.	10,000,000	200,000	50	*				1,600,000	Dec.	1881	.50					1.05		1.20	1.15	1.10				500	
27	Con. Bobtail, G.	Colo.	1,136,630	227,326	5	*				147,762	Mch	1880	.10														S.F
28	Con. Gold Mining, G.	Ga.	500,000	100,000	5	*				198,000	Nov	1883	.02														
29	Con. Virginia, G. s.	Nev.	51,000,000	510,000	100	1,005,000	July	1883	.20	42,930,000	Aug	1880	.50				80	.27	.23			.25		.21		4,800	
30	Contention, s.	Ariz.	12,500,000	250,000	50					22,524,000	Dec.	1881	.25														S.F
31	Copper Queen, c.	Ariz.	2,500,000	20,000	10	*				1,325,000	Jan.	1884	.10														
32	Crescent, s. l. G.	Utah	15,000,000	600,000	25	**				150,000	Oct.	1883	.05														
33	Crown Point, G. s.	Nev.	40,000,000	100,000	100	2,873,000	Feb.	1883	.25	11,588,000	Jan.	1875	2.00														B.
34	Deadwood-Terra, G.	Dak.	5,000,000	200,000	25	*				4900,00	Jan.	1883	.10														
35	Dunkin, s. l.	Colo.	5,000,000	200,000	25	*				210,000	Oct.	1883	.05														S.F.
36	Eureka Con., G. s. l.	Nev.	5,000,000	50,000	100	350,000	Jan.	1884	1.00	4,767,500	July	1882	.25							2.00				2.00		360	
37	Evening Star, s. l.	Colo.	500,000	50,000	10	*				1,300,000	Nov	1883	.50														
38	Excelsior, G.	Cal.	10,000,000	100,000	100	363,000	Aug	1883	.60	875,000	Oct.	1880	.25														
39	Father de Smet, G.	Dak.	10,000,000	100,000	100					650,000	Dec.	1883	.20					3.00								100	
40	Findley	Ga.																								
41	Franklin, c.	Mich		54,000		860,000	Jun	1877		348,000	Jan.	1884	2.00														
42	Freeland, s.	Colo.	5,000,000	200,000	25	*				50,000	May	1880	.20														S.F.
43	Fresno Enterprise, G.	Cal.	5,000,000	100,000	50		Mch	1883	.10	110,000	July	1882	.10														S.F.
44	Gem, s.	Colo.	125,000	125,000	1					23,750	May	1881	.02														
45	Glass-Pendery, s. l.	Colo.	5,000,000	250,000	20	*				25,000	May	1881	.10														
46	Glen, s.	Colo.	100,000	100,000	1					7,000	May	1883	.01														S.F.
47	Gold Stripe																										
48	Gould & Curry, G. s.	Nev.	10,800,000	108,000	100	3,584,000	Nov	1883	.50	3,826,000	Oct.	1870	10.00														
49	Grand Central, s.	Ariz.	1,000,000	100,000	10					625,000	Dec.	1882	.25														
50	Grand Prize, s.	Nev.	10,000,000	100,000	100	47,000	Jun.	1883	.25	450,000	Sept	1879	.25							.20						100	
51	Granite, s.	Colo.	125,000	125,000	1	*				4,250	May	1883	.01														
52	Great Eastern, G.	Dak.	3,000,000	300,000	1	*				16,000	July	1880	.01														
53	Great Western, Q.	al.	5,000,000	50,000	10	35,500	Aug	1873	.15	262,500	Oct.	1882	.25														
54	Green Mountain, G.	Cal.	1,250,000	125,000	10	*				212,000	Nov.	1881	.07½	2.00	1.90	2.10	2.00	2.00		2.00		2.10	2.05	1.95		4,400	
55	Hale & Norcross, G. s.	Nev.	11,200,000	112,000	100	4,230,000	Jan.	1884	.50	1,598,000	Apl	1871	5.00														S.F
56	Hall-Anderson, G.	N. S.	150,000	150,000	1					7,000	Jan.	1882	.10	1.10		1.10	1.05							1.50	1.30	1,000	B
57	Hecla Con., s.	Mont	1,500,000	30,000	50					567,500	Jan.	1881	.50														
58	Heuriett, L.	Colo.		270,000						27,000	Feb.	1883	.10														
59	Hibernia, s. l.	Colo.	7,500,000	300,000	25	*				180,000	July	1881	.40														
60	Holyoke, G.	Idah.	200,000	200,000	1					52,000	Nov	1883	.02														
61	Homestake, G.	Dak.	12,500,000	125,000	100	200,000	July	1878	1.00	2,397,500	Jan.	1884	.20	9.75		10.00										16	
62	Hope, s.	Mont	400,000	8,000	50	*				124,340	Dec.	1883	1.50														
63	Horn-Silver, s. l.	Utah	10,000,000	400,000	25	*				3,100,000	Feb.	1884	.50	7.50				7.50	7.25	7.38	7.25	7.50	7.38	7.38	7.25	3,420	
64	Howell S. & M. Co.	Ariz.	375,000	187,500	2	*				3,750	Aug.	1883	.01														
65	Hukill, G. s.	Colo.	1,000,000	200,000	5	*				210,000	Dec.	1878	.10														
66	Idaho, G.	Cal.	310,000	3,100	100					3,414,650	Jan.	1881	5.00														B.
67	Independence, s.	Nev.	10,000,000	100,000	100	205,000	Dec.	1883	.20	225,000	Sept	1879	.25														
68	Indian Queen, s.	Nev.	250,000	125,000	2					368,750	July	1883	.03														S.F.
69	Inyo, G.	Cal.	500,000	100,000	5	*				45,000	Apl.	1882	.05														
70	Iron-Silver, s. l.	Colo.	10,000,000	500,000	20	*				1,300,000	Jan.	1884	.20	2.05		2.10		2.20				2.20	2.10			1,775	
71	Jacualtica, s.	Mex.	10,000,000	100,000	100					960,000	Nov	1883	.50														E.
72	Kentuck	Nev.	3,000,000	100,000	100	342,000	Nov	1881	.30	1,320,000	Jan.	1884	.10														
73	La Plata, s. l.	Colo.	2,000,000	200,000	10	*				610,000	Sept	1882	.30														S.F.
74	Leadville, s. l.	Colo.	4,000,000	400,000	10	*				330,000	Dec.	1883	.05	.50		.55	.52			.54	.53			.55		1,500	
75	Leeds, s.	Utah	6,000,000	60,000	100	87,000	July	1882	.50	78,000	Oct.	1878	.15														
76	Little Chief, s. l.	Colo	10,000,000	200,000	50	*				740,000	Jan.	1884	.10							.50	.49	.50	.48	.47		1,200	S.F
77	Little Pittsburg, s. l.	Colo.	20,000,000	200,000	100	*				1,950,000	Mch	1880	.50														B.
78	Marguerite, G.	Cal.	500,000	25,000	20					18,750	Oct.	1882	.25														
79	Martin White, s.	Nev.	10,000,000	100,000	100	1,050,000	Dec.	1883	.25	90,000	July	1879	.20														
80	Minas Nuevas, s.	Mex.	300,000	100,000	3	*				20,000	July	1883	.10														
81	Morning Star, s. l.	Colo.	1,000,000	100,000	10					615,000	Oct	1883	.25														
82	Mount Pleasant, G.	Calf.	150,000	150,000	1	*				90,000	Dec.	1883	.20														
83	Mt. Diablo, s.	Nev	5,000,000	50,000	100	137,500	Jun.	1883	2.00	50,000	Nov	1883	.25														
84	Napa, Q.	Cal.	700,000	100,000	7					290,000	Jan.	1883	.10														
85	Navajo, G. s.	Nev.	10,000,000	100,000	100	235,000	Mch	1882	.20	225,000	May	1883	.25														
86	New York Hill, G.	Cal.	5,000,000	100,000	100	55,000	Mch	1878	.20	215,000	Aug.	1882	.10														
87	New York & Colo., G.	Colo.	1,250,000	50,000	25					25,000	July	1879	.10														B.
88	Northern Belle, s.	Nev.	5,000,000	50,000	100	425,000	Jan.	1884	8.00	2,400,000	Apl.	1883	.50	.43						.40		.06		.06	.04	1,175	
89	North Bell-Isle, s.	Nev.	10,000,000	100,000	100	105,000	Jan.	1884	.10	81,000	Aug.	1881	.15											.35		300	B
90	Ontario, s. l.	Utah	15,000,000	150,000	100					5,225,000	Jan.	1884	.50					29.50								68	
91	Ophir, G. s.	Nev.	10,000,000	100,000	100	3,645,000	Aug	1883	1.00	1,595,000	July	1882	1.00														
92	Osceola, c.	Mich	1,250,000	50,000	25	480,000	Apl.	1876	1.60	1,010,000	Dec.	1883	.50														S.F.
93	Oxford, G.	N. S.	100,000	100,000	1	*				35,000	Jan.	1884	.50														
94	Pleasant Valley, G. s.	Cal.	10,000,000	100,000	100	30,000	Sept	1883	.15	30,000	Dec.	1882	.05														
95	Plymouth Con., G.	Cal.	5,000,000	100,000	50	*				400,000	Jan.	1884	.50														E.
96	Polonia, s.	Colo.	200,000	8,000	25					12,000		1882	1.50														
97	Prussian, s. l.	Colo	1,500,000	150,000	10					132,000	Jan	1883	.10														P.
98	Quick-Silver, pref, Q.	Cal.	4,300,000	43,000	100					654,000	July	1882	6.00														
99	" com., Q.	Cal.	5,700,000	57,000	100					151,000	July	1882	.40													700	S.F.
100	Quincy, c.	Mich	1,200,000	40,000	25	200,000	Dec.	1883	5.00	3,764,000	Jan.	1884	4.50														
101	Renfrew, G.	N. S.	60,000	30,000	2					30,000	July	1882	.02														E.
102	Richmond, s. l.	Nev.	1,350,000	54,000	25	*				4,042,587	May	1884	1.25														
103	Rising Sun, s.	Dak.	750,000	150,000	5	*				52,000	May	1881	.07½							.02		.02				1,400	
104	Robinson Bar, G.	Idah.	100,000	100,000	1	*				9,000	Dec.	1882	.03														
105	Robinson Con, s. l.	Colo.	10,000,000	200,000	50					575,000	Nov	1881	.50							.30		.32	.31	.32	.31	1,000	E.
106	Robert E. Lee, s. l.	Colo.	250,000,000	500,000	500					100,000	Dec.	1882	.10														
107	San Francisco, c.	Cal.	5,000,000	50,000	100	45,000	Sept	1880	.50	20,000	Feb.	1883	.05														B.
108	Savage, G.	Nev.	11,200,000	112,000	100	5,596,000	Nov	1883	.50	4,400,000	July	1879	3.00														
109	Shoshone, G.	Idah.	150,000	150,000	1					7,500	Apl.	1883	.01														E.
110	Sierra Buttes, G.	Cal.	225,000	22,500	10					1,450,933	Oct.	1883	.25														
111	Sierra Grande, s.	N. M.	10,000,000	400,000	25					700,000	Oct.	1883	.25									.78				100	P.
112	Sierra Nevada, G. s.	Nev.	10,000,000	100,000	100	5,450,000	Jan.	1884	1.00	102,000	Jan.	1871	1.00			2.60				2.60						220	B.
113	Sta Pimas Eureka, G.	Cal.		40,655							Apl.	1882														S.F.
114	Silver Cord, G. s. l.	Colo	4,500,000	450000	10					225,000	Nov	1883	.25														
115	Silver King, s.	Ariz.	1,000,000	100,000	100					1,300,000	Dec.	1883	.25	7.50										7.00		60	
116	Silver King, s.	Colo.	1,000,000	500,000	2					50,000	Aug	1881	.10														
117	Smuggler, s. l.	Colo.	600,000	6,000	10					66,700	Aug.	1883	.25														B.
118	Socorro, c.	N. M.	250,000	2,500	100					4,000	Mch	1882	.00¾														
119	South Yuba, G.	Cal.	2,000,000	40,000	50	*				150,000	Oct.	1881	.75														
120	Spring Valley, G.	Cal.	200,000	200,000	1	*				50,000	Jan.	1881	.25	.85												100	
121	Standard, G. s.	Cal.	10,000,000	100,000	100					4,350,000	Jan.	1884	.25	7.00				7.00	6.75	7.00	6.75	6.88	6.75	6.75		508	
122	Stormont, s.	Utah	200,000	200,000	1					155,000	Nov.	1881	.05														
123	St. Joseph, s.	Mo.	1,000,000	100,000	10	*				30,000	Dec.	1882	.20														
124	Tip Top, s.	Ariz.	10,000,000	100,000	100	250,000	Sept	1883	.25	100,000	Nov.	1881	.20														B.
125	Tombstone, G. s.	Ariz	12,500,000	50,000	25	*				1,250,000	Apl.	1882	.10														
126	True Fissure, G. s. l.	Utah	1,500,000	150,000	10	*				75,000	Jun.	1883	.15														
127	United Gregory, G.	Colo	300,000	300,000	1					42,000	Apl.	1883	.25														E.
128	United Gold Min. Co.	Colo.									Oct.	1883	.05														B.
129	Vizina, s.	Ariz.	5,000,000	200,000	25	*				140,000	Apl.	1882	.10														
130	Yellow Jacket, G. s.	Nev.	12,000,000	12,000	100	5,358,000	Feb.	1883	1.00	2,184,000	Aug.	1871	1.50														

*Non-assessable. † The Deadwood has previously paid $275,000 in eleven dividends, and the Terra $75,000. ‡This company, as the Western, up to December 10th, 1881, paid $1,475,000. Quotations of these stocks will be found in S. F., San Francisco; B., Boston; and P., Philadelphia, tables. E are British companies. ‖Total number of shares, 500,000; 50,000 shares have never been issued, and are still held by the company. Dividend shares sold, 33,477. **Non-assessable for 3 years.

has been some business in Baltimore and other brands, which we quote, according to quality, from 14¼@14¾c.

London is a trifle better, cabling to-day firm at £56 7s. 6d. for Chili Bars, while Best Selected is unchanged at £61 10s.

Tin.—The market has been weak and has shown a declining tendency under a fairly large volume of business. We quote Straits spot at 18¼@18½c.

NON-DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. Number.	Shares. Par Value.	Assessments. Total levied to date.	Assessments. Date and amount per share of last.			Highest and Lowest Prices per Share at which Sales were Made. Jan. 26. H.	Jan. 26. L.	Jan. 28. H.	Jan. 28. L.	Jan. 29. H.	Jan. 29. L.	Jan. 30. H.	Jan. 30. L.	Jan. 31. H.	Jan. 31. L.	Feb. 1. H.	Feb. 1. L.	Sales.	
1	Advance M & M. Co.																						
2	Albion, S. L.	Nevada	$15,000,000	150,000	$100	$622,500	July	1883	.50														S. F.
3	Allouez, C.	Michigan	2,000,000	80,000	25	200,000	January	1883															B.
4	Alpha Con., G. S.	Nevada	3,000,000	30,000	100	430,000	January	1884	.5														S. F.
5	Alta, S.	Nevada	10,080,000	100,800	100	2,187,600	January	1884	.25														S. F.
6	Alta-Montana, G. S. L.	Montana	5,000,000	500,000	10																		
7	American Flag, S.	Colorado	1,250,000	125,000	10	300,000	June	1877	.25					.04	.03					.03		25,000	
8	Barcelona, G.	Nevada	5,000,000	200,000	25	*													.14			100	
9	Battle Creek																						
10	Bear Creek	California	300,000	300,000	1																		
11	Beauce																						
12	Bechtel Con., G.	California	10,000,000	100,000	100	185,000	January	1883	.10														S. F.
13	Belvidere																						
14	Best & Belcher, G. S	Nevada	10,080,000	1 0,800	100	1,446,240	Septemb'r	1882	.50					.17								30	S. F.
15	Big Pittsburg, S. L.	Colorado	20,000,000	200,000	100	*										2.60						20	
16	Black Jack, G.	California	250,000	100,000	2½																		
17	Bonanza Chief	Montana	1,000,000	1,000,000	1	*																	
18	Bondholder	Colorado	500,000	200,000	2½																		
19	Boston Con., G	California	10,000,000	100,000	100	120,000	November	1883	.25														
20	Boulder Con.	Colorado																					
21	Bradshaw, S.	Arizona	2,250,000	225,000	10																		
22	Buckeye	Colorado	2,000,000	400,000	5	*																	
23	" preferred	Colorado																					
24	Bull Domingo, S. L.	Colorado	10,000,000	200,000	50	*																	
25	Bullion, G. S.	Nevada	10,000,000	100,000	100	3,787,000	Nov	1883	.20														S. F.
26	Bye and Bye	Arizona	1,000,000	100,000	10	*																	
27	Calaveras, G.	California	500,000	500,000	1	*																	
28	Cal. W'r & M. Co., G	California																					
29	Caledonia, G. H., G	Dakota	10,000,000	100,000	100	490,000	October	1883	.10											.25	.20	200	
30	Castle Creek																						
31	Catskill, S.	Nevada	1,500,000	300,000	5																		
32	Central Arizona, S.	Arizona	10,000,000	100,000	100					.30				.27	.26					.27		150	B.
33	Chapparal	California																					
34	Cherokee, G.	California	1,500,000	150,000	10																		
35	Chollar, S.	Nevada	11,200,000	112,000	100	633,000	August	1883	1.00														S. F.
36	Climax									.06						.05				.06	.05	1,100	
37	Columbia Con., G. S.	Nevada	5,000,000	100,000	50	25,000	November	1883															
38	Con. Imperial, G. S.	Nevada	50,000,000	500,000	100	1,450,000	May	1883	.05														
39	Con. Pacific, G.	California	6,000,000	60,000	100	156,000	March	1883	.15				.45		.10		.55			.60		1,300	
40	Crescent, S. L.	Colorado	3,000,000	300,000	10	*																	
41	Crowell, G.	North Car.	500,000	500,000	1																		B.
42	Dahlonega, G.	Georgia	250,000	250,000	1	*																	
43	Dardanelles, G.	California	1,000,000	100,000	10																		
44	Decatur									.04				.04		.04	.03	.04				15,500	
45	Dunderberg, S.	Colorado	1,500,000	150,000	10	*																	
46	Durango, G.	Colorado	500,000	500,000	1	*																	
47	Eastern Oregon																						
48	Elko Con., S.	Nevada																					
49	Empire, S.	Utah	10,000,000	100,000	100		October	1883	.15														
50	Enterprise	Colorado																					B.
51	Exchequer	Nevada	10,000,000	100,000	100	650,000	June	1883	.20														
52	Fannie Barret, S.	Colorado																					
53	Globe Copper	Arizona																					
54	Gold Placer, G.	Colorado	5,000,000	200,000	25	*																	
55	Goodshaw, G.	California	10,000,000	100,000	100	220,000	January	1884	.10							.10						500	
56	Granite Mountain, S	Mont.	10,000,000	400,000	25	*																	
57	Granville, G.	North Car.	300,000	300,000	1	*																	
58	Harlem M. & M. Co, G.	California								.11				.12	.10	.10		.11	.10			2,900	
59	Harshaw, S.	Arizona	10,000,000	100,000	100																		B.
60	Head Center, S.	Arizona	5,000,000	200,000	25	160,000	May	1882	.20														
61	Hortense, S.	Colorado	2,000,000	200,000	10																		
62	Julia, G. S.	Nevada	11,000,000	110,000	100	1,416,000	January	1884	.10														
63	Kossuth, G. S.	Nevada	10,800,000	108,000	100	421,200	August	1877	.15														
64	Lacrosse, G.	Colorado	1,000,000	100,000	10	*																	
65	Leviathan, S.	Nevada	10,000,000	100,000	100	380,000	September	1882	.25														
66	Lucerne, S.	Colorado	5,000,000	500,000	10	*																	
67	Mariposa pref., G.	California	5,000,000	50,000	100	1,887,500	December	1881															
68	" common, G.	California	10,000,000	100,000	100	1,975,000	February	1883	.25														
69	May Belle, G.	California	10,000,000	100,000	100	84,000	December	1881	.20														
70	Mayflower, S.	Nevada	1,000,000	100,000	100	45,000	January	1884	.10														
71	Mexican, G. S.	Nevada	10,000,000	100,800	100	2,470,600	December	1883	.50														
72	Michoacan Synd.	Mexico																					S. F.
73	Miner Boy, G. S. L.	Colorado	5,000,000	500,000	10	*																	
74	Miller	Nevada	5,000,000	200,000	25																		
75	Mono, G.	California	5,000,000	50,000	100	535,000	January	1883	.20					1.3								100	
76	Moose Silver, S.	Colorado	3,000,000	300,000	10	*																	
77	Moulton, G. S.	Montana	10,000,000	400,000	25	*																	S. F.
78	Nevada Syndicate																						
79	New Pittsburg									.12												100	
80	North Standard, G	California	10,000,000	100,000	100	20,000	November	1881	.10														
81	Noonday	California	600,000	60,000	10	208,000	December	1882	1.00														
82	Old Dominion, C.	Arizona	3,000,000	300,000	10	*																	S. F.
83	Oriental	Nevada	2,000,000	200,000	10																		
84	Oriental & Miller, S.	Nevada	10,000,000	400,000	25											.13		.10				1,900	
85	Overman, G. S.	Nevada	11,520,000	115,200	100	3,892,700	December	1883	.25														
86	Potosi	Nevada	10,200,000	112,000	100	696,640	January	1884	.50														S. F
87	Quartz Creek				100																		
88	Rappahannock, G.	Virginia		250,000		*																	S. F.
89	Red Elephant, S.	Colorado	500,000	500,000	1	*				.08			.08			.15	.13	.14	.10	.12	.11	13,100	
90	Retort M. & M. Co.	Colorado			10																		
91	San Pedro, G. S. L.	New Mex.		400,000																			
92	Silver Cliff, S.	Colorado	5,000,000	200,000	25	*																	
93	Silver Islet	Canada	1,000,000	40,000	25																		
94	Sonora Con.	Mexico								.11	.10	.10		.12	.11	.11		.12	.10	.11	.10	24,900	B., P.
95	South Bodie, G.	California		100,000		100,000	March	1883	.15														
96	South Bulwer, G	California	10,000,000	100,000	100	195,000	May	1881	.25														
97	South Hite	California	10,000,000	100,000	100		January	1883	.05														
98	South Pacific	California			5																		
99	State Line, No. 1, S.	Nevada	200,000	200,000	1																		
100	" No. 2, S.	Nevada	5,000,000	20,000	25																		
101	" No. 3, S.	Nevada	5,000,000	200,000	25																		B
102	" No. 4, S.	Nevada	5,000,000	200,000	25																		
103	" Nos. 1 and 4, S.	Nevada			25																		
104	" Nos. 2 and 3, S.	Nevada																					
105	Sullivan, G. S. L.	Maine	500,000	100,000	5	125,000	December	1882	.25														
106	Sutro Tunnel	Nevada		2,000,000		*								.17	.16	.16		.17		.16		2,400	
107	Taylor-Plumas	California			10																		
108	Tioga, G.	California	10,000,000	100,000	100	285,000	October	1882	.10					.25								600	B.
109	Tuscarora, S.	Nevada	10,000,000	100,000	100	110,000	October	1881	.15														B., P.
110	Unadilla, S.	Colorado	50,000,000	500,000	100	*																	
111	Union Con., G. S.	Nevada	10,000,000	100,000	100	1,770,000	January	1884	.50											2.20		10	
112	Utah, S.	Nevada	2,000,000	20,000	100	1,460,000	January	1884	1.00														
113	Vandewater	Nevada	20,000,000	200,000	100	*																	
114	Washington	Arizona	2,000,000	200,000	10																		S. F.
115	Whalen Copper	Nevada	2,500,000	100,000	25																		
116	Wide West																						
117	Willshire	California	250,000	50,000	5	*																	

G. Gold. S. Silver. L. Lead. C. Copper. * Non-assessable. † Stocks quoted on S. F. San Francisco; B., Boston; P., Philadelphia. Non-Dividend shares sold, 109,610. Total share sold at all the exchanges, 144,087.

The Banca sale went off this market at a parity of £85, while London cables to-day £83 12s. 6d.

Lead.—The position of this metal continues to puzzle the trade. It has been freely offered from the West at 3·75c. for February and March delivery, and we hear of sales of about 300 tons at that figure, and more can be readily obtained. This looks seriously like a collapse, and it is certain that for the present the support which the metal has had has been withdrawn from it. It is possible that the decline may be the result of manipulation. If it is, the matter is not understood. We discuss the general situation of the metal at greater length to-day in our annual review, but believe it only just to give below another view of the present and near future, coming from the greatest lead-producing region in the country.

Buyers, of course, are frightened, and having no

cue whatever to the situation, and being pretty well supplied for the immediate future, are looking on. It is a subject for regret that the market was allowed to drop away so soon. The effect has been a very bad one, though it possibly is a proof of rare courage on the part of those who have attempted to advance prices, that they abandoned the attempt at once after finding that it could not be carried out successfully.

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

Our market is very dull, there being no buyers. Both Hard and Refined lead are held 3·60c.

Messrs. Everett & Post wire us from Chicago :

Our market is dull at 3·50c. asked. Buyers generally looking forward to a decline, or holding off and purchase only for immediate wants. However, 800 tons sold yesterday at 3·50c.

The Leadville *Herald* says : The Leadville smelters are not producing the amount of bullion at present that they were during the month of December. The decrease is due to several causes, principally a scarcity of lead ores. All the smelters are running on very low lead charges, and one of the most extensive establishments in the city is making little more than a car-load of bullion a day. The absence of lead ores is ascribed to the low prices paid by the smelters for ores running fairly well in this metal. The price paid by the smelters for average ore is about thirty cents a unit for the lead. The lead contained in base bullion is worth on board of cars in this city from thirty-seven to thirty-nine dollars per ton. Smelters claim the present prices of lead are artificial and unstable, and at present prices they are assuming great chances. The market quotations received from New York, it is alleged by the smelters, are merely nominal figures, and it is impossible to realize at the rates quoted. All offers made by refiners are far below the telegraphic quotations of the East, freight added. This fact, together with the paucity of the market, and the constant danger of a decline, have had the effect of inducing smelters to move very cautiously, and of restricting their purchases of lead ore for some time past. As a consequence, the mines have been worked with a view to the production of dry silver ores, and at present we find a diminished production of lead ores, a scarcity of these ores among the smelters, and an inclination among both mines and smelters to avoid any large production of lead. The result is, that the lead production of Leadville has decreased about 25 per cent during the past few weeks, with no immediate prospects of a restitution of the former yield.

Another feature calculated to retard the lead production of this district is the large percentage of refractory sulphide ores that are reduced at the Leadville smelters. These troublesome ores have greatly reduced the capacity of the Leadville furnaces. The treatment of this class of ore, profitable to the smelters, by reason of the high charges made for reduction, is at the same time quite a loss in the gross production of the smelters. There has been scarcely a time since the advent of this ore in the Leadville market, but one or more furnaces are closed down for the removal of the coating of zinc which, under the best management, will eventually accumulate in a furnace, until its capacity is reduced to a minimum.

Not until a firmer and more reliable lead market is established, and additional roasting stalls for the desulphurization of the refractory ores are provided, can Leadville again hope to reach the enormous production of lead that it made during 1882 ; and 1883 and even with these changes, it is doubtful if equally satisfactory results can be attained.

Spelter.—The market is quiet and dull at 4¼@ 4⅝c. for Common Domestic. We print elsewhere estimates of the production in 1883 and a general review of the situation. England cables £14 15s. for Silesian spelter. A small lot sold in this market this week at 5c.

Antimony.—This metal is firm at 11@11⅛c. for Hallett's and 11⅛@12c. for Cookson's.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Feb. 1.

American Pig.—The market is practically unchanged. A fair quantity of foundry pig is contracting for, and the market is without any signs of weakness. The principal question whether consumption is on a more liberal scale seems to demand a reply in the affirmative. The Glendon and Andover companies have reduced their price for Forge at tidewater from $20 to $19. As this may be interpreted to mean a sign of weakness, it is necessary to state that these two brands have in the past been held above the market for ordinary forge, and that the announcement is merely an approach to it brought about presumably by the falling off in orders due to the strike of the nailers in the East. Both brands are considered better than the ordinary run of forge iron. We quote Foundry, No. 1, $20@$22 ; No. 2, $18.50@ $19.50 ; and Gray Forge, $17.50@$19. Bessemer pig is quiet at $19.50@$20 while 20 per cent spiegel has been selling at $28 ex ship.

There have been no transactions at the Metal Exchange during the week.

Mr. Edward J. Shriver, Secretary of the Meta Exchange, has published the following returns : 216 furnaces, all kinds ; 55 in blast, 161 out of blast.

ALL GRADES.	UNSOLD STOCKS.	
	Dec. 1.	Jan. 1.
Anthracite	18,224	23,122
Bituminous	33,577	34,410
Charcoal	42,014	43,332
Grand total	93,815	100,864

ALL GRADES.	PRODUCTION.	
	In Nov.	In Dec.
Anthracite	19,873	20,781
Bituminous	28,142	28,192
Charcoal	10,282	8,471
Grand total	58,297	57,444

Scotch Pig.—The market is firm and quiet. Arrivals are light, owing to lack of return freights. Glasgow steamers will make only two trips per month in place of four.

We quote ex ship and to arrive: Coltness, $22.50 @$23; Langloan, $22,50; Summerlee, $21.50@$22; Eglinton, $20.50@$21; and Dalmellington, $20.50.

At the Exchange, the following cable quotations were received to-day : Coltness, 57s. 6d. ; Langloan, 54s. 6d. ; Summerlee, 52s. 6d. ; Gartsherrie, 53s. 6d. ; Glengarnock, 52s. 6d. ; Dalmellington, 49s. ; Eglinton, at Ardrossan, 46s. 6d. ; and Warrants, 43s. 3d.

Steel Rails.—During the last days of last week, sales of 30,000 tons of steel rails were made by one party, and since transactions have been limited to small lots. We quote $34 at mill.

Old Material.—The market is quiet. We quote Ts $20.50@$21.

Philadelphia. January 31.

[From our Special Correspondent.]

A better demand for pig-iron is gradually developing, and the feverishness in the market a week or two ago has entirely disappeared under the improving inquiry and more liberal movement. A half-dozen large transactions have just been closed. Several offers for large lots are in hand and will be closed before Saturday. Makers of standard brands are in receipt of offers for 60 days' requirements from founders and mill owners, and prices are firmer all round, though there is no advance in the better grades. Some inquiry has been made for inferior brands, and offers at $17.50 for Forge, but less iron of this quality is moving. No. 1 Foundry averages $20.50 ; No. 2 $19, with occasional transactions at 50 cents on each side.

Foreign Irons.—More inquiry is on the market, and large sized lots will likely be sold within a few days, at lower prices than have yet been named ; $19 is the buyers' price for Bessemer pig, and $23 for Spiegeleisen ; and when business is done, it will be found that prices are not far from those figures, although sellers report rather higher prices, with a good deal of confidence. Very little Scotch iron sold this week, but to-day offers were received for a few hundred tons for local foundry use.

Muck Bars.—A few inquiries are in hand, and offers are made below $32, but little will sell at that.

Blooms.—A few lots of charcoal and anthracite sold at previous figures.

Merchant Iron.—The expected improvement is still hoped for. Mill-owners are obliged to put up with an irregular demand of 5 to 25-ton lots, and the like. Some of the heavy business which was so confidently predicted a month ago could be had at less than current prices. The chances for running double are not very bright as yet.

Nails.—Nail-makers are rather unsettled in their opinion as to the probable course of trade. The possibility of a further suspension in the West is a good point. Eastern makers are closely watching Western nail-cutters, but will not restrict. Prices, $2.40@ $2.55.

Plate and Tank Iron.—The improvement in demand is gradual, and confined to small orders, and only for work in hand. Two or three large consumers of plate are looking around for bargains, but manufacturers can make very little further concession. Less than 2·25c. has been offered for Boat Plate. A good deal will be wanted next month.

Structural Iron.—The schemes for elevated railways are still pushed along, and manufacturers are watching the course of events with interest. Without this demand, the business will be barely sufficient to engage the full capacity of mills. The council committees of this city are hearing opinions on the question of an elevated road here.

Wrought Pipes and Tubes.—A moderate amount of business was placed this week, at card rates.

Sheet-Iron.—The business for thin sheets this week was more active than usual. Most other kinds were neglected. Stocks of galvanized are fair, but inquiry dull. Card rates unchanged on small lots, but heavy concessions would be given on large lots.

Steel Rails.—Quotations are $34@$35. A fair amount of business is being placed, but most of it in small orders. A few brokers have still their heads together to pool their issues and depress prices below present minimum rates.

Old Rails —A couple of thousand tons of old rails could be sold at $22.50@$23, but holders ask $23.50 @$24. Several thousand tons of crop ends would be sold if offers were taken. About $19 is offered.

Pittsburg. January 31.

[From our Special Correspondent.]

No improvement can be reported in prices for iron, the average figures paid during the past week being $17.50@$18 for Gray Forge ; $21 for Bessemer ; $18.50@$20.50 for Foundry ; Steel Rails, $35@$36 asked ; Old Rails, $23.50 ; Merchant Bar, 1·70@ 1·85c., and Nails, $2.40. Several good sales of Forge iron are reported, ranging from 100 to 1000-ton lots, and inquiries indicate that a more active demand will probably be presented next week. Nails are firm, but the demand is dull, as is usual at this season. A meeting of the manufacturers is to take place the second week in February. Merchant iron is in a little better request. Muck bars are not selling. There is very little doing in scrap ; 1000 tons of old rails have sold at $23. The Homestead Steel-Works will probably start up in a short time. Extensive improvements are making in the Lucy furnaces, which when completed will make them the most complete in the country. The Black Diamond Steel-Works are to have a train of the heaviest rolls in the world for rolling steel and iron plates. A pool embracing the entire coke region is now forming, and will control eventually 9700 ovens. The chief object of this pool is to raise the selling price of coke. Several similar attempts have been unsuccessful in the past, but this one seems likely to succeed.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Feb. 1.

Anthracite.

There is some delay in the case of a number of the companies in filling orders for immediate delivery, although the urgency created by the last cold weather has practically passed by. Our coal dealers and consumers have not during the fall and winter bought heavily, and undoubtedly a number of them are occasionally caught when a temporary scarcity relieves the monotony of an overburdened market. Business on the whole is quiet, and buyers have not much confidence. The large sizes are hurt by the competition of bituminous coal, and the growth of the change of manufacturers from large to small sizes for steam purposes.

The demand from the East is very slack.

The trade has learned with regret of the death, after

a brief illness, of Hon. H. E. Packer, President of the Lehigh Valley Railroad, he having filled the office since January, 1883. Mr. Packer, who was only thirty-three years old at the time of his death, was very popular, and took a strong interest in the welfare of Lehigh University.

Mr. Charles Hartshorne, who has before filled the post, will act as president for the present.

Bituminous.

A number of contracts are in the market, and a lively struggle for the business has begun. It is generally conceded that the result will be very low figures indeed; in fact, it is rumored that the price at which the contract already alluded to as having been closed was very low. We quote Clearfield alongside at $3.75@$3.90, and Cumberland $4@$4.25, the market being strongly in buyers' favor.

Philadelphia. January 31.

[From our Special Correspondent.]

Stocks at Port Richmond to-day are 120,000 tons. All sizes of coal are in fair demand, excepting egg, which is more abundant than any other, but even for this size, within a day or two, there has been some additional inquiry. Broken, stove, and chestnut are moving quite freely for both local and line trades, and in addition to this, outside buyers, both from New England and the West, are sending in to know what they can have coal at for February and March. The unusually cold weather throughout the Northwest depleted stocks there a little faster than was counted on by shippers here and dealers there. There was a little wider manufacturing demand than was looked for, hence the stocks are lower, and dealers are preparing to order heavier shipments this month. A very liberal movement is likely to take place at an early day to Western markets. The larger New England buyers decline to place orders at present, and while they are not looking for any further decline in price, they prefer to wait until stocks are needed. Freights to Boston, $1.45 to $1.60. The line trade is taking the entire output, as is shown by the figures of supplies at shipping points. Manufacturing demand will improve this month in Eastern Pennsylvania. Favorable reports continue to come from Southern points. The local domestic and manufacturing demand keeps up, confidence is everywhere felt and expressed by the representatives of the coal interests, and we are probably on the eve of an improving demand for manufacturing requirements. The figures of anthracite production shipped over the Reading road up to last Saturday were 1,374,419 tons, an increase of 221,550 tons over same time last year.

As the time draws nigh for the fixing of rates, a good deal of interest is felt as to what they are to be. Cumberland operators, at least certain ones who may possibly be favored, are in the market, making offers for large lots of coal, and are prowling around among Clearfield customers, making quiet offers with an air of confidence which gives Clearfield operators more or less uneasiness. When Mr. Garrett was asked to-day whether he had fixed prices, he denied that rates had been fixed, but, nevertheless, parties from Baltimore are offering coal in this market, which it is thought they would not offer unless they had some knowledge as to what rates were likely to be. The two roads, the Baltimore & Ohio and the Pennsylvania, will come together at an early day, and fix rates, but possibly not until some few miners who can see where others can not see have captured some trade. The Clearfield men will enter upon this season's trade under some more discouraging surroundings than last year. More territory has been opened up; more cars will be available; competition will be more active, if possible, and, in the absence of any possible agreement, there is nothing to say as to what prices will be. At present, all is black. Some of the larger operators are as hard to deal with as the smaller, and it will be a go-as-you-please race this year all through.

Pittsburg. February 1.

[From our Special Correspondent.]

The opening month of 1884 must pass into history as the dullest that has been experienced for at least ten years, in the history of the coal trade of Pittsburg. The past week has been as dull as its immediate predecessors, and would have been more so but for the continued very cold weather. This created an activity in domestic consumption, which was mainly felt by the yards of the two cities. These being numerous, and including many extensive firms, represent but a small fraction of the consumption in this community of mills and factories. Nevertheless the demand referred to was enough to enliven matters in the railroad pits supplying the yards. These are chiefly located on the Baltimore & Ohio and Pan-Handle roads. Prices were not affected by the increased activity, and remain at 6 cents for lump on the wall. Mill demand is slowly picking up as the season advances. The end of the glass-blowers' strike will bring into the consumptive demand twenty large concerns, whose furnaces take probably 900 tons every twenty-four hours. These furnaces were lighted yesterday, and will so remain until July 1st. It might be said, therefore, that the worst dullness has passed, at least for the railroad trade, and that any change in this trade must be one for the better. Railroad pits are averaging half-time, except on the A. V. Railroad, where the average is lower, owing to the encroachment of natural gas in the mills supplied from coal-works on that road. If this gas would refrain from blowing up workmen semi-occasionally, and from giving out entirely just when most wanted, the coal bills of our largest mills would be wiped out permanently.

On the river, there is absolute inaction and nine inches of ice, which latter is just now causing a good deal of apprehension, owing to a thaw and warm rain. Not a single river pit is in operation to-day, and prices below are such as to discourage river shippers. At Louisville, the continued cold weather has benefited prices very little, sales at 7½c. for Pittsburg lump afloat by the barge being reported. Losses from rising rivers are likely to be the record of the present week, as the ice is very solid and the snow at headwaters from two to three feet deep, with a warm sun at present writing, converting snow and ice into water. Labor troubles in river pits are quiescent for the time being.

In coke, I find no change, except a growing feeling on the part of operators that better times are at hand. What this feeling grows out of I can not say, but it exists, at any rate. As to prices, there is no change, rates remaining at $1@$1.25, Crushed $1.75 per ton, free on board cars at ovens. The demand keeps up to 600 cars per day, possibly 650, and Eastern consumption is steady and slowly gaining.

Buffalo. January 31.

[From our Special Correspondent.]

No change to report in the condition of the anthracite coal trade.

Coke is steady and fairly active.

The intense cold last week and the heavy falls of snow before and since caused considerable trouble to the several coal railroads. The supply of bituminous is good, but with no great surplus. Many cars of coals are unavailable in consequence of being snowed up. Trains were impeded considerably by the weather, and the consequent delay in arrival was somewhat annoying, but what "can not be cured must be endured."

The stock of anthracite is fully adequate to all requirements, and the yards are beginning to fill up in readiness for the opening of navigation, which, from present appearances of the lake, will be late—ice and snow only in view as far as the eye can reach westward.

At the meeting of the Northwestern Pennsylvania producers of bituminous coal, held in New York last week, a resolution was unanimously adopted favoring the reciprocity with Canada in coal and iron ore, and approving the efforts making by the "Association for Reciprocity on Coal and Iron Ore" to secure the necessary action by the governments of the Dominion of Canada and the United States to obtain such result. The articles named should be placed upon the free lists of the two countries, and doubtless beneficial results would follow. A wrong impression prevails, namely, that the movement originated in Canada, when, in fact, it had its origin in the United States.

Mr. Pusey, the Secretary of the Association, is reported to have made the following statement: "We don't ship any iron ore to Canada, for they have no furnaces to work it up. We do ship them large quantities of coal on which they put a duty of sixty cents a ton. During the year ended June 10th, 1883, we exported into Canada 1,570,493 tons of coal, on which the duty amounted to $942,295.80. In the same period, Canada sent into this country only 303,803 tons of coal. Our duty is seventy-five cents a ton, making the amount received by our government $227,102.25. We do not need Canadian coal except perhaps in the New England States, where it is easier to get coal from Nova Scotia than from our own mines. But we do need Canadian iron ore for Bessemer steel. Our supply in this country is limited, and we have been importing from Africa and Spain. We imposed a duty of 75 cents per ton on iron ore. In the period I have mentioned, we imported into this country from Canada 44,625 tons of ore. The duty on this was $33,476.25. They want a market for their ore and coal. We want a market for our coal, and want their ore. Our coal is superior to theirs, and we don't believe that the competition will injure our interests. We expect Congress will provide for the necessary treaty this winter."

I can not find out much news about the inside workings of the proposed pool arrangement on soft coal. The meeting in New York was reported to have agreed upon terms, and details were submitted and approved. Since then, trouble is said to have arisen, and matters are now in an indefinite shape. It is rumored that another meeting is to be held February 8th.

A newspaper paragraph published here states "that the officials of the Rochester & Pittsburg Railroad say that it is improbable that their road will enter the bituminous coal pool, as they are not in shape to close at this time, and they do not believe that any rules would be lived up to if the pool was made."

The New York Central Railroad Company has long wanted coal-trestles at this port. A commission has been appointed to appraise valuable lands, with both lake and canal frontages, for the purposes of the road; and if the property is secured, practically the whole water-front of our harbor will be in the hands of railroad corporations. These lands connect with the Niagara Falls branch as well as the main line of the railroads. In fact, the site selected is the only one left which is available for shipping coal by lake, and doubtless will soon be cleared and covered with the necessary buildings and appliances for the accomplishing of the desired object

The Union Steamboat Company has decided to begin immediately at its works here the construction of a freight propeller to be built entirely of steel. She will be 300 feet over all, 38½ feet beam, and 25 feet depth of hold. She will have a water bottom three feet above the real bottom, which will answer two purposes: first, to prevent sinking in case of accident to the real bottom; and secondly, to enable her to take water ballast if she is not sufficiently loaded.

The Common Council will unite with the Merchants' Exchange in urging upon Congress the great necessity which exists for increased harbor and dock room facilities at this port. For fifteen years, the general government has been constructing the outer breakwater, and comparatively little headway has been made. Last year, no work was done. Portions of the breakwater have already begun wearing away and require extensive repairs. The work should be completed as soon as possible, to accommodate the marine interests of the lakes—and all parties concerned should give the matter their personal attention and see that a sufficient appropriation is secured so that the construction may not be further delayed.

Messrs. G. R. Wilson & Co. have filed four specifications of claims against the Commercial Line of steamers' property for unpaid coal bills.

The Delaware, Lackawanna & Western Railroad Company is endeavoring to purchase several propeller, so that at the opening of navigation it may have a line of its own instead of chartering vessels for freighting and passenger purposes.

Chicago. January 30.

[From our Special Correspondent.]

There has been no improvement in the anthracite market at this point since our last review, the week past having been simply a repetition of the one which preceded it—dull and without any new or interesting features. The buying is all of the hand-to-mouth order, country dealers waiting to the last moment before sending in their orders, and then buying in one and two-car lots. A large shipper ran over his mail orders in the presence of your correspondent to-day, and, without an exception, they were for one-car lots. The country trade is very evidently looking

for lower prices rather than higher, and there is no doubt it is looking in the right direction. With the ample stocks of anthracite in Chicago, Milwaukee, and other distributing centers, and the decidedly slim chance of any "boom" this late in the season, there can be no question but that prices have reached their highest point. On the other hand, it is equally certain that the stocks of country dealers are rapidly diminishing under the present policy of buying only for immediate requirements, and they must come into the market with larger orders very soon. We are speaking now of dealers of the larger class, who pretend to keep up assortments and rarely run the risk of seeing their yards empty of any of the sizes most in demand.

The extreme Northwestern trade, in Minnesota, Dakota, Northern Iowa, etc., has been brisk all along, those districts having experienced continued severe weather since the middle of December.

Receipts of anthracite continue quite large, though not so large now as to cause any uneasiness. There is some complaint of delays in shipment, owing to washouts, but, so far as we can learn, the trouble is not serious. Circular rates, given below, are shaded on all orders, though no more than earlier in the month. We quote :

PER NET TON BY CAR-LOAD.

Grate	$6.29
Egg	6.47
Range	6.74
Chestnut	6.87
Lehigh lump	7.68
Wilkes-Barre lump	6.72
Pittston lump	6.72

The market for bituminous coals is generally flat, there being no activity noticeable save in one or two grades. A moderately active inquiry is reported for Indiana Block, of which there was a surplus last week. Hocking Valley is moving in moderate quantities at about the same prices quoted last week. Prices generally are a shade lower under the light demand and movement. With the starting up of some of our large mills which have been idle during most of the winter, an improvement in this market is looked for. Deliveries on old contracts, interrupted by the shutting down, will be renewed and new contracts will be entered into. The line trade is reported fair. We quote the prices at about the following range :

Erie and Brier Hill	$4.75@$5.00
Pittsburg	3.75@ ...
Indiana Block	3.00@ 3.10
" Slack	1.50@ 1.75
" Nut	1.75@ 2.00
Baltimore & Ohio	@ 3.60
Hocking Valley	@ 3.60
Youghiogheny	4.00@ ....
Wilmington	2.60@ 2.75
Blossburg	@ 4.15
Cumberland Smithing	@ 4.00
Sonman "	@ 4.00
Kinkaid Lump	@ 3.60
Grape Creek	2.30@ ....
Fountain County	@ 2.50
Clinton Lump	@ 2.30
Streator	2.25@ 2.35
Minonk	@ 2.50
Morris	@ 2.50

A fair demand is reported for coke, and the prospect of an improved market with the opening up of operations in some of the large mills which have been idle is good. The tendency of prices is upward, in sympathy with the former feeling in Pittsburg and at the ovens. We quote Connellsville at $5@$5.10 and Crushed Coke at $5.70@$6.

Boston. January 31.

From our Special Correspondent.]

The wholesale coal market in all its branches, at this port, is keeping along steadily. Anthracite trade is in a healthy condition. Sales are still light, because there is still a good supply and very little disposition to buy except as supplies are actually needed. If any thing, there is more freedom shown in buying than before the effects of restriction were at all felt. Retailers seem to have got over growling because there is no ground for an advance, and, as has been said, matters are going along steadily. Representatives of New York houses continue firm at $4.40 for stove and $3.85@$3.95 for broken and egg. The Philadelphia & Reading Company is more willing to meet the market than it was, and is now asking f. o. b. prices of $4.25 and $3.90 for broken and egg. It is not selling much coal, however, and is making no special efforts to do so. Pocket prices are steady at $5.75@$6 for stove coal, with the outside figure asked for small lots, which are chiefly sold at this season. If agents are to be believed, now is the time to buy Shamokin coal. This is claimed to be a superior white ash coal, occupying a position between Franklin and ordinary white ash, and has found considerable favor in this market. The West, however, shows a tendency to outbid the Eastern market on this coal, and the argument is, that it should be bought early before the Western demand sets in, as the supply will not be large. It is worth $4 for egg and $4.35 for stove f. o. b. at Philadelphia. The supply of Lykens Valley coal is small, owing to colliery repairs, and it is firmly held.

There are no new features to the bituminous trade. This is not a very good year to force business of any kind, and contracts will probably not be placed much, if any, before the usual time. No reason now appears why as low rates may not prevail at the usual opening of the season as now. We hear of nothing like a combination or agreement between the rival producing companies. There is nothing doing in provincial coal.

Freights remain low, with rates almost nominal at some ports. The number of captains who have hauled up in disgust at the low freights for this winter season seems to be on the increase. We quote :

New York, $1.10@$1.25 per ton ; Philadelphia, $1.50@$1.60 ; Baltimore, $1.60@$1.70 ; Georgetown, $1.70@$1.75 ; Newport News, $1.65 ; Richmond, $1.70 ; Bay of Fundy, $1.60@$1.65 ; Cape Breton, $2.25.

Retail trade is fairly good, with occasional brisk spots in the business. Prices are firmly held. We look for no change at present. We quote :

White ash, furnace, egg, and nut	$5.75
" " " stove	6.00@6.25
Red ash, egg	6.25
" " " stove	6.50
Lorberry, egg and stove	6.50@6.75
Franklin, egg and stove	7.00
Lehigh, furnace, egg, and stove	6.00@6.25
"	6.00

Cleveland. January 30.

[From our Traveling Correspondent.]

A visit during the past month to Columbus, O., Chicago, Detroit, and Cleveland reveals a very uniform condition with the trade. Local trade has been quite brisk all around, but the larger trade, both as to manufacturers and dealers, has been dull. Still, in spite of the universal complaint from dealers, the statistical reports show a large quantity of coal handled. The districts of which Chicago and Detroit are the distributing points are constantly increasing the number of consumers, yet, notwithstanding this large and steady increase of consumption, there appears to be a larger increase in production and in the number of dealers, and especially in the number of the "cut-throat" style of dealers ; hence margins are foolishly sacrificed to force sales, and the consequence is, that the situation in both Chicago and Detroit is best described in the phrase often heard on the streets among dealers : "The coal business is all cut to nothing." Here there is but little doing except with the local jobbing and retail trade. The latter has been very brisk, and prices have been well maintained. The "Valley" (Cleveland, Akron & Canton) is assuming more and more importance as a factor in the Cleveland local market. The branch to Newburg, which was completed about January 1st, is now putting about 250 tons of coal into Newburg daily, and the road has shipped 1500 cars (20-ton) during this month. I quote prices as follows :

	Retail, delivered.	Wholesale, on track.
Brier Hill	....	$3.00
Massillon	$4.00	2.80@3.00
Palmyra block	4.25	3.10
Pittsburg	3.50@3.75	2.65@2.70
Connotton	3.00@3.50	2.25@2.50
Tuscarawas (Goshen)	3.25	2.40
Salineville	.....	2.40

STATISTICS OF COAL PRODUCTION.

The Transportation of Coke over the Pennsylvania Railroad for the week ended January 26th, and year from January 1st :

Tons of 2000 pounds.	Week.	Year.
Gallitzen & Mountain (Alleghany Region)	2,349	9,267
West Penn. RR	1,285	12,418
Southwest Penn. RR	39,861	147,726
Penn. & Westmoreland Region, Pa. RR.	4,277	15,125
Monongahela, Penn. RR	1,139	5,435
Pittsburg Region, Pa. R. R.	30	47
Snow Shoe (Clearfield Region)	417	1,737
Total	49,358	191,755

The decrease in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 1807 tons, as compared with the corresponding period in 1883.

Comparative statement of the production of anthracite coal for the week ended January 26th, and year from January 1st :

Tons of 2240 lbs.	1884. Week.	1884. Year.	1883. Week.	1883. Year.
Wyoming Region.				
D. & H. Canal Co.	54,610	159,954	43,399	227,424
D. L. & W. RR. Co.	70,934	260,129	58,850	287,952
Penna. Coal Co.	21,821	57,721	13,608	78,116
L. V. RR. Co.	19,402	79,701	....	59,537
P. & N. Y. RR. Co.	2,706	11,624	2,925	12,688
C. RR. of N. J.	*	.....	....	110,399
North & West Br. RR.	14,411	56,242	....	25,381
	183,884	625,371	118,782	801,497
Lehigh Region.				
L. V. RR. Co.	74,077	255,164	55,171	279,080
C. RR. of N. J.	.....	*	....	105,345
S. H. & W. B. RR.	4,007	13,119	....	3,065
	78,084	268,283	55,171	387,490
Schuylkill Region.				
P. & R. RR. Co.	162,291	556,104	70,715	352,243
Shamokin & Lykens Val.	*	*	19,385	71,613
	162,291	556,104	90,100	423,856
Sullivan Region.				
St Line&Sul.RR.Co.	1,392	5,234	1,563	4,908
Total	425,651	1,454,992	265,616	1,617,751
Increase	.....	.....	.....	.....
Decrease	.....	162,759	.....	.....

* 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	1,440,200 tons.
" " " " 1880	1,682,636 "
" " " " 1881	1,462,052 "
" " " " 1882	1,631,357 "

Belvidere-Delaware Railroad Report for the week ended January 26th :

	Week.	Year. 1884.	Year 1883.
Coal for shipment at Coal Port (Trenton)	.....	.....	125
Coal for shipment at South Amboy	9,777	27,526	55,352
Coal for distribution	15,464	52,284	55,304
Coal for company's use	4,030	16,579	11,184
Total	29,271	96,389	121,965
Increase	.....	.....	.....
Decrease	.....	25,576	.....

The Production of Bituminous Coal for the week ended January 26th was as follows :

Tons of 2000 pounds, unless otherwise designated.

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lbs.	35,469	117,997
Barclay Region, Pa.		
Barclay RR., tons of 2240 lbs.	6,002	25,389
Broad Top Region, Pa.		
Huntington & Broad Top RR., of 2240 lbs.	4,644	14,089
East Broad Top	.....	.....
Clearfield Region, Pa.		
Snow Shoe	4,306	16,917
Tyrone and Clearfield	55,302	199,641
Alleghany Region. Pa.		
Gallitzen & Mountain	10,961	40,842
Pittsburg Region, Pa.		
West Penn RR.	8,641	30,659
Southwest Penn. RR.	3,507	11,632
Pennsylvania RR.	6,383	20,877
Westmoreland Region, Pa.		
Pennsylvania RR	19,789	93,139
Monongahela Region, Pa.		
Pennsylvania RR.	3,158	11,163
Total	158,142	582,345

* Reports not received.