

# THE ENGINEERING AND MINING JOURNAL

AND  
**COAL**

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**CONTENTS.**

EDITORIALS :	PAGE.	COAL TRADE NOTES :	PAGE.
The Cincinnati Meeting of the American Institute of Mining Engineers	117	Ohio	128
The Dividend and Non-Dividend Paying Mines Listed at the Exchange	117	Pennsylvania	128
The Bilbao Iron Mines	117		
The Future of Bituminous Coal in the East	117	<b>GENERAL MINING NEWS :</b>	
		Arizona	128
<b>CORRESPONDENCE :</b>		California	128
Charles L. Strong	118	Canada	128
		Colorado	128
<b>Composition and Fuel Value of Pennsylvania Anthracites</b>	119	Dakota	129
<b>The Treatment of Complex Ores</b>	121	Georgia	129
<b>Prof. Charles A. Smith</b>	122	Mexico	129
<b>The Snow Water-Wheel Governor</b>	123	Michigan	129
<b>The Smelting-Works at Freiberg</b>	123	Montana	129
<b>Analysis of Japanese Bronzes</b>	125	Nevada	129
<b>Non-Dividend-Paying Mines</b>	125	New Jersey	129
<b>Dividend-Paying Mines</b>	126	North Carolina	129
<b>The Relative Economy of Gas, Steam, and Hot-Air Engines</b>	126	Pennsylvania	129
<b>Coal in Illinois in 1883</b>	126	Utah	130
<b>Furnace, Mill, and Factory</b>	127	Vermont	130
<b>Labor and Wages</b>	127	Wyoming	130
<b>Railroad News</b>	127	Annual Financial Statements	130
		<b>FINANCIAL :</b>	
<b>NOTES :</b>		Gold and Silver Stocks	131
<b>The Value of the Ratio of the Circumference of a Circle to its Diameter</b>	121	Copper Stocks	131
<b>Novel Thermometer</b>	123	<b>BULLION MARKET</b>	132
<b>Production of Gold</b>	125	<b>METALS</b>	132
		<b>IRON MARKET REVIEW</b>	132
<b>COAL TRADE NOTES :</b>		<b>COAL TRADE REVIEW :</b>	
Indiana	128	New York	134
Iowa	128	Philadelphia	134
Maryland	128	Buffalo	135
Massachusetts	128	Boston	135
New Mexico	128	Cleveland	135
		Statistics of Coal Production	135
		<b>Advertisers' Index</b>	xii

THE mining engineers have been watching the reports from Cincinnati with anxious interest. Slowly, day by day, the water has been creeping higher and higher, instead of showing signs that the crisis has been passed, until to-day come assurances that the flood has reached its highest point. Were it not for the encouraging letters and dispatches of the local committee, many would have lost heart; but the gentlemen in Cincinnati write in a tone that is irresistibly cheery under the circumstances; and we feel convinced that those who had once made up their mind to attend the meeting are going to the flooded city, in spite of the fact that they will meet under the blaze of kerosene lamps.

FOR the convenience of those who take an active interest in mining stock operations, we print elsewhere our usual summary of the transactions in dividend and non-dividend-paying mines listed at the Exchange during the year 1883. The record is certainly not a gratifying one, and represents a shrinkage in values that is very serious. The purifying process through which the mining interests have passed during

the past few years may now be looked upon as having thoroughly accomplished its work, and there are many encouraging signs now that, severe as the treatment has been, it has left the germs of new life untouched. The recovery will probably be complete, and we may look forward to years of legitimate, substantial growth and striking successes. Fortunately, it will be years before the past is forgotten.

THE Bilbao iron mines have not done so well in 1883 as in 1882, as was to be expected. The following figures will show the character of the export movement from that district:

	Tons.
To Great Britain	2,312,210
Holland, chiefly transit to Germany	454,463
France	461,943
Belgium	141,918
Corsica	1,476
United States	6,224
	3,378,234

This shows a falling off, as compared with the shipments of the year 1882, of 314,308 tons. In Great Britain, Wales took 1,269,316 tons, the Cleveland District 680,146 tons, and Scotland 347,756 tons.

**THE FUTURE OF BITUMINOUS COAL IN THE EAST.**

The time has come when every user of steam within reasonable access of tide-water or rail markets of coal should face the question whether or not it is wise to make such alterations in his boilers as to fit them for the use of bituminous coal. Until now, the great bulk of the consumption of coal for raising steam in mills and factories in the Eastern and Middle States has turned to anthracite. The manifest destiny of this trade was, as we predicted years ago that it would be, turned over to other hands than those which have held it so long. Anthracite is too precious a fuel for household purposes to be dumped into blast-furnaces, or be shoveled on to the grates of boilers. Until recently, however, the field of anthracite was little touched because of the high prices of bituminous coal. That obstacle is now being removed, and it is a question well worthy of frank discussion whether the decrease in the difference of prices between anthracite and bituminous coal is likely to continue favorable to the latter. Ten years ago, the Cumberland region and the company controlling its outlet by rail to tide-water, the Baltimore & Ohio Railroad, had no competitor. Overrating its capacity to crush any rival, it allowed the Clearfield operators, with their powerful ally, the Pennsylvania Railroad, to gain a foothold. Year after year, the younger competitor gained in strength, sweeping the market more and more thoroughly by concessions which the backing of their carrier enabled them to make. In 1883, some effort was made to bring about an understanding between the Pennsylvania and Baltimore & Ohio railroads, to maintain the rates ostensibly agreed upon and to abolish private drawbacks. It failed, and before a number of the Cumberland shippers had succeeded in convincing their carrier of the gravity of the situation, their rivals had secured most of the heavy contracts. It appears that, though slow to comprehend it, the managers of the Baltimore & Ohio Railroad have been taught a lesson. Recent developments prove that they have followed the example of their competitors. They must have given their shippers of coal from the Cumberland region ample assurances of support in their efforts to secure a reasonable share of the business this year, because there is no doubt that Cumberland coal has been offered at \$2.50 per ton, f. o. b. at Baltimore, equivalent to \$3.75 in this city, \$3.90 at Boston, and \$3.80 at Sound ports. These figures, of course, are for contract lots, and it is useless to say that they are met by the Clearfield operators. They prove beyond a doubt that the published tariff rates on coal from Cumberland to Baltimore are nominal. It is a fact which railroad managers appear ready to admit that, under ordinary conditions and with a heavy traffic, a rate of three quarters of one cent per ton per mile will leave a very handsome profit for hauling coal. With Cumberland coal selling at \$2.50 at Baltimore, the carrier can certainly reap a very large profit, and leave a satisfactory margin to mining companies not burdened with an excessive indebtedness. The same is true of producers and carriers of Clearfield coal, provided the railroads are willing to make a reasonable adjustment.

At the current low figures, the coal and railroad interests can live, and some of them even thrive. The future will, of course, depend upon the action of the railroads. They may reach the conclusion that they would rather double their profit per ton and carry less coal by combining to ask higher rates. We do not believe that such a course is probable, and we doubt its wisdom. They are not now as absolute masters of the situation as they were only a year or two ago. New lines are entering their preserves and new competitors are appearing at tide-water. The decline in freight rates, which in reality is almost entirely the cause of the falling off in the prices of bituminous coal on the Atlantic seaboard, is therefore likely to be permanent. The effect will be, we believe, one of great benefit to the mining companies and operators, notably in the Cumberland field. Already we have occasion to note

almost weekly signs of the capture of new territory. And if consumers gain the conviction that there is no probability of a rise in prices above their means, they will begin generally to look with favor upon bituminous coal as a steam-making fuel. We feel convinced that they can be assured on this point. It is likely that the expected increase in the demand will stiffen prices somewhat later in the season, but even the most sanguine do not look for a rise of more than twenty-five cents per ton.

Unfortunately, we do not possess any accurate data on the comparative value for steam purposes of anthracite as compared with bituminous coal, but even sellers of anthracite are ready to concede that good Cumberland will convert ten per cent more of water into steam than anthracite, pound for pound. When the latter is selling at 25 to 30 cents per ton less than bituminous coal, it will not be advantageous to use it, other things being equal.

There is one point which will tell much against soft coal, namely, smoke. In some industries, this nuisance is so much feared that manufacturers will not have it at any price. We believe that this objection is generally overestimated. With a properly designed boiler setting, smoke need not be much feared.

We look forward, therefore, to a heavy increase in the demand for bituminous coal this year. Temporarily, this may embarrass the anthracite companies, and they will be forced more and more to devote their attention to marketing their output in the form of domestic sizes. This will cause a greater breaker waste; but on the other hand, the multiplication of transportation facilities and the extension of their markets westward will more than compensate for a loss of business which, at best, they could not hope to hold in the long run.

#### CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Charles L. Strong,\*

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Mr. Charles L. Strong, whose death occurred under such distressingly sad circumstances last February, was a pioneer in American mining, and his life affords some great lessons from which all can well profit. He was a victim of the American monster, "overwork." Although born in Vermont, Mr. Strong was a member of the Northampton, Massachusetts, family, which has, during two hundred years, given so many distinguished men to our country.† He was elder and only brother of the late Major-General George C. Strong.

Mr. Strong went early to New York City, where for some eight years he was employed in a mercantile house. His unusual abilities and faithfulness won for him a first position and many friends outside of his business circle. His evenings were devoted to study, repairing the loss, keenly felt, of a collegiate course, which the death of his father had made impossible. His only recreation was an evening now and then at the opera or concert-room, where he drank in the delights of music, which to him was more than all other pleasures. In 1850, he was solicited by a Wall street financier to go to San Francisco and establish a bank. Here also he was no less highly esteemed. His memory was something wonderful, and he trusted it to a degree which would be far beyond the capacity of most men. An exemplification of this occurred at the time of the great fire of 1851. The bank building, supposed to be fire-proof, was destroyed, and Mr. Strong severely burned in vain endeavors to save the property. After six weeks' confinement from the effects of his injuries, he was able to settle every account of the institution from memory. Cases were contested in court, but in every instance his settlements were upheld. A few years later he was the partner and California manager of a large book and publishing house, Lecount & Strong, publishing the first California magazine, *The Pioneer*, as early as 1855. He erected for this business the first four-story building on the Pacific coast, and also manufactured on the premises, for its use, the bricks and most of the building materials were imported. The inside finishings were of mahogany, and it stands to-day one of the most substantial buildings in San Francisco. After withdrawing from the book business, his next pioneering was among the salmon fisheries at Puget Sound, spending quite a fortune in hunting for codfish and erecting stone warehouses, placing on a sure footing a business which is one of the great industries of the coast.

Mr. Strong was closely identified with the growth and development of San Francisco in those early years, assisting in the erection of churches, hospitals, etc. The great difficulty encountered in those days may be understood when one reflects that few people came to California with any thought beyond making money and returning East to spend the remainder of their days; so that all efforts at permanency of settlement were resisted; but Mr. Strong seems to have been one to realize that the foundation of a great State was laying.

While his abilities secured him a leading position in business circles, no less were his eminent social qualities recognized in social circles. An exceedingly handsome man, tall, with fine physique and commanding presence, he was fitted to fill the place he occupied in the minds and hearts of men. Those who knew him in the zenith of his power speak with warmth of his generous heart, and almost tenderly when they call him by the old-time familiar name "Charlie Strong." Although he made

money readily and was looked upon as a wealthy man, he never amassed a great fortune. Money was to him a means of doing good and giving pleasure, and he spent it with princely generosity.

Outside of his mercantile accomplishments, he had a fund of general information, and having been always fond of practical and scientific pursuits, it is not a matter of surprise that he was attracted to the field where the great work of the new West, mining, was yet in its incipency. Going as a visitor to see what there was in the recent silver discoveries in "Washoe," he remained to develop through the powers of his mind one of the great enterprises of the world. We find him in 1860 superintendent of the Gould & Curry Mining Company, at Virginia City, which reached, under his management, the foremost place among the celebrated mines of the world. At this time, there was no better known man in that busy field which had so much to do in making mining in the United States what it is to-day.

The Comstock is too often thought of only as the origin of illegitimate mining speculation; but if all had been as careful of intrusted interests as was this pioneer, many who now are poor and owe their financial ruin to the mining fever of Nevada, would to-day be the possessors of an easy competency. It was not the same thing to be the superintendent of a mining enterprise then that it is now. The business was new technically; educated men were few, mining appliances were crude, and one could not order any thing from a windlass to a stamp-mill at short notice from large firms making the manufacture of mining machinery a specialty. Litigations were frequent, and great questions which have since been settled by legislation had not then come up. Such bodies of ore as were found in the Gould & Curry at about the 300 to 400-foot level had never been known, and required new methods of mining and much more extensive arrangements for exploration and treatment than had hitherto been employed. Think of ore-bodies more than 70 feet wide, while one company extracted from 500 to 700 tons of rich silver ore a day. The Ophir had taken out some fine ore; but the first great bonanza on the Comstock was the Gould & Curry, which yielded upward of \$11,000,000. It astonished every one, and brought people from all parts of the world to Virginia City. It made subsequent extensive mining schemes possible, which, like all other worldly success, has good as well as bad sides. The company's reduction-works were completed early in 1863, and enlarged during the same year. Mr. Strong's splendid health began to show signs of giving way. At times, he had 1000 men under him, never using a note-book to assist his memory, carrying every detail in his mind, and possessed of such energy that he relied too little on subordinates to carry out his directions, but would himself do more than any man ought to attempt. Busy with his outside work all day, he would go to his office at night to attend to his correspondence, and, until the last year, his books also, writing far into the night, yet rising usually at five o'clock in the morning.

When the Gould & Curry had seven or eight different mills treating its ores, located at long distances from each other, from the mine, and the company's works, it was no small matter to visit these daily. Possessed of the Vermonter's love of a good horse, Mr. Strong usually owned several. His control over animals and steady nerve made him a skillful horseman. Driving rapidly from one mill to another, at a great saving of time, and frequently taking a party four-in-hand, he would make his Eastern visitors stare as he dashed over the steep grades or around sharp curves with such wonderful dexterity that he always avoided accidents. Those disposed to criticize refused to see in this a slight recreation for an overworked man, and stigmatized as extravagant what was a great saving of time. The duties of entertaining strangers and visitors (who came usually with letters from the directors) were strictly attended to. A man of such marked character must of course have made some enemies. The severest charge they made was one of extravagance. As there was much to show for his expenditure, it was evident to his critics that large sums were wasted, while the money that was spent by him was taken from the mine as the works progressed. Those were flush days in the Comstock, and a certain liberality was consistent with the times. The Gould & Curry mill *did* cost more than a forty-stamp would cost now, and its arrangements were not perfect; but we must not forget that those were the days which developed the Washoe process. Starting with Mexican appliances, the result was a California silver mill differing little from that used to-day. To appreciate this leap in metallurgical methods, and the ingenuity and inventive skill called forth, one requires to see the treatment in a Mexican patio, and then compare it with the present admirable silver mill process. Mr. Strong's constant geniality, his quick perception and good judgment, were traits that made it possible for one man to direct such a great undertaking and keep all working smoothly and harmoniously. No one can say that Mr. Strong's cheery salutation did not make his work seem lighter or prepare him for renewed exertion. We have heard foremen say that Mr. Strong could give them more help as he stood upon the carriage, and gave a few hasty directions without even alighting, than other superintendents could in half a day. His strong will and sense of justice, with a certain magnetic influence, made him control men easily. They carried out his wishes and directions with almost a feeling of pleasure or readiness to serve one whom they knew to be their friend. Ever ready to devote time, talents, and money in good works, we find him, during the press of business in 1862, building St. Paul's church, Virginia City, the first Episcopal church in Nevada, advancing the money and personally superintending its construction. Here, as elsewhere, he was patron of music and musicians, assisting many through dark days of struggle.

The Gould & Curry Company, of course, claimed all the ledge embraced within their end-lines, and upheld their right to every thing under their outcrop. The unparalleled width of the lode and the numerous spurs and stringers gave rise to many attempts to secure part of the great wealth of the company's property; and just here was shown Mr. Strong's sagacity in advising the company not to enter into lawsuits with outsiders working on the spurs of their lode; but, on the other hand, to do such work as to show to every intelligent miner the right to his own ground. This was done by pushing mining work very actively from the main ore-body, and by following this mineral deposit to reach his opponents' ground. This simple energy secured the Gould & Curry property and saved many a dollar. Many would do well to follow his example and avoid as far as possible being the aggressors. It is best to maintain one's own right by clear evidence rather than by seeking quarrels. In this

\* The writer regrets his inability to give closer dates or absolute statements, as he is obliged to rely wholly on memory; but he has felt it almost a duty to state what little he knows; and if it should be the means of bringing forth further details of a life so worthy of being held up as an example until overwork destroyed it, the effort will not have been in vain.

† A history of the Strong Family was compiled by Professor Dwight some years ago.

and other instances, Mr. Strong showed his tact, and often prevented, or if not, successfully defended, litigations. It was a firm principle not to go to law unless compelled to do so, as he preferred to be the well prepared defendant rather than the plaintiff.

Mr. Strong's reputation here was by no means confined to mining circles. He was a friend of all, and was recognized as a power in the community. When Nevada was made a State, he was urged to accept the nomination for first governor; but as the duty would have been in addition to his work with the Gould & Curry Company, he felt obliged to decline the honor. Later, his many friends tried to make him United States Senator, but this he also declined.

It is not to be wondered at that overwork proved too much for him who was loth to believe that he could cause himself any permanent injury through work that was no effort to perform and in which he was so delighted. Early in 1864 he was obliged to leave it. After a short rest, the directors urged his taking the presidency of the company in San Francisco, with lighter duties. His health was broken, and he realized the impossibility of further attending to business for a time. The company, with regret, was obliged to accept his resignation, but as a slight token of their appreciation of his services, voted him one year's extra salary. How many were his opportunities to enrich himself any one familiar with mining, and particularly with Virginia City ways, must know; but the subject of our sketch would rather have died in poverty than have taken the least undue advantage of his position. His private means he kept outside of the business where his splendid talents enriched others. His interest was always with legitimate mining. Stock operations he looked upon with disfavor. It is sad that his health broke down when it did, so that he was debarred from taking his share in the wonderful developments on the Comstock a few years later—laurels which his friends would have been more than glad to see him wear. His nervous system had been overtaxed, yet his physicians hoped that absolute rest from business, change of scene, etc., with the aid of his remarkable constitution, would allow him to escape the great danger of paralysis, or softening of the brain, that seemed to threaten him. He spent a few years in travel, after which, by urgent advice of his physicians, he devoted several years to farming and orange planting on a ranch which he purchased in Los Angeles County, California. Greatly improved in health, the quiet life became irksome, and we find him with renewed vigor again giving his attention to mining operations. To all intents and purposes, he was a well man; but the strain he had been through showed itself during the remainder of his life. The constant pain in the head, and occasionally nervous chills, proved that the enemy was only at bay. During the last nine years of his life, he developed several mines, and erected several mills—two in California, one in Arizona, and two in Nevada—and seemed to all a man of uncommon strength and ability. The writer had the pleasure of knowing him somewhat intimately at Galena, Nevada, when every effort was made by Mr. Strong to re-discover valuable ore in the White & Shiloh property, now owned by the Aetna Mining Company. Every economy was practiced, and almost incredible work was performed by Mr. Strong. He did his own book-keeping, and, at times, assaying, surveying, and chemical work, besides the general duties that usually fall to the lot of a superintendent. He personally visited every part of his mine daily, ran a lixiviation mill at times without a fireman, and in every way saved every cent he could for his company. It is a harder thing to be the unfortunate director of unsuccessful operations than to conduct more extensive profitable enterprises; and this Mr. Strong felt. Surely, it was no fault of his that his company did not pay dividends. He worked harder than others who returned large profits to their employers. It was his misfortune, but not his fault, and we may yet see the labors he started crowned with success. From Galena, Mr. Strong went to Eureka, to superintend the Geddes & Bertrand mill and the erection of the new lixiviation mill. After completing the works, but before one year had expired, having again overtaxed himself keeping up such hours as from five A.M. to two P.M., in close attention to his duties, he was forced to resign his position and return to his home in Oakland, California, for a few months of much needed rest. Warned often by his physician that he would again lose his health, he failed to realize that there was a limit to his physical endurance. His great will power made it possible for him to throw off pain and perform a stated task in a way that deceived him as to the actual danger of his condition. In September, 1882, he invested his own money with that of some friends in a gold mine at Auburn. He proceeded to erect a mill and develop the property, looking forward to its successful completion, when he could devote time to the restoration of his health. There were the usual delays in the construction of the works, extra duties to perform—what had been so easy before was now accomplished with effort. Just after the mill was started, meeting with some perplexing disappointments and reverses, the thought that his friends had money with him caused him far more trouble than any personal loss—increased bodily suffering, insomnia and loss of appetite combined to wreck a life that had been almost unique in its power, and the sad, untimely end followed.

A kinder, gentler man never lived. His memory, clear as crystal on most points, his character, splendidly rounded, yet disease had planted her fetters where had been his greatest strength. Although the diseased brain was worked to the death, the intellect and business faculties seem to have been true to the point where self-control was lost. The news of his death swept like wildfire through San Francisco, and was received with deep grief. Poor fellow! Those who knew him best know that he now lives where disease never comes. A man more tender and true in all family relations could not be found, and one thinks with sadness of that desolate circle which it seemed as if he might long enliven with his loving presence. The sad cause of all this distress was overwork, over-devotion to his business, and a nervous sensibility that made him worry too much over what he could not help—too much thought for others, too little appreciative of his duty to self. Without that greatest of earthly boons, health, what can be accomplished in life? It is necessary to regard our bodily requirements, not to forget that we owe a duty to ourselves, to our friends, and to our employers by maintaining our present abilities at their highest acuteness. Money-making and renown are not all we should live for; rest is necessary, too, and without health

what will our accumulations be to us? Yet no one could read a page in Charles Lyman Strong's life and take any encouragement toward laziness and inertia. Duty and fidelity were preëminently shown in all his actions.

HELENA GOLD MINE, LAS DELICIAS,  
SONORA, MEXICO.

E. E. OLCOTT.

#### COMPOSITION AND FUEL VALUE OF PENNSYLVANIA ANTHRACITES.\*

By Charles A. Ashburner, Geologist in Charge Survey Pennsylvania Anthracite Fields.

Since the Survey has commenced its examination in the Anthracite Fields, numerous requests have been made for chemical analyses of the different coals; not so much to show the mineralogical characteristics of the bed, as the fuel constituents of their commercial product. On account of the limited appropriation to provide for the anthracite work, it has been impossible, at the outset, to undertake an investigation of all the problems, both of a practical and scientific character, which have suggested themselves, and which it will be necessary to consider, in order to render the Survey complete, and its results of the greatest value.

One of the questions which is beset with the gravest difficulties is that of the mineralogical and chemical study of the anthracite coals. This has to do with the origin of our Pennsylvania anthracite, which is still an open question. Although we have many facts to indicate its probable answer, I feel that it will be necessary for a very careful mineralogical and chemical investigation to be made before we can with any assurance approximate to a final solution. The chemical investigations of Mr. J. W. Thomas, Dr. Ernest Von Meyer, and Marsily, of the characteristics of British and European coals, have thrown much light upon the questions of the formation of coal, the influence of the atmosphere upon its deterioration, and the character of the gases evolved from the coal in the mines. Such investigations are of interest and value as aids in determining the deterioration of market coal when subjected to atmospheric influences under varying conditions, and the proper and most economical ventilation of the mines, either to dilute or entirely remove the gases which affect not only the health of miners in the inhalation of slightly impure air, but their safety in the prevention of explosions.

The analyses of American chemists of many of our anthracite coals show the liability of the coal-beds, or portions of them, to change their constitution and character within very short intervals. This feature has been more prominently demonstrated by the analyses of Dr. Charles M. Cresson, made for the Philadelphia & Reading Railroad Company.

The governmental researches of Professor Johnson, made in 1843, and those made a little over a year ago by Quartermaster-General M. C. Meigs, U.S.A., prove wide differences in the effective fuel value of many of the Pennsylvania anthracites, and clearly indicate the economy in the purchase of special coals; although at the present time the coal trade makes no reliable distinction between the coals which are shown to have such different evaporate capacities. The tests of Scheurer-Kestner, and C. Meunier-Dollfus, reported to the Société Industrielle de Mulhouse, and those of William Kent, of Pittsburg, are claimed by Mr. Kent to show that theoretical estimates of calorific power, based upon ultimate chemical analysis, might sometimes vary as much as 15 per cent from the results obtained by a direct calorimetric trial; but the estimate based upon analysis was always the lower of the two. It is also noticeable that generally the greater the percentage of oxygen in the coal, the greater the difference between the experimental and calculated results. Mr. Kent claims that chemical analysis, and especially the ultimate analysis for total carbon, hydrogen, oxygen, and nitrogen, is a valuable guide to the steaming power of coal when properly burned; although the results of the tests of both Professor Johnson and General Meigs indicate a directly opposite conclusion.

These references certainly show the necessity for the Survey making a thorough investigation as to the constitution of coal contained in the anthracite beds. What would be the best plan to be pursued can not yet be determined, nor was it intended that the Survey should enter upon these problems at all, until the purely mapping and geological work in the region had progressed further than at present.

The consumers of American coals are beginning to realize the fact that the value of a coal, as an effective fuel, under varying conditions of consumption, is not solely dependent upon its physical characteristics or the locality from whence the coal is obtained.†

#### CHEMICAL ANALYSES OF PENNSYLVANIA ANTHRACITE.

During the past year, demands have been made for chemical analyses of market coals, showing the proportion of fixed carbon, volatile matter, water, sulphur, phosphorus, and ash; and although such analyses are probably among the least important which should be made, it was deemed advisable in the case of the coals of the Lehigh Coal and Navigation Company, mined from the Panther Creek Valley, where the purely geological and mining work of the Survey had been completed, that such market specimens should be collected and analyzed. These analyses are contained in Chapter VII. of this report, where special reference is made to them.

After the proof of this report had all been corrected and the index placed in the State Printer's hands for publication, a special request was

\* From proof-sheets of the First Report of Progress of the Anthracite Survey.

† A prominent anthracite operator related to me an incident which illustrates the prejudices of the trade in regard to the values of coals. This gentleman was operating a colliery in the Shamokin region, and had connection with his colliery with both the Philadelphia & Reading Railroad, which transported its coal down the Schuylkill Valley, and the Lehigh Valley Railroad, which shipped its coal to market down the Lehigh River. A contract was made for regular shipments of coal from his colliery over the Lehigh Valley Railroad at a time when there was a discrimination of 50 cents between the Lehigh and Schuylkill coals in favor of the Lehigh; the coal trade generally understanding that Lehigh coal was coal shipped over the Lehigh Valley Railroad, and Schuylkill coal that shipped over the Philadelphia & Reading Railroad. The Lehigh Valley lateral which took his coal to the main line of the road had to be closed for some days for repairs, and he was compelled, in consequence, to fill his orders by shipment over the Philadelphia & Reading Railroad. But a few days had elapsed before his consignee complained of receiving a very inferior Schuylkill coal, instead of the superior Lehigh coal which he had formerly received. He was forced to make a rebate of 50 cents a ton on the coal which he had temporarily shipped over the Philadelphia & Reading Railroad.

It is gratifying to know that, among the more intelligent consumers, no difference is recognized between the coal transported through the Lehigh Valley and that through the Schuylkill Valley. In fact, several favorite brands of coal which can not be excelled are now shipped almost entirely down the Schuylkill Valley.



coal mined from both beds passes through one breaker and is mixed before being shipped to market. It is estimated that the colliery is at present shipping daily one fourth of its coal from the Mammoth bed and three fourths from the Wharton bed. The Mammoth coal which is taken from the strippings is considered by the operators to be very poor coal. The specimen of Wharton (specimen No. 6) coal was sampled from 6 mine cars from colliery No. 1, and from 4 mine cars from colliery No. 2. The specimen from the Mammoth bed (specimen No. 7) was sampled from 4 mine cars from colliery No. 2 and from 4 mine cars from the stripping.

*Specimens Nos. 8 and 9.*

Collected from Spring Mountain colliery No. 4, at Jeansville, in the Beaver Meadow basin, Luzerne County, Eastern Middle Coal-Field, October 8th, by Assistant Winslow, assisted by Mr. William McFarlane, breaker-boss. J. C. Haydon & Co., operators.

Both the Mammoth and Wharton coal-beds are mined at this colliery, about four fifths of the daily shipment being mined from the Wharton bed and one fifth from the Mammoth bed. The coals are not shipped to market separately, however, but are mixed in the market cars. The Wharton coal mined at colliery No. 1 is considered to be a harder and better coal than that mined from the same bed at colliery No. 4. The Mammoth coal (specimen No. 8) was sampled from 5 mine cars at breaker No. 4, and in addition 3 lumps were taken from a heap at the blacksmith's shop. The Wharton coal (specimen No. 9) was sampled from 10 mine cars at the same breaker.

*Specimens Nos. 10 and 11.*

Collected from Spring Brook colliery No. 5, at Yorktown, in the Beaver Meadow basin, Carbon County, Eastern Middle Coal-Field, October 9th, by Assistant Winslow, assisted by Stephen Cann, mine-boss. George H. Myers & Co., operators.

Both the Mammoth and Wharton beds are mined at this colliery, the Mammoth bed producing about three fourths and the Wharton bed about one fourth of the daily shipment. About half of the Mammoth coal is at present taken from the inside workings, and the other half from the strippings, the latter coal being considered the poorer. All the Wharton coal is mined under cover. The Mammoth coal (specimen No. 10) was sampled from 5 mine cars from the stripping workings and 3 mine cars from the covered workings, about an equal amount of coal being taken from each place. The Wharton coal (specimen No. 11) was sampled from 6 mine cars.

*Specimens Nos. 12, 13, and 14.*

Collected from St. Nicholas colliery, at St. Nicholas, Schuylkill County, Western Middle Coal-Field, October 15th, by Assistants Wells and Winslow, assisted by Mr. William Sauerbrey, outside boss. Philadelphia & Reading Coal and Iron Company, operators.

The middle and bottom splits of the Mammoth coal-bed, and the Buck Mountain coal-bed, are worked at this colliery. At present, there are mined daily about two thirds of the shipments from the Buck Mountain bed, about one sixth from the middle split of the Mammoth, and about one sixth from the bottom split of the Mammoth. The middle split Mammoth coal (specimen No. 12) was sampled from 8 mine cars; the bottom split Mammoth coal (specimen No. 13) from 4 mine cars from the drift level, and the Buck Mountain coal (specimen No. 14) from 10 mine cars.

*Specimens Nos. 15 and 16.*

Collected from Gilberton colliery, at Gilberton, Schuylkill County, Western Middle Coal-Field, October 13th, by Assistants Wells and Winslow, assisted by John W. Howell, inside mine-boss. Philadelphia & Reading Coal and Iron Company, operators.

At this colliery, the Buck Mountain and the Seven-Foot coal-beds are mined, the better coal being considered to come from the former bed. The coal from the Seven-Foot bed is shelly. About two thirds of the daily shipment is mined from the Buck Mountain bed and one third from the Seven-Foot bed. The Seven-Foot coal (specimen No. 15) was sampled from 10 mine cars, and the Buck Mountain coal (specimen No. 16) from 6 mine cars.

*Specimens Nos. 17 and 18.*

Collected from Draper colliery, at Gilberton, Schuylkill County, Western Middle Coal-Field, October 15th, by Assistants Wells and Winslow. Draper Coal Company, operators.

At this colliery, the Mammoth and Primrose beds are the principal ones mined; about two thirds of the daily shipment is mined from the Mammoth bed, two-ninths from the Primrose bed, and one ninth from the Holmes and Buck Mountain beds combined. As the Mammoth and Primrose beds supply the principal product of this colliery, they alone were sampled, the specimen from the former (specimen No. 17) being supplied from 8 mine cars, and that from the latter bed (specimen No. 18) from 7 mine cars.

(TO BE CONTINUED.)

THE VALUE OF THE RATIO OF THE CIRCUMFERENCE OF A CIRCLE TO ITS DIAMETER.—For the benefit of the curious, as well as those who wish to be very precise in their calculations, the *Locomotive* inserts a close approximation of the value of the ratio of the circumference of a circle to its diameter. The approximation has been carried to 600 places of decimals, but the value given below will be found sufficiently accurate for most practical purposes. The value of  $\pi$ , generally taken at 3.1416, when extended to 207 decimal places becomes 3.14159265358979323846264338327950288419716939937510582097494459230781640628620899862803482534271706798214808651328230664709384460955058223172535940812848473781392038633302157473996003259312591294018328065174. If any one is captious and wishes a still greater degree of accuracy, he may get it down as fine as he pleases by means of the following formula, if he has time:

$$= 4 \left( \frac{2 \times 4 \times 4 \times 6 \times 6 \times 8 \times 8 \times 10 \times 10 \times 12 \times 12 \times 14 \times 14 \times 16 \times 16}{3 \times 3 \times 5 \times 5 \times 7 \times 7 \times 9 \times 9 \times 11 \times 11 \times 13 \times 13 \times 15 \times 15 \times 17} \text{ etc.} \right)$$

using the even numbers for the numerator and the odd numbers for the denominator.

THE TREATMENT OF COMPLEX ORES.\*

By J. W. Chenhall.

The treatment of complex ores and the condensation of lead fumes have been for many years important problems in metallurgy, and the author wishes to premise that it is his intention to deal with the same only so far as his own personal experience extends. Complex ores belong to that class which, containing two or more minerals, can not be separated by mechanical means (dressing), or by any of the ordinary smelting processes, as pursued in copper smelting, lead smelting, or gold and silver works.

The following are the complete analyses of three varieties of complex ore, also the metallic contents of four others, all of which have been successfully treated by the methods hereafter described:

	Constantine. Per cent.	Cavalo. Per cent.	Bluestone. Per cent.		Copper. Per cent.	Zinc. Per cent.	Lead. Per cent.	Silver. Oz. per ton.
Zinc (as sulphide).....	10.64	13.40	29.28					
Lead.....	4.81	17.14	12.90					
Copper.....	1.35	0.44	0.65					
Silver and gold.....	0.04	0.06	0.03					
Sulphur.....	26.85	15.37	22.14					
Iron.....	19.93	4.98	7.16					
Alumina.....	2.33	1.02	.....					
Magnesia.....	.....	0.22	.....					
Barium sulphate.....	.....	35.04	.....					
Silica.....	26.48	11.19	26.84					
Arsenic.....	0.65	0.13	0.15					
Lime.....	0.60	.....	0.84					
Sulphuric acid.....	3.53	.....	.....					
Antimony.....	0.02	1.01	.....					
Oxygen and loss.....	2.77	.....	1.01					
	100.00	100.00	100.00					
Rio Malagon ore.....	4.5	31.65	18.25					16.75
Lead blende.....	.....	4.75	12.50					14.75
Lead calamine.....	.....	27.00	29.75					18.60
American ore.....	0.2	27.20	12.00					23.20

The foregoing examples will suffice to give a clear idea of the character of the ores referred to. The extraction of the zinc from such ores has often been attempted by means of hydrochloric acid after calcination, with the view of decomposing the chloride of zinc by lime; but the serious difficulty of washing the oxide of zinc free from the chloride of calcium, and obtaining it in a form dense enough for the spelter manufacturer, and also the presence of chlorine in any form being injurious in the subsequent smelting of the residue containing lead and silver, have prevented this method of treatment being successfully followed.

In February, 1877, Mr. Edward Andrew Parnell, of Swansea, took out a patent, No. 820, for improvements in the manufacture of metallic zinc and sulphuric acid, and it has been the development of that patent which has led to the successful treatment of the ores under consideration, the gist of which consists in the dissolving of oxide of zinc from calcined ore by sulphuric acid, and the after-decomposition of the sulphate of zinc by sulphide of zinc or carbon. When heated alone, sulphate of zinc requires a very high temperature to effect its decomposition. Such a method is impracticable on a large scale; but when mixed with a deoxidizing agent sufficient to take one equivalent of oxygen from the sulphate, it is easily decomposed, the product being oxide of zinc and sulphurous acid. A mixture of two equivalents of sulphate of zinc with one equivalent of carbon, heated to dull redness, affords oxide of zinc. (With a large proportion of carbon, sulphide of zinc is produced.) A like decomposition is effected by means of sulphide of zinc, whether native or artificial; but at a considerably higher temperature, three equivalents of sulphate of zinc and one equivalent of sulphide of zinc produce four equivalents of oxide of zinc, and four equivalents of sulphurous acid ( $3ZnSO_4 + ZnS = 4ZnO + 4SO_2$ ). Native zinc-blende is the reducing agent preferred on the large scale for making oxide of zinc suitable for the manufacture of zinc or spelter.

In the treatment of the ores already described, it is found expedient to divide them into two classes, namely, those in the first class, which contain zinc in sufficiently large quantities for its extraction by Mr. Parnell's process, which should be from 15 to 35 per cent of zinc; and those of the second class, which vary from 5 to 15 per cent of zinc. It is proposed here to deal first with the classes of ores rich in zinc, and the poorer ones afterward. The mode of treatment for the ores rich in zinc is, in the first place, to grind it sufficiently fine to pass through a sieve of six or eight holes to the lineal inch. This is accomplished by passing the larger lumps of ore through a Blake's stone-breaker, and from thence through a Cornish crushing-mill, having two series of rolls, the upper ones being fluted on their faces and the lower ones plain.

The next stage is to calcine the ground ore by exposure to air at a moderate heat. This is effected in muffle-furnaces, 46 feet in length by 15 feet in width, outside measurement. The furnace is so constructed that the heated gases from the fire-place pass along above the arch, and then descend at the opposite end of the furnace, traversing the flues under the working-bed twice, before their exit to the chimney-flue; thus the products of combustion travel a distance of about 120 feet before escaping to the chimney. There is no difficulty in keeping this furnace at a uniform heat throughout its whole length, with the consumption of about 13 or 14 tons of coal a week. It is of the utmost importance that the operation should be conducted at a moderate temperature, to allow as much of the sulphide of zinc as possible to be transformed into sulphate of zinc, in order to reduce the consumption of sulphuric acid, in its after treatment; and, further, if the ore be calcined at a very high temperature, the zinc is not so readily dissolved out; silicate of zinc and silicate of lead being formed produce a gelatinous silicate, which impedes the after-washing of the ore and delays the settling of the fine ore in suspension.

The next operation consists in the dissolving of soluble sulphates of zinc and oxide of zinc by sulphuric acid and water, and is conducted in large rotary pans. Their diameter is 10 feet, depth 2 feet, and they are made of cast-iron, lined with sheet-lead  $\frac{3}{8}$ -inch thick, so as to prevent the action of the acid upon the pan. These pans are revolved by spur-gear, fixed on the top of massive frames, between which they are placed. There is also a cross-bar over each pan, to which is attached a number of plows or scrapers, so that when the pans are turned around, the ore is thoroughly mixed with the liquor. The

\* Read before the British Institution of Civil Engineers.

mode of conducting this operation is as follows: Acid liquors, partially saturated from previous working, are run into the pans, to which is added a sufficient quantity of calcined ore to neutralize the whole of the acid present in the liquor. By this means, a liquor is obtained of about 40 degrees Twaddle, or containing about 14 pounds of dry sulphate of zinc per cubic foot. This operation is repeated until about four tons of ore have been put into each pan. Each installment of neutralized liquor is run off into suitable vessels. The ore in the pans now receives an excess of sulphuric acid, to dissolve out the remaining oxide of zinc, and is then further washed with water. These water-washings and the previous strong acid liquor are run into suitable tanks, and are, in fact, the partially saturated liquors before referred to as being neutralized in the first operation in the pans. The liquors from this process are allowed to traverse long shallow settling-troughs before entering the tanks for the final settlement of all suspended particles of ore. In the method just described, the principal part of the zinc in the ore is dissolved, and about two thirds of the copper, but very little of the iron, provided it has been thoroughly oxidized during calcination.

The residues remaining in the revolving pans after the extraction of the zinc, and those that are arrested in the settling-chutes and tanks, contain the whole of the lead and silver, and about one third of the copper in the original ore as delivered to the calciners. In some cases, it has been found that the fine particles of ore separate very slowly from the liquors in the settling-tanks, and separation is further impeded when a gelatinous silica is present; but in the latter case only is recourse had to mechanical filters to surmount the difficulty. The clear liquors containing zinc and copper are now run into suitable tanks, in which the copper is precipitated in the ordinary manner, pursued in the various humid processes for the treatment of copper. The re-agent generally used is scrap-iron, the oxide of iron produced having very little injurious effect upon the retorts in which zinc smelting is conducted. Metallic zinc and sulphureted hydrogen are both suitable for this operation, but the former is cheaper.

The copper precipitate obtained is thoroughly washed with water to free it from sulphate of zinc and from small pieces of undissolved metallic iron. It is then dried and smelted by the usual copper-smelting process.

The zinc-liquor is now conveyed into long evaporating furnaces, in which the heat is applied over the surface, and the evaporation continued until it reaches the strength of 90 degrees Twaddle, or a density of 31 pounds of sulphate of zinc to the cubic foot. It is then run into furnaces of smaller dimensions provided with two cast-iron lips, and fitted with doors to admit of the dry sulphate being removed. The heat in these furnaces is also applied over the surface of the liquor, and the evaporation continued until the sulphate of zinc becomes of the consistency of ordinary mortar. When the evaporation has reached this point, the determined quantity of very finely ground sulphide of zinc (blende) is added, and thoroughly mixed with the semi-dried sulphate. The blende is ground fine enough to pass through a screen having thirty holes to the lineal inch. As soon as the mixing of the blende is effected, the drying of the sulphate mixture is continued in the same furnace, until it has become thick enough to be easily removed. It is then spread, while hot, upon suitable floors, so as to harden thoroughly previous to being operated upon further. It may appear an extravagant mode of evaporating; but it is the simplest and most expeditious method yet introduced to overcome the difficulty in connection with this material. These liquors when boiling act very perceptibly upon either wrought or cast-iron, and in fact, upon any metal other than lead, thus precluding their use. The result of numerous experiments has also disclosed the fact that, if the heat be applied to the bottom of these furnaces instead of over the surface of the liquors, the speedy destruction of the bottoms of the furnaces ensues, arising from the immediate adhesion and instantaneous hardening of the sulphate of zinc.

The next operation is to deal with the dried sulphate of zinc in the production of oxide of zinc, and the formation of sulphurous acid. This operation is carried on in muffle-furnaces, each having four distinct compartments, and each compartment being capable of holding a charge of two tons of the sulphate of zinc mixture. These furnaces are about 30 feet long and 16 feet wide external measurement. Their construction as regards the application of heat, is, in every particular similar to the calcining-furnaces already described. The furnaces having been charged and the moisture driven off, the doors are closed and sealed with clay, and remain so for about twenty-six or twenty-eight hours. The sulphate of zinc during this time is thoroughly decomposed, producing oxide of zinc and sulphurous acid, and the sulphurous acid is conveyed by suitable flues to lead chambers for the manufacture of sulphuric acid in the usual way. In practice, it is customary to use an excess of the deoxidizing agent, and therefore it is necessary that the remaining undecomposed sulphide of zinc should be oxidized by calcination. This is effected in the same furnace by stirring the charge through the doors. The object of dividing the furnace into compartments is to reduce the loss of heat to a minimum, also to secure a saving in time in the furnace regaining its maximum temperature. It is obvious that the other three fourths of the furnace will radiate heat to the cool portion, whereas a whole furnace being charged simultaneously, the cooling is found to be so extensive as to take a longer time to attain its maximum temperature than to complete the operation. The division of the furnaces also affords better control over the charges. The oxide of zinc produced is now ready for treatment in the ordinary zinc-smelting process.

Having thus dealt with the liquid portion from the washing operations, the treatment of the residues therefrom, together with the poorer classes of ore, will now be considered. The former contain a large percentage of lead and a little copper, and the latter contain a high percentage of copper and very little lead. The lead residues are mixed with the fumes obtained from the smelting operations, and agglomerated in suitable reverberatory furnaces. Both classes of ore, and the residues described above, are then smelted in small blast-furnaces, the ore in its normal condition, and the lead-residue after agglomeration. The charging-hole of the cupola furnace for the lead material is from 7 feet 6 inches to 9 feet above the blast-tuyeres, and the charging-hole for the copper material is from 2 feet 6 inches to 3 feet 6 inches above the tuyeres. It may be here mentioned that the latter description of furnace is used by the Swansea

Zinc-Ore Company, Limited, Llansamlet, Wales, but with the addition of hot-air stoves attached to the throats of the furnace, thereby obtaining a hot blast for smelting, which has proved of very considerable help in the case of refractory ores. The agglomerated material produces argentiferous pig-lead, and a small quantity of copper regulus, the latter resulting from the undissolved copper remaining in the humid process residues. The copper material, when smelted, produces argentiferous regulus, which is desilverized in the following manner: The copper in the regulus is concentrated to about 45 per cent; then finely ground and thoroughly oxidized by calcination, and afterward dissolved out by sulphuric acid. The resultant residues are then smelted with lead products, forming argentiferous pig-lead, and the pig-lead is desilverized by the process pursued in ordinary lead-smelting works.

Another element in the treatment of complex ores is the arresting of the fumes produced in the blast-furnaces already alluded to, and is effected by the method introduced by Messrs. Wilson & French in 1878. The process consists of the exhausting of the products of combustion, together with the fume containing lead and zinc from the top of the blast-furnaces, and the forcing of them through a depth of from 4 inches to 9 inches of water, under which is arranged a series of wooden frames covered with metallic gauze. In case of the liquors acting upon the metallic gauze, wickerwork basket-frames are substituted. Another point of essential importance in this system of condensation is the disintegration of the fume contained in the smoke under water, by which the metallic particles are instantly wetted and sink to the bottom of the condenser. The machinery employed for this operation is a specially designed Root's blower, manufactured by Messrs. Thwaites Brothers, Bradford. There are two of these machines at the Swansea Complex-Ore Company's (Limited) Works, each of which is capable of passing 30,000 cubic feet of gas per minute, say, at 300 degrees Fahrenheit, against a pressure of 12 inches of water. The cooling of the gases from the furnaces prior to entering the exhauster is effected by allowing them to pass over a series of open pans, one above the other, filled with water. No difficulty is experienced in keeping the gases sufficiently cool to avoid fire in the wood-condenser, or injury to the machinery. The fumes obtained are then washed with sulphuric acid, to separate the zinc from the lead. The lead fumes go to the agglomerating furnace with the lead residue, and the liquor containing zinc to the department first described.

The loss in smelting was 2 tons 2 cwt. out of 66 tons 14 cwt., contained in 1269 tons 9 cwt. of ore; 52 tons 12 cwt. being recovered as lead, and 12 tons in the regulus. The loss of silver was 284 ounces out of 11,246 ounces of gold and silver.

#### PROF. CHARLES A. SMITH.

The *American Engineer* says: It is with profound sorrow—a sorrow arising not only from personal grief but from a knowledge of what the profession has lost—that we announce the death at Newburyport, Mass., on the 2d inst., of Prof. Charles A. Smith. The death of Professor Smith does not come unexpectedly to his friends; for it has been known to them for many months, that he was suffering from a terrible and fatal disease, which incapacitated him from active professional work, and which led to his resignation last fall from the professorship of engineering in Washington University, St. Louis, which chair he had filled for many years with eminent credit and success.

Professor Smith was one of the few teachers in engineering who combined a thorough appreciation and knowledge of both theory and practice, although the characteristic and bent of his mind were to pay decidedly more attention to facts than to speculation. He was thoroughly versed both in analytical and graphical methods of investigation, and has done some original work in graphical statics. To show that he was a skillful designer, it is but necessary to mention that, in the beginning of 1880, he received the first premium of five hundred dollars awarded by the municipal authorities of Richmond, Virginia, for the most satisfactory competitive design of pumping machinery, which machinery was later erected under his supervision. The stipulation was for plans for "sets of machinery capable of delivering in twenty-four hours 12,000,000 gallons of water to a height of 175 feet, through a 30-inch pump-main, from 3600 to 4000 feet in length, the motors to be worked under a constant head and fall of 20 feet, with a total supply of 264 cubic feet of water per second." The cost of the works was in the neighborhood of \$300,000.

Professor Smith has contributed a number of valuable papers on engineering topics, several of which, on the performance of the gas-engine, the relative economy of various systems of steam heating, a translation of M. Hallauer's experiments on steam-engines, and the first installments of a treatise on steam-making, or boiler practice, have appeared in the *American Engineer*. Our personal obligations to Professor Smith, who was one of our most valued contributors, do not, however, alone rest on these products of his labor; for he has been instrumental in many ways in supplying for our columns data of interest, and drawings of pumping and other machinery.

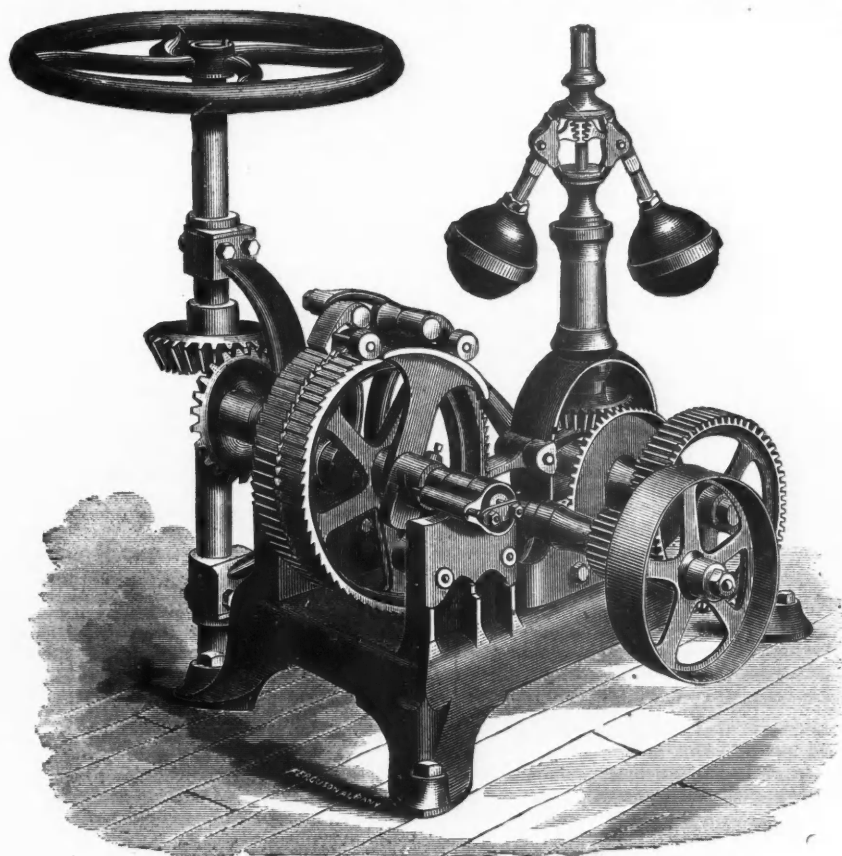
The last year of his life, Professor Smith devoted to the preparation of a new work on "Steam Using," which we learn was all but completed at the time of his death. Doubtless this will incorporate the special extended experience of Professor Smith in the department of steam-engine practice, and will include a complete account of the work of Hirn and Hallauer in France, the important bearings of whose experiments and results were more clearly recognized by Professor Smith than by any other American engineer. Professor Smith attached the greatest possible value to the evidences of careful experiments and to the dictates of experience, and had a special appreciation of the experimental work of Mr. Isherwood. This bent of mind, to which we have referred, did not, however, cause him to have less faith in theory in the true sense of the term, and the works of Rankin were his favorite text-books in applied mechanics, civil and steam engineering.

Professor Smith's demise, in the prime of his manhood—he was but thirty-eight years of age—will bring especial grief to the professors and to the alumni of the Massachusetts Institute of Technology, of which school he was one of the most honored graduates; and to the engineers and his associate professors in St. Louis, who were wont to consult him and treasure his advice in much of their own engineering practice.

## THE SNOW WATER-WHEEL GOVERNOR.

There is no device in the outfit of a mill operated by water-power that is more essential and conducive to economy than a reliable governor on the water-wheel, and it is an astonishing fact that so many mills, otherwise fully equipped, are running without a regulator of some sort. A reason for this fact may be found in part in the fact that so many unreliable and indifferent governors have been palmed off on the unsuspecting public that were as good as none, or the more reliable and effective have cost too much to make them popular. We illustrate a governor known as the "Snow Water-Wheel Governor," manufactured by the Cohoes Iron Foundry and Machine Company, which, although it has been in the market and favorably known as the best for the past twenty years, never reached its highest development and utility until last year. The manufacturers say:

Twenty years' experience in governing water-power has demonstrated the fact that, while a few wheels under favorable conditions may be governed by a comparatively indifferent mechanism, there are many that require special adaptation to meet the requirements under variable conditions. This led to an effort to construct a governor that would



THE SNOW WATER-WHEEL GOVERNOR.

be effective and universal. As there is a limit to the power of all wheels that varies with high or low water and other obstructions, a reliable stop motion is indispensable—one that may be adjusted without any reference to the number of turns of gate-shaft required. The stop required in this governor is simply a screw-stem, which is adjusted by tightening two nuts, and automatically adjusting the pawl-guard.

Heretofore, or until last year, all double-acting governors have been made with double cams, cranks, guard-plates, and ratchets, in fact, a double machine, expensive and complicated; but the Snow double-acting, as constructed now, has a simplified mechanism, reducing the working parts so that it contains but one cam, guard-plate, ratchet, etc. The crank-shaft operates the pawls, on both throws, forward and backward, at the same time the pawls are on top of the ratchet, fully exposed to view and easy to care for.

When in operation, the governor brings the gate to the point which gives the required speed with a gradual movement, and instead of continually hoisting and closing the gate in the vain attempt to correct its own errors, it rapidly reaches the desired point and then remains inoperative, till a change in the weight to be carried demands a change in the height of the gate. Notwithstanding its great strength and durability, it is very compact, occupying upon its base but 18 inches by 29 inches, and in height but 31 inches.

**NOVEL THERMOMETER.**—The ordinary mercurial thermometer is, as is well known, based on the dilatation of bodies by the action of heat, and on the difference of dilatation between mercury and glass. A new thermometer, in which the mercury column sinks with a rise of temperature, has, moreover, been introduced by M. D. Latschinoff, who has based his instrument on the discovery of Kohlrausch that the coefficient of dilatation of ebonite is greater than that of mercury. Latschinoff has made the reservoir of his thermometer of ebonite, and the result is, that the level of the mercury falls in it when the temperature rises, and, on the contrary, rises when the temperature falls. A rise of 20 Cent. degrees lowers the mercury 25 millimeters.

## THE SMELTING-WORKS AT FREIBERG.\*

By K. Merbach.

*The Mulde Works.*—The Mulde smelting-works, located south of Freiberg, in Saxony, treat about two thirds of the entire quantity of ore produced in the Freiberg mining district. All of them are argentiferous and auriferous, and include ores containing as a principal constituent quartz or spar, pyrites, lead, copper, arsenic, and zinc. Formerly iron pyrites, arsenic, and zinc ores were not kept separate, being worked for silver without any attempt to utilize the sulphur, arsenic, or zinc. It was only after the efforts to abate the smoke nuisance that the accounting for these substances to the miners became possible.

All the Mulde works, then, are therefore preparatory processes, and the establishment therefore possesses, besides the smelting plant proper, sulphuric acid, arsenic, and zinc works. All the ores carrying 25 per cent or more of sulphur, but less than 10 per cent of arsenic, are roasted in the sulphuric acid works, to which are assigned also as a further raw material the residues from making red arsenic, and the copper and lead mattes produced in smelting. When ores or furnace products are delivered in pieces, they are roasted in kilns, while the fine material goes to Ger-

stenhofer furnaces. The gas produced contains from 4.5 to 5 per cent by volume of sulphurous acid. In spite of all efforts to separate from the raw material arsenic ores proper, the raw ore contains arsenic, so that the gas is not free from arsenious acid. Therefore it is necessary, before allowing the gas to enter the lead-chambers, to pass it through large chambers and flues, generally made of sheet-lead, in order to afford it an opportunity to cool and to decrease its velocity. It is thus that the greater part of the arsenic in it is deposited in the form of flue-dust. The size of these dust-chambers has kept pace with the growing quantity of ore roasted, until now they have reached a capacity of 2170 cubic meters. After the gas has gone through such a space, its temperature has fallen to such an extent that it is not surprising that there are no Glover towers at the Freiberg works.

The question which mineral is most suitable for the dust-chambers has been decided by long experience. Chambers built up of broken stone or brick, even when the best material was chosen, were rapidly destroyed, especially at those points where sulphuric acid was condensed in consequence of the lowering of the temperature. Cast-iron, too, proved a failure, the only suitable material being sheet-lead, cooled by water where exposure to the heat made it liable to rapid destruction. Lead pipe, soldered side by side, through which water was passed, was also tried. The chambers, of which there are five, have a capacity to gather up 13,125 cubic meters. The sulphurous acid enters at the lower part of the chambers and escapes at the upper part, the steam being supplied through the roof. The nitric acid, which is used in liquid form, is produced by decomposing Chili saltpeter with sulphuric acid. Every system is provided with a Gay-Lussac tower, the acid flowing from it being decomposed with the aid of steam in leaden drums lined with tar bricks. Many experiments have been made on the construction of the lead-chambers, the conclusion being that the most advantageous is a system of two large, one small, and one roof chamber leading to the Gay-Lussac tower, having a maximum capacity of 3000 cubic meters.

The crude acid is largely used as such in the manufacture of fertilizers, an industry which has developed with the manufacture of sulphuric acid

\* From *Freiberg's Berg- und Hüttenwesen*. Published by the Bergmannische Verein zu Freiberg.

at the works. The rest of the acid is submitted to a precipitation with sulphureted hydrogen, in order to remove the small percentage of arsenic in it. The sulphureted hydrogen is made by treating with sulphuric acid a sulphide of iron produced by smelting crude pyrites with acid slags in a reverberatory furnace. The producers have a capacity of about 100 cwts. of sulphide of iron, and conduct the sulphureted hydrogen into high lead towers in which the acid to be purified trickles down. In order to secure a fine distribution of the acid, prisms of sheet-lead with their edge pointing upward have been put in. The acid, dripping on them, is scattered. The sulphide of arsenic is separated from the acid by filtering with vacuum filters. The sulphide of arsenic, after being thoroughly dried, is calcined in kilns, the product being sulphurous acid, which goes to the sulphuric acid chambers, and arsenious acid, which settles as dust in the flues. Though crude, this method is the only one which is advantageous, because the use of the sulphide for arsenic manufacture is impossible on account of its impurities.

The acid waters resulting from the washing of the sulphide of arsenic, as well as those from the manufacture of sulphureted hydrogen, are neutralized with scrap-iron, and are boiled down for the manufacture of green vitriol. The concentration of sulphuric acid from fifty degrees Baumé to sixty degrees is done at the Mulde works in leaden pans, three platinum apparatus being used for the further concentration to sixty-six degrees Baumé. One of these apparatus is of old French design, one of more recent construction, and one according to the Faure-Kessler plan. A portion of the sulphuric acid produced in the roasting-furnaces is now used for the manufacture of anhydrous sulphuric acid by conducting the gases from the roasting over platinum asbestos according to the patent of Dr. C. Winkler. The Mulde sulphuric acid works have in operation fifteen kilns, each of which has a capacity of 8.05 cubic meters, a height of 2.88 meters, a width of 1.27 meters, and a length of 2.26 meters. Such a kiln will roast in twenty-four hours 30 cwts. of ore and furnace materials. There are furthermore 18 Gerstenhoefer roasting-furnaces having a height of 4.80 meters, a length of 1.03 meters, and a width of 0.78 meter, the total capacity per day being 35 cwts. of ore. It is possible, therefore, in working full, to roast 1080 cwts. of ore. The dust-chambers for the kilns have a capacity of 4.94 cubic meters, and for Gerstenhoefer furnaces 1676 cubic meters. The product of the five systems of chambers is about 700 cwts. of chamber acid of fifty degrees Baumé. For precipitating arsenic in the acid, two precipitating towers are used, each of them being 9.095 meters high, 1.065 meters wide, and 1.010 meters deep, and two sulphureted hydrogen generators. In each of the towers, about 300 cwts. of acid can be treated daily. The concentration of the acid is carried out in 55 lead pans and three platinum apparatus having a capacity daily of 800 cwts. of sixty degree acid and 300 cwts. of sixty-six degree acid. The steam required for the works is produced in seven boilers. In 1882, the sulphuric acid works roasted, in spite of frequent repairs, 217,992 cwts. of ore and furnace products, and produced therefrom 140,584 cwts. of sulphuric acid and 3240 cwts. of anhydrous sulphuric acid. There were made besides 12,930 cwts. of sulphate of iron, 2267 cwts. of sulphate of soda, and 11,787 cwts. of arsenical flue-dust.

*The Arsenic-Works.*—The arsenic works has three departments, one devoted to the manufacture of realgar, another to the production of metallic arsenic, and a third to the manufacture of arsenious acid and white arsenic glass. The raw material for the manufacture of realgar is a mixture of argentiferous iron pyrites and mispickel, carrying from 30 to 35 per cent of sulphur and from 10 to 15 per cent of arsenic. These ores are heated in closed retorts, twelve of which are placed in a furnace provided with two fire-places. A mixture of sulphur and arsenic, crude realgar, is expelled, which is condensed in sheet-iron prolongers. This product is melted in iron kettles provided with a tapping hole, and is purified by the addition of sulphur. The realgar thus obtained is ground. As a by-product of the purifying process, a cinder is produced which contains ore-dust and sulphide of arsenic. It is worked for white arsenious acid. The ore remaining behind in the distilling retorts has been deprived of most of its arsenic, but has lost only a part of its sulphur, so that it can be advantageously used in the manufacture of sulphuric acid. At the Mulde works, there are nine furnaces with 108 retorts, in which 200 cwts. of ore are worked per day.

Metallic arsenic is made by heating pure arsenical pyrites in closed clay vessels, twenty-two of which are placed in one gallery furnace provided with a grate under its entire length. On heating the arsenical pyrites, some sulphide of arsenic escapes at first, and then metallic arsenic is distilled over, which settles in fine crystals on the hottest part of the prolongers immediately adjacent to the mouth of the vessels. A small quantity of arsenic in the form of powder is deposited on the colder part of the prolongers. The crystalline metal goes into the market in large pieces, while the powder is used for the manufacture of realgar.

For making arsenious acid, the works use the flue-dust gathered in the condensing chambers and flues of the smelting-works and the sulphuric acid works. This dust consists of arsenious acid contaminated by soot, ore-dust, and volatilized compounds of the metals. Another raw material is ore carrying arsenic in too small a quantity for making metallic arsenic and too little sulphur to be available for producing realgar. This flue-dust is treated in two English roasting-furnaces heated with gas, and in order to obtain a flame free from soot, coke is used as a fuel. Every furnace is provided with brick chambers and sheet-lead flues, communicating with a stack. The temperature in the roasting-furnace is so regulated, in making flue-dust, that it just suffices to volatilize the arsenious acid. The latter is completely condensed in the chambers, and it is resublimed in order to obtain a clean product. The strongly sintered residue is added to the smelting charges because it carries lead. Ores are worked in the same manner, except that they do not require as high a temperature, the combustion of the sulphur in the ore carrying the heat up.

The arsenious acid is partly marketed as such, and is partly converted into white arsenic glass. This is done by heating the arsenious acid in iron kettles provided with a sheet-iron top ending in a pipe communicating with a small dust-chamber. In this pipe, the sublimed acid settles as a transparent, colorless glass. Twenty kettles are in operation. By adding small quantities of sulphur to the arsenious acid, orpiment may be produced. It is an article for which the market is, however, a limited one.

In 1882, the arsenic works treated 88,800 cwts. of flue-dust and ore which yielded 5214 cwts. of realgar, 482 cwts. of metallic arsenic, and 10,189 cwts. of arsenious acid, 7217 cwts. of the latter, with 1515 cwts. of purchased material, being converted into 8081 cwts. of white arsenic glass.

*The Zinc-Works.*—One of the most frequent constituents of Freiberg ores is black or argentiferous blende. Unfortunately, it seems almost impossible to separate it cleanly by dressing, and this may explain the fact that, although the blende occurs frequently in the Freiberg veins, the quantity of ore fit for the manufacture of zinc is comparatively small. The production of zinc, therefore, is limited in the Freiberg works. Two distilling-furnaces, one of them with the Siemens regenerative furnace and the other built on the Boetins plan, suffice to work the entire quantity of blende furnished. One of the furnaces has 32 and the other 44 muffles. The ores, which are generally coarse blende obtained by hand-sorting, are roasted first in the sulphuric acid works; then they are crushed fine and are roasted in a reverberatory, because the sulphuric acid works can only roast with advantage down to six per cent of sulphur. After roasting dead, the ores are mixed with lignite coke and are distilled in the furnaces. The zinc thus obtained is refined by remelting in a small reverberatory, and is sold as such. The zinc-dust, obtained as a by-product, is valued as a paint. The residues of the zinc manufactured go to the smelting-works, as they contain silver. The total quantity of the ore worked in 1882 was 12,583 cwts. of ore, producing 2834 cwts. of spelter and 233 cwts. of zinc-dust.

*The Smelting-Works.*—All of the ores containing sulphur, arsenic, and zinc treated in the works already alluded to are delivered to the charging-floors of the smelting-works, where they are well mixed with all the other ores directly delivered for furnace treatment. They are roasted, the object being to produce a sintering of all the ores delivered in dust form, and to get rid of the rest of the sulphur in the roasted ores, about six per cent of sulphur and half of one per cent of arsenic. The seven roasting-furnaces, capable of treating about 1800 cwts. of ore daily, have a length each of 13.02 meters, a width of 3.25 meters, and a fire-place of 3 by 0.54 meters. The gases from all these furnaces, consisting of the gases of the combustion of coal, sulphurous acid, sulphuric acid, arsenious acid, and particles of ore carried over by the draught, are conducted into a condensing apparatus consisting of the underground and the above-ground flues and chambers. They are partly made of masonry, covered with iron plates, and partly of sheet-lead, having a total capacity of 6507 cubic meters. After having passed through this apparatus, the gases escape through a stack 42.05 meters high. The arsenious acid and the particles of ore are deposited in these chambers and flues as a dust, which is delivered to the arsenic works. The sulphurous acid and sulphuric acid not condensed escape from the stack so much diluted that there is no danger of injury to the adjoining vegetation. The ore melted in the roasting-furnaces is charged into iron cars, broken into pieces after chilling, and is melted in Pilz furnaces with additions of slag. It is characteristic of this smelting process that all the ores are previously roasted, with the exception of very rich silver ores and gold and silver drosses, and that the necessary quantity of iron flux for the decomposition of the sulphides is not added in the form of a specially prepared raw matte, but in the form of an admixture of pyrites roasted in the course of the manufacture of sulphuric acid.

At the Mulde works, there are four furnaces, having each eight tuyeres, and one smaller one with six tuyeres. The furnaces have a closed front without any fore-hearth, are round, and have an enlarged section in their upper part. They are from 5.02 to 8.05 meters high from the level of the works to the charging-door, the larger ones having a diameter at the tuyeres of 1.05 meters, while the six-tuyere furnace is one meter in diameter. The diameter of the furnaces at the charging-door is from 1.25 to 2 meters. To protect the walls against burning through, water-jackets are provided, made of sheet-iron, and thus a run of from three to four years has been reached. The slag produced flows into iron pots alternately through one of two iron gutters, while the matte and base bullion are tapped into portable cast-iron pots. The daily capacity of a furnace using about 110 cwts. of coke ranges from 600 to 700 cwts. of ore and an equal quantity of slag. The products obtained are base bullion, a matte containing iron, lead, copper, and a little silver, and slag containing small quantities of lead and silver.

The base bullion, besides gold, contains silver and lead, copper, tin, arsenic, antimony, and bismuth, and its treatment is therefore complicated. At first, it is subject to a liquating process, to get rid of the copper. The two liquating furnaces used are reverberatories, with a strongly inclined hearth, at the end of which a sump is provided. Upon this hearth, the base bullion is heated to such a point that the argentiferous lead melts and flows into the sump, while the copper remains behind in a dross. This dross is smelted in a blast-furnace with additions of roasted lead matte, copper matte and base bullion being produced, accompanied occasionally by a speiss carrying iron, copper, nickel, cobalt, and arsenic. The lead accumulating in the sump of the liquating furnace is tapped into iron molds and turned over to the refining process. The refining furnaces, of which the Mulde works possess five, are reverberatories, with deep hearths having a capacity of 400 cwts. of lead. The lead is melted down in them, and is carried to a red heat, the blast being conducted upon the surface of the bath by two tuyeres set in at the sides of the fire-bridge. In this manner, the impurities contained in the lead are oxidized, first tin, then arsenic and antimony, yielding, with lead, a scum which is removed from the surface of the bath, until the color of the litharge indicates that the lead is pure. It is then tapped from the furnace, the refining of one charge requiring from two to three days. The scum is separated according to its color into four classes, the first containing a considerable quantity of tin, which is easily oxidized, and is a powder, as tin oxide does not melt at the temperatures used. The other portions of the scum obtained carry little or no tin, and are therefore completely melted. After the tin oxide, arsenic is oxidized, and, following this, antimony. The antimony scum is reduced in a blast-furnace, and the lead obtained is refined, and similarly that portion of the scum is treated which contains a good deal of lead but very little antimony. The refined lead is worked by the Pattinson process, by which the silver is concentrated into a rich lead, with a maximum of two per cent, of silver. A greater concentration is not practi-



cable, because the crystals of rich lead are so fine that they can not be well separated from the poorer lead.

The question may be asked, why, at the Freiberg works, a process is used which has long been discarded elsewhere in favor of desilverization by means of zinc. There are two reasons why it has been retained. First, because the high grade of the base bullion would entail a very heavy consumption of zinc, and would be expensive because of the further treatment of the rich alloy, which would be very complicated in this case. The second reason is the high percentage of bismuth in the base bullion. In the Pattinson process, the bismuth concentrates in the rich lead and can be obtained in cupelling the latter; while in the zinc desilverizing process, it will remain in the poor lead, and, however small the percentage of bismuth in the base bullion might be, it would concentrate in the refined lead in so serious a manner that its quality would be seriously impaired.

The Pattinson plant consists of 24 kettles, 15 being sufficient for ordinary working, while 9 remain as a reserve in case of heavy deliveries of lead. The rich lead containing about two per cent of silver is cupelled in three German cupelling furnaces, one of which has two fire-places. The litharge produced is run into iron boxes, a part of it on cooling falling in pieces as red litharge, which is sifted and sold as such, while the yellow litharge is reduced in a blast-furnace. The lead thus recovered returns to the Pattinson process. During the cupelling process, rich lead is continually added, so that on the smaller hearth from 700 to 750 cwts. and on the larger one from 1000 to 1200 cwts. of rich lead are cupelled in from six to seven days. Bohemian lignite is used as a fuel, and in order to obtain a long oxidizing flame, blast is conducted under the grate, an arrangement which is also applied to lead refining furnaces. On account of the bismuth in the lead, which concentrates with the silver toward the end of the cupelling, all the lead is not oxidized, because the greater part of the bismuth would thus either be lost in the litharge or would be volatilized. The cupelling is, therefore, stopped when the rich lead has reached a concentration equivalent to about eighty per cent of silver. This silver-bismuth-lead alloy is treated in a small reverberatory refining-furnace with movable arch. A part of the bismuth and lead is absorbed by the hearth, the rest flowing off as a bismuth litharge. When the silver is fine, it is granulated and delivered to the parting-works. The bismuth litharge, as well as the hearth containing that metal, is crushed fine, and is treated in clay pots with hydrochloric acid, whereby the bismuth is dissolved, while the lead remains behind as a chloride. The bismuth solution is conducted into wooden tanks filled with water, and thus a basic chloride of bismuth is obtained, which is reduced to metal in crucibles.

The lead matte obtained in smelting the ore in blast-furnaces is broken into pieces and calcined in the kilns of the sulphuric acid works. As it can not be roasted as dead as the further treatment of the matte requires, it is worked for a second time in Wellner stalls. The gases produced are not fit for the manufacture of sulphuric acid, and are therefore conducted into the condensing apparatus of the roasting-furnaces. The matte is then smelted with slag from the ore smelting and other siliceous materials. The lead thus produced contains the greater part of the silver in the matte and in the slags, while the bulk of the iron is fluxed and the copper in the matte forms a sulphide. Thus from a matte rich in lead and silver, but poor in copper, a copper matte is obtained poor in silver and lead, but rich in copper. The latter is treated in a reverberatory. The slag made in smelting matte is thrown on the dump or manufactured into slag brick because it is too poor for further treatment. This slag contains about .0015 per cent of silver and from 1 1/2 to 2 per cent of lead. When it is considered that, on account of the high price of lime or fluor-spar, such flux can not be added in smelting, and that the ores are generally very high in zinc, it is not surprising that the slag is very impure and high in zinc, reaching even twenty per cent of oxide of zinc. In matte smelting, a small quantity of speiss is occasionally obtained containing arsenic, iron, lead, copper, nickel, cobalt, and silver. It is from time to time treated separately, being thoroughly roasted to get rid of the arsenic as completely as possible and then smelted in a furnace with the addition of slag. Argentiferous lead, in small quantity, is obtained, the greater part of copper goes into a matte, a part of the iron is fluxed, and the nickel and cobalt concentrate in a speiss. A repetition of this method of working furnishes a product running about .05 per cent of silver, from 15 to 20 per cent of nickel and cobalt, and about 20 per cent of copper—a product which is sold. The copper matte is concentrated in a reverberatory, being smelted with quartz and heavy-spar, after thorough roasting, the product being a matte containing 70 per cent of copper and having a maximum of .025 per cent of iron.

In 1882, the Mulde works treated 433,130 cwts. of ore and furnace materials, using 416,500 cwts. of coke, coal, and lignite in about equal proportions, and producing 55,826 pounds of doré-bars, 72,367 cwts. of refined lead, 7955 cwts. of litharge, 6849 cwts. of concentrated copper matte, 2578 pounds of bismuth, and 42,623 cwts. of arsenical flue-dust.

ANALYSIS OF JAPANESE BRONZES.

An examination of some specimens of Japanese bronze of Mr. J. Tadanari Matsudaira, B.Sc., a student of Rutgers College, New Jersey, gave the results recorded in the following short paper, contributed to the Transactions of the college. Bronze, as is well known, is an alloy of copper and tin. The relative amounts of its constituents vary according to the purpose for which it is intended; sometimes lead, zinc, gold, and silver are added, with the intention of giving it a greater brilliancy or fusibility. Modern bronzes differ from the antique ones in composition and manner of manufacture. The bronze coin of Alexander the Great (335 B.C.) contained 86.72 per cent of copper and 13.14 per cent of tin. A Roman bronze coin (500 B.C.) contained 66.04 per cent of copper, 7.66 per cent of tin, and 29.32 per cent of lead. Many of the modern French bronzes are composed of—Copper, 91 parts; tin, 2 parts; zinc, 6 parts; lead, 1 part. The Japanese word corresponding to bronze is "karakane," meaning Chinese metal. Brass is called "shin-chu." The bronze industry in Japan is very ancient. Copper has been produced in Japan since the eighth century; but even before that period, the manufacture of bronze had reached a certain stage of per-

fection, the copper or its alloys having been imported from China. Giyoka, a priest and the introducer of the potter's wheel, planned the erection of monster statues to the god Buddha, and the plan was carried into execution by the Emperor Shomw in 724-749 A.D. Three of these statues still exist. They are about fifty feet in height, and are said to contain a small percentage of gold. The modern bronze castings are employed for many useful and ornamental purposes, such as statues, bells, vases, knife-sheaths, candlesticks, etc., and are generally made in the simple and curious style of the old and celebrated Chinese bronzes, or are embellished with the characteristically grotesque vagaries of Japanese art. The bronze objects are cast in clay molds, formed upon models made of a mixture of wax and resin, which is melted and poured out of the molds previous to running the metal in. The melting-furnaces are generally of small dimensions, and consist of an iron pot lined with clay. The surface of the casting is then finished, and the design corrected by chiseling. Frequently gold and silver are inlaid to produce artistic effects. This work is known as "zogan," and is principally carried on in the provinces of Kagan and Techin. Frequently the surface of the bronze is deadened and darkened by the application of a solution of sulphate of iron and other chemicals. I have examined two of the best known kinds of brass. One is called "shibuich." Its surface is of a light, brilliant gray color, but a scratch reveals red metal. The object from which I took my sample for analysis was a knife-sheath. The analysis gave:

Copper	74.11	Per cent.
Silver	25.81	
Total	99.92	

The other sample was also from a knife-sheath, and was the metal known as "shakudo." The surface was a dark rich brown. It contained:

Copper	98.85	Per cent.
Silver	.63	
Iron	.05	
Total	99.63	

NON-DIVIDEND-PAYING MINES.

	12 months.				Sales.
	Opening.	Highest.	Lowest.	Closing.	
Advance	\$0.30	\$0.30	\$0.03	\$0.18	5,300
Albion	2.95	2.95	.05	.55	4,925
Alta	.12	1.45	.12	1.45	500
Alta-Montana	.29	.29	.01	.03	249,475
American Flag	.08	.09	.02	.03	14,000
Barcelona	.24	.49	.12	.20	248,200
Bear Creek	.22	.25	.20	.24	4,100
Bechtel Consolidated	.20	.25	.05	.05	2,515
Belvidere	.40	.40	.40	.40	1,000
Best & Belcher	4.00	5.50	2.50	2.50	3,320
Big Pittsburg	.10	.29	.10	.10	57,650
Bonanza Chief	.03	.04	.02	.02	17,800
Bondholder	.05	.05	.05	.05	200
Boulder Consolidated	.01	.02	.01	.02	4,600
Bradshaw	.39	.42	.10	.17	90,700
Buckeye	.01	.03	.01	.02	30,900
Preferred	.05	.05	.05	.05	500
Bull-Domingo	.05	.08	.04	.05	6,200
Bye and Bye	.03	.04	.01	.01	11,100
Calaveras	.03	.03	.01	.01	21,300
Calaveras W. and M. Co.	.08	.08	.05	.05	1,300
Caledonia, B. H.	1.20	1.20	.14	.15	18,419
Catskill	.30	.30	.25	.25	200
Central Arizona	.37	.55	.10	.20	41,425
Chapparral	.62	.02	.02	.02	22,000
Cherokee	.06	.11	.01	.02	66,000
Chollar	1.20	2.95	1.20	2.95	500
Chimay	.10	.14	.05	.07	105,660
Colorado Central	.40	.40	.35	.35	1,125
Consolidated Imperial	.02	.16	.02	.04	48,100
Consolidated Pacific	.45	.45	.45	.45	200
Crowell	.04	.07	.02	.04	32,500
Dahlonega	.02	.04	.02	.02	31,900
Decatur	.10	.12	.02	.04	792,400
Dunderberg	.25	.25	.25	.25	300
Durango	.09	.10	.02	.03	68,700
Eastern Oregon	.80	1.05	.03	.10	343,500
Elko Consolidated	.09	.31	.01	.17	701,000
Enterprise	.60	.62	.13	.25	192,200
Fannie Barret	2.05	2.25	2.00	2.20	23,600
Globe Copper	.08	.08	.07	.07	600
Goodshaw	.06	.16	.01	.16	16,100
Harlem	1.00	1.55	.09	.09	280,990
Hortense	.10	.20	.07	.10	30,900
Lacrosse	.15	.18	.06	.08	134,350
Lucerne	.01	.01	.01	.01	300
Mexican	2.50	5.50	1.90	1.90	25,575
Miner Boy	.02	.02	.01	.01	1,800
Mono	.35	.38	.30	.22	2,900
North Mexican	.55	.80	.30	.65	6,100
North Standard	.20	.25	.07	.13	6,900
Oriental & Miller	.13	.24	.02	.08	334,350
Parnell	.45	.46	.11	.25	9,360
Quartz Creek	.03	.04	.01	.01	68,900
Rappahannock	.09	.13	.05	.08	116,100
Red Cliff	.06	.06	.06	.06	100
Red Elephant	.05	.11	.05	.06	79,150
Ruby, of Arizona	.50	.57	.33	.33	7,300
Silver Cliff	.37	.43	.06	.06	43,500
Sonora Consolidated	.08	1.55	.08	.09	1,935,620
South Hite	.20	.45	.01	.03	49,600
South Pacific	.10	.10	.05	.06	282,900
State Line Nos. 1 and 4	.03	.05	.01	.01	111,200
State Line Nos. 2 and 3	.07	.09	.03	.04	164,400
Sutro Tunnel	.17	.25	.13	.17	802,400
Taylor-Phumas	.23	.23	.13	.16	411,950
Tioga Consolidated	.05	.33	.05	.33	400
Tuscarora	.08	.23	.08	.10	23,540
Unadilla	.04	.05	.01	.01	41,200
Union Consolidated	2.90	12.00	1.80	2.75	24,179
Vandewater	.32	.33	.19	.19	24,300
Washington	.12	.12	.06	.07	13,900
Whalen Copper	10.00	10.00	10.00	10.00	10
					8,316,278

PRODUCTION OF GOLD.—The returns thus far received by the Director of the Mint indicate that during 1883 the production of gold amounted to \$30,000,000.

**DIVIDEND-PAYING MINES.**

	Twelve months.				Sales.	Dividends paid in 1883.
	Opening.	Highest.	Lowest.	Closing.		
Alice	\$1.95	\$3.5	\$1.90	\$2.25	49,300	
Amie Consolidated	.14	.28	.07	.09	784,415	\$25,000
Argenta	.52	1.40	.10	.10	8,946	
Barbee & Walker	.05	.05		.05	100	
Bassick	4.50	11.50	4.50	6.50	12,195	300,000
Belcher	.88	.88		.88	100	
Belle Isle	.56	1.60	.15	.20	41,365	
Bodie Consolidated	2.25	2.25	.12	1.70	36,815	
Breece	.22	.25	.14	.15	17,875	
Bulwer	1.20	1.20	.40	.45	42,351	35,000
California	.20	.58	.03	.12	166,720	
Caribou Consoli- dated	.20	.34	.06	.07	23,850	
Carbonate Hill	.87	1.35	.80	1.15	10,000	60,000
Castle Creek	1.20	1.20	.08	.40	14,650	30,000
Chrysolite	1.50	1.70	1.01	1.25	174,105	
Consolidated Vir- ginia	.40	1.05	.28	.32	302,645	
Crown Point	1.05	1.05		1.65	250	
Dunkin	.22	.36	.20	.27	31,767	10,000
Eureka Consoli- dated	9.00	11.25	2.65	3.00	18,193	
Father de Smet	4.25	5.50	2.25	3.00	4,840	120,000
Findley	.17	.10	.04	.08	23,100	
Gold Stripe	.05	.10	.04	.06	96,900	
Gould & Curry	3.25	3.25	2.35	3.25	705	
Grand Prize	.30	1.15	.09	.25	33,795	
Great Eastern	.03	.04	.01	.01	72,500	
Green Mountain	.39	1.50	.39	1.50	95,705	
Hale & Norcross	1.00	7.13	1.00	1.75	2,750	
Hal-Anderson	1.30	2.00	1.00	1.15	175,110	
Hibernia	.01	.17	.01	.04	30,700	
Homestake	18.00	19.00	8.00	10.00	12,982	525,000
Horn-Silver	6.50	8.63	4.60	6.25	85,592	1,100,000
Hutill	.15	.29	.04	.07	72,900	
Independence	.61	1.00	.04	.08	45,780	
Iron Silver	2.40	3.25	1.80	2.10	159,726	300,000
Leadville	.65	.75	.25	.42	51,556	80,000
Little Chief	.40	.88	.35	.58	164,177	20,000
Little Pittsburg	.65	1.10	.47	.47	39,529	
Martin White	3.10	3.10	.05	.40	2,008	
Moose	.03	.03		.03	.00	
Navajo	8.25	9.50	1.35	3.60	77,725	125,000
Northern Belle	9.75	10.50	.18	.18	23,485	100,000
N. W. Belle Isle	.20	.91	.20	.50	35,275	
Ontario	35.50	35.50	18.00	29.25	10,043	300,000
Ophir	1.80	7.00	1.15	7.00	7,007	
Prussian	4.35	4.75	4.20	4.65	5,600	15,000
Quicksilver, pref.	30.00	46.50	30.00	30.00	5,400	
Common	8.00	10.00	5.50	6.00	6,820	
Rising Sun	.06	.11	.01	.02	44,900	
Robinson Consol- idated	1.25	1.40	.29	.31	1,205,890	
Savage	.70	4.00	.70	.85	3,010	
St. Joseph's Lead	.07	.07		.07	1,000	
Sierra Grande	3.50	3.70	.60	.60	402,990	500,000
Sierra Nevada	2.50	9.25	1.88	3.50	38,787	
Silver King	10.75	11.50	5.50	7.63	8,450	175,000
Spring Valley	2.50	2.50	.50	.50	515	
Standard	6.88	7.50	5.00	5.75	30,006	325,000
Stormont	.20	.72	.10	.15	34,920	
Tip Top	.75	5.00	.75	5.00	400	
Virginia	1.00	1.25	.15	.15	4,800	
Yellow Jacket	1.00	5.13	.90	3.50	8,050	
					4,871,470	\$4,145,000

**THE RELATIVE ECONOMY OF GAS, STEAM, AND HOT-AIR ENGINES.**

In an elaborate paper entitled "Some Experiments upon the Otto Gas-Engine," Messrs. Morgan Brooks and J. E. Steward, graduates of the Stevens Institute of Technology, Hoboken, N. J., reached the following figures on the commercial efficiency of the gas-engine as compared with steam and hot-air engines:

In making a comparison of this kind it is necessary to consider: 1. The cost of gas or coal consumed. 2. The cost of water used, 3. Lubrication. 4. The cost of attendance. 5. Depreciation and repairs. 6. Interest on capital invested.

1. The average consumption of gas in a gas-engine per effective horse-power per hour, including igniting flames, is about 30 cubic feet.

The consumption of coal per effective horse-power per hour by small steam-engines is about 7 pounds.

2. The water used in the water-jacket of a gas-engine will not enter into the estimate, since by the use of tanks the same water may be used continuously.

The water supplied to the boiler of the steam-engine here considered amounts to  $\frac{1}{2}$  cubic feet per horse-power per hour.

4. A gas-engine requires little or no attendance. A man can accomplish  $\frac{1}{2}$  of a day's work and still take full charge.

Steam-engines of this size require from  $\frac{1}{2}$  to 1 day's attention, depending upon the proximity of the engine and boiler.

5. As regards depreciation, it is safe to say that gas and steam-engines have about equal terms of life; for, while gas-engines have less complication of working parts than steam-engines, yet they are subject to more severe and abrupt strains.

6. The interest will necessarily be directly proportional to the amount of capital invested.

The following summary shows the relative cost of a day's running:

GAS-ENGINE, 8 H. P. ACTUAL, 10 HOURS.	
1. 2400 cubic feet gas at \$2.50 per 1000	\$6.00
2. Water	0.00
3. Lubrication	0.20
4. One sixth day's labor at \$2.	0.33
5. Depreciation, etc., at 12 per cent per year, 12-360 on \$1075	0.38
6. Interest at 5 per cent per year, 5-360 per cent on \$1075	0.15
Daily expense	\$7.04

STEAM-ENGINE, 8 H. P. ACTUAL, 10 HOURS.	
1. Coal, 560-2240 tons at \$5	\$1.25
2. Feed-water, 65 cubic feet at \$1.25 per 1000	0.08
3. Lubrication	0.15
4. $\frac{1}{2}$ day's labor at \$2.	1.00
5. Depreciation, etc., at 12 per cent per year, 12-360 per cent on \$800	0.27
6. Interest at 5 per cent per year, 5-360 per cent on \$800	0.11
Daily expense	\$2.86

The following figures have been obtained for the expense of running a

small hot-air engine. This engine has been running in a printing-office in New York City for eighteen years. It uses  $4\frac{1}{2}$  pounds of coal per horse-power per hour; every third year relining costs \$100.

**HOT-AIR ENGINE,  $2\frac{1}{2}$  H. P. ACTUAL, 10 HOURS.**

1. Coal, 115-2240 tons at \$5	\$0.25
2. Water	0.00
3. Lubrication	0.10
4. Attendance same as for gas-engine	0.33
5. Depreciation, etc., at 10 per cent per year, 10-360 per cent on \$750	0.21
6. Interest at 5 per cent per year, 5-360 per cent on \$750	0.10
Daily expense	\$0.99

The cost of one horse-power per hour is—

With gas engine	8 $\frac{1}{2}$ cents
With steam-engine	31 $\frac{1}{2}$ "
With hot-air engine	4 "

For intermittent work, the gas-engine is much more economical than the above figures indicate; and this fact, together with its safety, cleanliness, and convenience, makes the gas-engine very desirable where small powers are required.

With cheaper kinds of gas, it becomes possible to reduce the figures for gas-engines as low as, if not lower than those obtained for steam-engines. In England and Germany, where the cost of illuminating gas varies from \$0.50 to \$0.75 per 1000 cubic feet, the above figures would be reduced 60 per cent, making the daily expense of the gas-engine about \$2.75.

It should be remembered that illuminating gas is not required for the gas-engine. The manufacture and distribution in cities of some cheap gas especially adapted for use in gas-engines may soon become a prominent industry; and, with economy added to its other merits, the gas-engine may largely supplant steam for manufacturing and other purposes.

**COAL IN ILLINOIS IN 1883.**

The State Bureau of Labor Statistics has just issued a supplemental report giving interesting and very complete statistics concerning the coal production of Illinois in 1883. The data presented, according to the Chicago *Inter-Ocean*, will prove the more interesting because obtained from original sources, either by the various county inspectors of mines or by special agents of the bureau, and are more complete and comprehensive than any which have before been gathered. These statistics cover the year ended July 1st, 1883, and embrace a record of the number, location, and character of each mine in the State, the number of men employed, the prices paid for mining, the number of tons produced, the value of the same at the mines, the amount of capital employed, and the record of casualties which occurred in the prosecution of the year's business.

A brief summary of the report shows that coal is mined in 49 counties, and the whole number of mines is 639, covering an area of 110,368 acres, of which 12,589 acres have been worked out. These mines give employment to 23,939 persons, and in the year covered by the report produced 10,508,791 tons of coal, an increase of 1,393,138 tons over the year 1882. The total value of the product of the mines is reported at \$15,320,384, and the capital employed at \$10,396,540. The estimated capacity of the annual production is 21,035,435 tons. During the year, there were 365 casualties and 134 lives lost, of which 69 were in the Diamond mine at Braidwood, in the terrible disaster, February 16th, 1883.

Three counties were added during the year to those where coal was produced—Cass, Edgar, and Macou. In Cass County, mines were opened at Virginia and Ashland, at a cost of \$27,000; in Edgar County, at Illiana, at an outlay of \$60,000; and in Macon County, at Decatur and Viantie, where \$15,000 were invested.

In 1882, La Salle County stood at the head of the coal-producing counties with a product of 1,169,030 tons. St. Clair County had been foremost in 1880, but in 1882 was second, and Macoupin County third. In 1883, Macoupin County came to the first place with a total tonnage of 1,233,200 tons, showing a gain over 1882 of 452,275 tons. La Salle County was second, and Sangamon, St. Clair, and Madison followed in the order given. The largest gains were found in Rock Island County, where the increase was 465,000 tons; the greatest falling off was in Jackson County, where the output declined from 429,832 tons to 192,826, a part of which is due to the prolonged strike of sixteen weeks, in which all business was suspended.

Since 1870, the mines in the State have increased from 322 to 639, the employes from 6301 to 23,939, the product from 2,624,163 to 10,508,791 tons, and the value from \$6,079,432 to \$15,310,521.

Of the 639 mines worked last year, it appears that 183 produced less than 7000 tons each. Those which produced from 1000 to 10,000 tons number 238, and those which produced from 10,000 to 50,000 bushels were 148, while 70 produced an average of 157,440 tons each.

The largest coal business done by any one company was by the Chicago, Wilmington & Vermilion Coal Company, which raised from its shafts at Braidwood 388,000 tons, and from three shafts at Streator 392,187 tons, or a total of 780,187 tons.

The average value per ton for the whole State has undergone very little change during the last three years. The average value per ton in 1880 was \$1.44; for 1882, \$1.46; and for 1883, \$1.46. Local prices of coal at the mines varied in different parts of the State from 90 cents to \$2.50 a ton—the former price prevailing in the southern part of the State, and the latter in the northern counties.

The lowest averages for counties are those of Washington, 97 cents, and Perry, 98 cents, and the prices paid for mining in those counties are from 45 to 60 cents per ton. In some of the northern counties, miners receive as high as \$1.50 a ton, but this is only in low and wet workings. Throughout the central part of the State, the ruling price is 75 cents, and in the northern from 85 cents to \$1.

The principal strikes of the year were those in the vicinity of Belleville and that at La Salle. At Belleville, a general strike began May 1st, and lasted for seven weeks, in which time it was found necessary to call upon the State authorities for the protection of property, and in the disturbance one man was killed. The actual accounts of one of the miners at Belleville show the monthly average wages to be \$36.68, and the average cost of living per month \$30.71. The extreme earnings were \$11.28 for the month of January, and \$83.34 for December. The strike at La

Salle involved an idleness of 800 men for a period of four months. Both strikes were adjusted by compromise.

The record of casualties shows that one man was killed out of every 146 employed underground, and that one was killed for every 78,424 tons of coal produced.

But the average condition of the mines in the State is improving and will continue under the new inspection law. The number of mines having escapement shafts was increased from 354 to 396 during the year, and many others are reported in process of construction.

The last General Assembly of the State amended the mining laws, providing for State inspectors of mines, for weighing coal at the mines, requiring fire-proof buildings at the pit-head, requiring miners to use copper needles and copper-tipped tamping-bars in preparing blasts, prohibiting the use of furnaces for ventilation which should discharge smoke into the hoisting-shaft, and prohibiting the employment of boys under fourteen years of age under ground.

The most conspicuous of these is the inspection law, and for the purpose of carrying out its requirements the State has been divided into five districts, and inspectors appointed for each by the State. County boards are also authorized to appoint inspectors for counties, who shall act as assistants to the State inspectors. This will, no doubt, greatly improve the condition of the mines in the State and reduce the casualties.

#### FURNACE MILL, AND FACTORY.

The nail plate mill of the Pottstown Iron Company at Pottstown, Pa., and seven furnaces in the puddling department, started up February 11th. The mill shut down December 5th, and has been lying idle since.

An order has been received at the Trenton Iron-Works that will keep the wire-drawers at work for five months.

The Peninsular Works of Detroit are now delivering an order of 1000 cars to the Union Pacific. Seven hundred are for the Oregon Short Line, 500 of which are coal and flat cars, and 300 are for the Denver, South Park & Pacific. The entire number have a capacity of 40,000 pounds, and the narrow-gauge cars have the Westinghouse air-brake.

Among some of the recent shipments of the Cummer Engine Company, Cleveland, Ohio, is a 20 by 42, 287 horse-power, to the A. T. Stearns Lumber Company, Neponset, Mass.; a 12 by 24, 89 horse-power, to M. Benner, Chicago, Ill.; a 10 by 20, 55 horse-power, to the Elithorpe Air-Brake Company, Chicago, Ill.; a 10 by 20, 55 horse-power, to E. M. McGillin & Co., Cleveland, Ohio; a 13 by 24, 105 horse-power, to the Joshua Hendy Machine Works, San Francisco, Cal.; and an 18 by 36, 215 horse power, to the Cypress Lumber Company, Apalachicola, Florida. The Variety Iron-Works, Cleveland, Ohio, have sent in their order for a 16 by 30, 170 horse-power, Cummer engine, and the Dominion Wadding Company, Sorel, Province of Quebec, Can., have ordered a 14 by 30, 130 horse-power, Cummer engine. Mr. W. B. Pearson, Manager of the Cummer Engine Company's Chicago Branch, has just received an order for a 24 by 48, 414 horse-power, Cummer engine from the Paine Lumber Company, Oshkosh, Wis., notwithstanding the fact that all the prominent automatic engines in the market were pressed upon the Paine people.

The annual report of the Omaha Smelting-Works Company puts the production in 1883 at \$12,700,000. This is an increase of 33 per cent over the output in the preceding year. The force employed last year averaged 350 men. Over 17,000 tons of coal and 8000 tons of coke were consumed and \$750,000 paid to the Union Pacific Railroad for freight charges.

Work was resumed February 11th in the New-Jersey Steel and Iron-Works at Trenton, employing about a thousand men. They have been shut down since Christmas, ostensibly to allow of repairs in buildings and machinery.

The Old Virginia Nail and Iron-Works in Lynchburg, Va., have started up making bar iron and nails. They are also making all the light iron rails for a narrow-gauge road at Indian Rock, near Lynchburg.

The Washburn Iron Company, of Worcester, Mass., has made a contract for the erection of a Bessemer steel plant with two converters at its mill in Worcester. This company has hitherto rolled steel from imported or purchased blooms, but will hereafter make its own steel.

The great blast-furnaces of the Joliet Steel Company, Joliet, Ill., have started up, giving employment to 100 more men.

The Crown Point Iron Company has sold 10,000 tons of old iron to the Lackawanna Iron and Coal Company, of Scranton. The Albany & Rennselaer Iron Company, of Troy, takes the entire product of the south furnace, and the Scranton Steel Company the product of the north furnace.

At Struthers, Ohio, matters are in good shape among mines and mills. Summers Brothers & Co. are running full on roofing iron and have added another furnace for bar annealing.

Some of the mills and furnaces at Chattanooga and neighborhood are moving along steadily. In the city, the South Tredegar Iron and Nail Company's nail mill is on single turn, as is also the Lookout Rolling-Mill Company's bar mill. The Roan Iron Company's mill has been idle for a number of months, with no apparent prospect of its starting up soon. This company, however, has two large blast-furnaces at Rockwood station, on the Cincinnati Southern road, 70 miles north of here, which are kept constantly in blast, averaging about 100 tons daily from native ores, with coke for fuel, manufactured in the company's own ovens, from coal mined from the hills alongside of which the furnaces are planted. The Oakdale furnace, a few miles north of the Rockwood, are out of blast for the present. The blast-furnace of the Chattanooga Iron Company, planted in town, is also running steadily, averaging 40 tons daily from native ores, and coke from the Dade mines in Dade County, Georgia. The new Citico furnace, a fine structure which has just been completed, is also planted at the edge of town on Citico Creek. It is a fine furnace, with three large Whitwell stoves. Fire was put in to dry it out recently. The South Pittsburg furnace is running, averaging about 90 tons daily. The Cowan furnace is also doing well, making a daily yield of about 75 tons, while the Rising Fawn makes about 90 tons daily.

The Western Nail Association, February 13th, reduced the card rate from \$3.40 to \$2.60. The stocks were reported light and trade unsatisfactory. Few factories in the West are in operation.

A certificate of incorporation of the Standard Vapor-Fuel, Iron, and Steel Company has been filed in the County Clerk's office, New York. The capital is \$2,000,000, in shares of \$100 each. The trustees are Henry C. Nutt, George R. Collingworth, J. S. Andrews, W. C. Dornin, and J. D. Wendel.

A San Francisco foundry has recently received a large order from an English firm to manufacture a complete hydraulic outfit for a mine in the Transvaal. The machinery is costly, and includes a sixty-stamp quartz mill, each stamp weighing 900 pounds. Yet the machinery is so well arranged for packing that no section weighs more than 500 pounds, and it is all easily handled. It will be shipped next week for Delagoa Bay, the nearest shipping point to the mine. A body of miners, engaged at San Francisco on a three years' contract, sailed for South Africa last month.

Messrs. Dean Brothers, of Indianapolis, have issued a new catalogue describing and illustrating their steam-pumps.

J. M. Jones & Sons, car manufacturers in West Troy, have made an assign-

ment to E. C. White, of New York, with preferences of \$87,000 to M. M. White & Co., of New York. Assets not known.

A mine locomotive, with 10 by 14 inch cylinders and six drivers, is being constructed for the Atchison, Topeka & Santa Fé Railroad Company, in New Mexico, by the Wyoming Valley Manufacturing Company, of Wilkes-Barre, Pa. The height of the locomotive is not to exceed 5 feet 8 inches at the highest point.

#### LABOR AND WAGES.

The annual convention of the Amalgamated Association of Iron and Steel Workers to determine the scale of wages for the ensuing year from June 1st will be held in Pittsburg April 5th. Each district in the association will hold conventions on the second Saturday in March, to elect delegates to the general convention and to suggest changes in the present scale.

The House Committee on Labor has ordered a favorable report on Representative Hopkins's bill for the establishment of a department of labor statistics. The measure provides for the appointment of a commissioner, who shall acquire all useful information on the subject of labor, its relations to capital, and the means of promoting the material, social, religious, and intellectual prosperity of the laboring men and women.

President Harris, of the National Executive Board of the Coal Miners' Association, has called a meeting of the presidents of the different State organizations to be held at Pittsburg on the 14th instant. The object of the meeting is to take such action as is required for the miners' interests. Representatives from Ohio, Indiana, Iowa, Maryland, Virginia, and Illinois will be present.

William Weibe, President of the Amalgamated Association of Iron and Steel Workers, recently visited Joliet, to advise with the members of that association relative to the scale of prices to be agreed upon between that association and the Joliet Steel Company for this year. The mills will start up March 1st.

A mass meeting was held February 8th by the workingmen's unions at Joliet, Ill., to demand relief from the evil effects of the system of prison contract labor.

It is reported that one hundred and fifty miners have been discharged from the mines at Cole City, Georgia, to make room for a large invoice of convicts received.

The regular semi-annual convention of the river and railroad coal miners of the Pittsburg District will be held at Pittsburg, March 11th. The meeting will be one of the most important in the history of the Miners' Association, as a number of vital questions touching rail and river rates will come up for discussion and final adjudication. At present, there is a feeling of dissatisfaction all over the river district, a number of pits being operated below the district price. A determined effort will be made to establish uniform rates, as a matter of justice to both miners and producers.

#### RAILROAD NEWS.

The Wabash is receiving from the shops at Cambridge City, Ind., 100 coal cars, with a capacity of 40,000 pounds each.

A dispatch from St. Paul states that it is officially announced there that the Northern Pacific Railroad Company will on March 1st sever all connection with the Oregon Railroad and Navigation, the Oregon & California Railroad, and the Pacific Coast Steamship companies. Negotiations are said to be pending between the Northern Pacific Railroad and the Oregon Railroad and Navigation companies for the leasing of the latter company from Walla Walla to Portland to the Northern Pacific. The latter is anxious to secure this road in order to have practically a line of its own to Portland and the seaboard.

The Northern & Western Railroad Company is rapidly improving the twenty-five acres of land it has purchased at Lambert's Point, on the Elizabeth River, near Norfolk, Va., by the erection of extensive coal-docks. A railroad is erecting between Norfolk and the Point, and the production of the mines of the company is to be increased from 30,000 to 50,000 tons per month.

The Philadelphia Record states that the Pennsylvania Railroad Company has about consummated negotiations with the Lehigh Valley Railroad Company for the lease of the latter's line to the former. These negotiations have been pending for nearly a year, but were not sooner completed because of the ill-health of the late President Packer and the inability to reach satisfactory terms.

The President of the Mexican Central Railroad has stated that the first train will pass over that road from El Paso to the City of Mexico about April 1st.

Officials of both the Lehigh Valley and Pennsylvania railroad companies deny the revived report that the former road has been or is to be leased by the latter. Pennsylvania Railroad officers declare the statement that they have made or would make a guarantee of 10 per cent on the stock as ridiculous, and also say that they have a satisfactory traffic contract with the Lehigh Valley for an interchange of business.

Bills have been introduced in the Mississippi State Senate to incorporate the Helena, Memphis & New Orleans Railroad Company, Macon & Tuscaloosa Railroad Company, Aberdeen & Fulton Railroad Company, Mississippi & Deer Creek Railroad Company, Mississippi, Alabama & Georgia Railroad Company, and the Warrior Coal-Fields Railroad Company.

Judgment was rendered in favor of the German bankers Sulzbach, February 11th, by the United States Circuit Court at Philadelphia, in the case against the Thompson estate, to recover \$800,000. Sulzbach Brothers brought the action as bondholders of the Davenport & St. Paul Railroad Company. The complaint as filed against Mr. Carnegie is dismissed. The court proposes to file a decree appointing a master to assess the damages.

The directors of the Lehigh Valley Railroad, February 12th, elected Elisha P. Wilbur, a nephew of the late Asa Packer, President, to fill the vacancy caused by the death of Harry E. Packer.

Thomas Dickson, President of the Delaware & Hudson Canal Company, has made a statement as to the value of the company's canal, and foreshadowing an important change in the methods of its transportation, which has created great surprise along the route of the canal, as it is now regarded as more than likely that the business of that region will be entirely revolutionized in the near future. Mr. Dickson was a witness in a suit brought by the company to have the valuation of the canal in the town of Marbletown, Ulster County, reduced from the amount at which it had been assessed. The canal cost nearly \$60,000 a mile to construct; but Mr. Dickson declares on oath that the canal as a canal has no value, because transportation over it is no longer economical. Changes and improvements in railroad building and management have made transportation by rail possible at much less cost than by the canal, and thus its usefulness has been destroyed. The only value the canal has now, Mr. Dickson says, is in the right of way it commands between Rondout and Honesdale, and its adaptability as a road-bed for all rail transportation between the mines and tide-water. This valuation is placed by the witness at between \$5000 and \$8000 a mile, and the company has in contemplation the abandonment of the canal and the substitution of a railroad. Although it has been rumored from time to time for several years that the company had such a change under consideration, this is the first official intimation that such is the fact that has been made. The length of the canal is 108 miles. At Honesdale, it is connected with the mines by gravity railroad system over the Moosic Mountains.

Telegraphic reports from Havana state that several American capitalists are largely interested in mines abounding in a sort of liquid pitch on the northern coast of the province of Pinar del Rio. Large quantities of the product are now regularly shipped to the United States, and to facilitate its transportation, a railroad is planned along the coast through a section having an abundance of pitch, and to connect other large mines by railroad with the port of Mariel.

## COAL TRADE NOTES.

## INDIANA.

The coal mines around Brazil are not running as briskly as they have been, some of them not averaging half-time. Zellars and the Nickel Plate are the only mines putting in pretty good time. Work is duller for this time of year than it has been for some time.

## IOWA.

There has been an agreement that all coal passing through Des Moines should be sold at the same price charged by the Coal Exchange there. Prices have been cut by some outside dealers, and the Coal Exchange to-day reduced the shipping price from \$2.25 a ton to \$1.75. The miners will begin digging Monday at four cents a bushel. They have been receiving four and a half, but, according to agreement, reduced the mining price themselves.

## MARYLAND.

Mr. Thomas Brown, Inspector of Mines for Allegany and Garrett counties, in his report for 1883 says: I am happy to be able to state that the condition of the mines in these counties is generally improved since the date of my first commission in 1880. The miners have had a liberal supply of timber furnished them. There has also been a large increase of trap-doors in the various mines, and a number of new furnaces for ventilating purposes have been erected, and more attention has been paid to bratticing up abandoned workings, all of which has improved the ventilation of our mines, thereby adding to the comfort of the miner. This has been accomplished in part by reasoning with the superintendents of the various coal companies. They know full well the importance of good ventilation in the process of mining. There are but few mines in the region of any importance that have not got a ventilating furnace, and those without one will soon be supplied, as the owners find it to their advantage, as it enables them to mine more coal per acre from their property, especially in drawing back-pillars; for it is a well-known fact millions of tons of coal have been lost in the region for want of proper ventilation.

Reports from Lonaconing state that the Detmold mine is idle. Cony is not doing much. Pekin and Big Vein are working full-time. Koontz is idle, but will shortly resume operations. Work at the Jackson mine is somewhat better.

## MASSACHUSETTS.

Charles E. C. Gay, coal and wood dealer at Wellesley, has filed a petition of insolvency at Dedham. He has liabilities of some \$12,000.

## NEW MEXICO.

GALLUP.—This coal company has been organized with a capital stock of \$200,000. Members of the company are some of the oldest coal operators on the line of the Atlantic & Pacific Railroad, and now own the most extensively developed mine, and have put out more coal than all the other mines in the Gallup coal regions. They have now in sight (with entries driven) over 25,000 tons of coal and a mining capacity of 500 tons per day. The headquarters of this company is at Albuquerque.

## OHIO.

Mining operations at Chapman are reported to be dull. Sipps's continues good. Shriver's, which was rebuilt after the burning, has every thing in readiness for working, but instead of resuming, all hands were suspended; cause reported—that it didn't pay last year.

## PENNSYLVANIA.

## ANTHRACITE.

The Dodson colliery, at Plymouth, has again regained its original strength, and is producing more coal than ever before in its history, hoisting over four hundred cars daily.

A fire is raging in an abandoned drift of the Salem Coal Company at Shick-shinny. All efforts to extinguish it have been unsuccessful. Communicating gangways with other portions of the mines are closed to cut off all air-currents. Unless the fire is extinguished soon, the loss can not be very large.

A rich vein has been struck in the Middle Creek workings, over eight feet in thickness, the coal being of excellent quality. The coal is equally good in the gangways and big vein. This colliery for a number of years has been comparatively worthless, and was for a long time abandoned.

A general suspension of work in the mining regions in and about Mount Carmel has been reported. The rain and the melting of the heavy mountain snows have submerged the workings. At some of the collieries, large forces of hands have been employed in endeavoring to dam the mountain streams. At some of the mines, there are from 30 to 40 feet of water.

The new slope at Continental colliery, of the Lehigh Valley Coal Company, at Centralia, has been finished, and the openings started. Gangways are driving east and west, from which large quantities of coal will be taken during the coming season.

The new colliery of J. A. Dutter, at Gilberton, is rapidly approaching completion. The machinery is getting into position, and shipments are expected to begin about the first of April.

Operations at the Garfield colliery of Douty and Gable, near Shamokin, are rapidly pushed forward. A 60-horse power hoisting-engine has been placed in position, and the slope, which has been driven upward from a drift at the water-level a distance of 110 feet, is timbering. By the time this work is completed, the machinery will be ready for hoisting, and sinking below the water-level will be begun. The slope will go down 250 yards below the water-level.

## COKE.

The outlook in coke circles, says the *CConnellsville Courier*, has brightened somewhat during the past two weeks. Of the 9695 ovens in the region, but 704 are idle, as compared with 758 two weeks ago. Shipments have increased, and the average daily output is now 700 cars. This increase comes principally from the West, though the transient and foundry trade of New York and the New England States has been heavier than for some time past—the larger operators in the East, notably at Philadelphia, New York, and Boston, and this move has led to a more extensive introduction of our famous furnace fuel in those sections. Orders for foundry coke are coming in every day. Around Uniontown, north and south, every thing is running full except Redstone, where limited orders have reduced the output two-thirds. Lemont has but 100 of 152 ovens burning, and Mount Braddock 192 ovens still idle. At Dunbar, all are running except Mahoning, 100 ovens of which are still in the clutches of the law, with no immediate prospect of escape. With the exception of the works troubled with water, every thing around Connellsville is making all the coke it can. The Pennsylvania works, another works in the meshes of the law, are also idle; but they are advertised for sale March 31, and it is hoped that they will soon be in operation again. With the single exception of the long-time idle 50 ovens of Mrs. Blake at Scottdale, every thing in that vicinity is running full. At Mount Pleasant, the Standard and Boyle works have fired all their idle ovens, and how every thing is going full tilt in that locality. All the ovens on the June Bug branch on the Baltimore & Ohio, from Connellsville westward, and all the Frick works, are running full. On the southwest, from Scottdale northward, the American works, 72 ovens, are idle, but all the others are running full.

## BITUMINOUS.

The Barclay Coal Company reports its income for rent of railroad and royalty on coal for the month of January at \$8545, being \$1588 less than for the same month last year.

## GENERAL MINING NEWS.

## ARIZONA.

## COCHISE COUNTY.

COPPER QUEEN.—The iron deposit recently discovered on the 300 level makes an excellent flux, and is used in place of that which was taken from the Rucker. The furnaces are running steadily, turning out their regular daily shipments of copper bullion. The stopes are all in excellent condition and easily keep the furnaces running.

## MARICOPA COUNTY.

ARIZONA CONSOLIDATED MINING AND SMELTING COMPANY.—For the purpose of working mines situated about twenty miles north of Phoenix, this company has been formed, with a capital stock of \$200,000.

CENTRAL ARIZONA.—The bullion production for 1883 amounted to 12,528 ounces of gold, valued at \$210,038.

## PINAL COUNTY.

The Pinal Reduction-Works will start up as soon as there is sufficient ore on hand.

## YAVAPAI COUNTY.

UNITED VERDE.—This company has averaged, since it started its furnace this month, almost 12 tons of copper per day, with about the same average of silver as stated above, namely, 103 ounces. Advantage has been taken of the fine weather of late to get in sufficient coke from the railroad to insure a steady run for the month of February.

## CALIFORNIA.

## INYO COUNTY.

The Inyo Independent reports that the parties who came from New York recently, Messrs. Elliot and Stevens, to examine the Panamint properties, report favorably, and it is the intention to erect a new mill and begin operations at an early day at this long suspended camp.

It is reported from reliable parties that the Sterling or Silva mine, below Darwin, has been sold to parties who will at once begin the extraction and shipment of ore.

Reports from Cerro Gordo are, that the body of ore in the Ygnacio has been cut, with the most promising prospect of a continuance of high-grade ore.

A recent strike in the Defiance mine at Darwin shows the old mine to be still "a live proposition." A large body of high-grade ore has been uncovered, and, if reports are not colored too highly, the Defiance will, at an early day, come again to the front.

## MONO COUNTY—BODIE DISTRICT.

There is nothing of importance to report. The usual amount of work at the mines continues. Reports of rich strikes are made; but nothing positive can be learned, and it is probable that the statements are only made for the benefit of interested parties.

## YUBA COUNTY.

EXCELSIOR.—This water and mining company, whose property is mostly located in Smartsville, will turn most of its attention to farming. This company owns about 2600 acres of foot-hill land and will use the water, heretofore devoted to mining, for the purpose of irrigation.

## CANADA.

## PROVINCE OF NOVA SCOTIA.

OXFORD.—Owing to the unusual mild winter, surface water has caused delay in mining, and consequently the bullion production of the past year has not been as large as was expected. A new pump and more powerful machinery are now getting into place, which will enable the company to materially increase the output. The Coleman lode has been cut at a distance of 800 feet west of present workings, giving 1400 feet on that lode. Where last cut, it is from 3 to 4 feet wide. The Mill lode continues as heretofore, showing exceedingly well. About sixty-five men are employed.

## COLORADO.

## CLEAR CREEK COUNTY.

The January shipments of ore, as in previous years, are light compared with the average monthly shipments. There were shipped from the depot at Georgetown 47 cars of ore; 27 cars were sent to Denver, 11 to Argo, and 9 to Golden. The shipments made were:

Grant Works, 164 tons 1420 lbs.	\$20,400.00
Argo Works, 110 tons	16,055.00
Golden Smelter, 81 tons	11,037.55
Hall & Co., 55 tons 384 lbs.	9,342.00
Mendota mine, estimated, 62 tons	5,000.00
Total	\$61,834.55

HUKILL.—Shipments have begun.

KOHINOOR DONALDSON.—The mill at Fall River has been completed, and a trial test made.

## GILPIN COUNTY.

ROLLINS.—This company produced in January three hundred and fifty ounces in gold, the profit of the Perlgo mine.

## JEFFERSON COUNTY.

The plans for the establishment of a new plant for smelting-works in Golden are perfecting as rapidly as possible. Parties interested are now in Boston to aid in carrying out the plan for securing the old Trenton works site, in which the McNair furnaces will be placed. The success secured by Mr. Edward O'Neill with those furnaces at the Miners' works in Golden, is assurance enough of the success of such an enterprise.

## LAKE COUNTY.

From the Leadville Herald we take the following:

ADAMS.—The sinking of the Clontarf shaft has been resumed. The depth of the shaft is 540 feet, to which twenty feet more are to be added. When this is done, a level will be driven to the eastward to catch the vein on its dip. To accomplish this will require ten or twelve weeks. When completed, the mine will be prepared to enter upon an era of large production and profitable operation. So far, the mine has extracted but a limited quantity of ore, and its ore-receipts have only been enough to pay running expenses. The advisability of sinking a new shaft on the Moyamensing claim in Big Stray Horse Gulch is also under consideration. The suit of the Moyamensing claim against the May Queen claim has been brought to a termination by an agreement between the litigants, the Adams Mining Company and Dennis Sullivan and others. The exact terms of the compromise are not known, but it is understood that the Adams Mining Company accepted about one sixth of the original claim and a division of the ore still remaining in the territory formerly in conflict.

CASH CREEK TUNNEL.—Situated along the line between Lake and Chaffee counties, about twenty miles south of Leadville, is one of the richest and most extensive gold placer areas to be found in the Rocky Mountain regions. Small portions of this territory have been worked profitably for many years past, in a crude and inefficient manner. During the past year, however, an English syndicate secured control of the property, and is now prosecuting work with a view to carrying on operations in the spring, on a scale that will have few, if any, equals in Colorado. The drawback of these mines, so far, has been the limited supply of water, and the brevity of the working season. This obstacle to the successful and profitable working of these placers will hereafter be obviated by

the present construction of large water-ways, insuring an ample supply of water during the entire working season. To secure these beneficial results ditches, flumes, and tunnels, many miles in length, have been built or are at present in course of construction. The ditch will draw its supply from Clear Creek, which it taps a short distance below the town of Vicksburg. Following alongside the gulch, it continues, either as a ditch or flume, for four and a half miles. A ridge is here encountered which it is necessary to cross in order to reach Cash Creek Gulch. To overcome this obstacle, a tunnel is driving to complete the water-way between the two gulches. The total length of the tunnel will be 2114 feet. Of this distance, 1256 feet have already been cut, leaving 858 feet to be completed. The tunnel is advancing from both sides, and to facilitate matters, a shaft has been sunk midway between the two headings of the tunnel. This shaft has attained the level of the floor of the tunnel, and the driving of the tunnel both ways from the shaft has been commenced. By this mode of operations, it is anticipated that the tunnel work can be completed by April 1st and the company prepared to go to work. The ditch has a capacity of 5000 inches of water. At the point where it leaves the Clear Creek side and enters the tunnel, it is 600 feet above the bed of the Clear Creek stream, that elevation being gained in four and a half miles. The tunnel emerges on the Cash Creek slope, 300 feet above the old diggings in Cash Creek Gulch, and fully one hundred feet above the highest gravel deposits in the gulch. The work is done by the Twin Lakes Gold Mining syndicate.

**CHRYSOLITE.**—This company has made arrangements with Mr. H. S. Kearney, of the Leadville Gold and Silver Amalgamating Mill, for a test of one thousand tons of low-grade ore taken from the Chrysolite dumps. There are several hundred tons of this character of ore on the premises of the Chrysolite, which have been sampled and found to run quite well. A run on a small quantity of ore was made some time ago, and it failed to prove profitable. A test is now to be made on a more extensive scale. If the results prove satisfactory, the company will doubtless erect or purchase a mill for the treatment of this class of ore. The test has not yet been begun, although about four hundred tons of the ore have already been delivered at the mill.

**COMIQUE.**—The owners of this shaft, on the north side of Fryer Hill, have instituted a suit against the Little Pittsburg Mining Company for \$15,000 damages. The claim is based on alleged damages sustained by the Comique, the result of the Little Pittsburg discharging water from its north shaft and allowing it to percolate through the ground and enter the Comique shaft. The difficulty, it is claimed, could have been avoided by the proper construction of launders, to carry the water beyond the reach of the Comique shaft.

**LITTLE CHIEF VS. LITTLE PITTSBURG.**—The suit between these companies, which has been pending for a long time, has been decided in favor of the Little Chief, and judgment rendered in the sum of \$17,711.05.

**NEW PITTSBURG.**—The properties of this company are all worked on a lease. None of them is taking out any considerable quantity of ore, although several of them have prospects of meeting with success.

**ROSEVILLE-ALTA.**—It is thought that this company will secure sufficient funds to resume operations on its properties on Prospect Mountain at an early day.

PUEBLO COUNTY.

**NEW ENGLAND & COLORADO.**—Work on this smelter at Pueblo will be commenced March 9th.

SUMMIT COUNTY.

About fifty persons interested in Summit County mines held a meeting at Denver recently. The object of the meeting was to devise the best means of advancing the mining interests of that section. In addition to inaugurating plans for more thoroughly advertising the mining interests of that county, this new association also has in view the object of securing better shipping rates to Denver for ores. A number of committees were appointed, and resolutions adopted, after which the meeting adjourned, subject to the call of the president, Judge Berreman.

DAKOTA.

Fair specimens of asbestos have been taken from a mine in Harney District. Samples have been sent East.

**CLIMAX.**—Shipments of mica have begun by the new company, and the working force of the mine has been increased.

**FATHER DE SMET.**—The report for the week ended February 1st shows ore extracted from the first, second, and third levels, 3010 tons. Ore milled 3000 tons. Justice uprise advanced 8½ feet. Rise is up 63 feet.

**MINERVA.**—This gold mining company, which has just been organized, is erecting a forty-stamp mill and such other machinery as is necessary for treating the ore. It is estimated that the cost of reduction will not exceed two dollars per ton.

GEORGIA.

The mining companies operating in Lumpkin County are, with few exceptions, doing more than the usual amount of work for this season of the year, the weather being very favorable for mining operations. The reports from the mines are, as a rule, encouraging. Work will without doubt be commenced on at least two recent discoveries early in the spring, and an additional twenty stamps will probably be added to the plant of the Barlow very early in the season. At the Keystone, operations have been resumed, the pending litigation having been settled. Prospectors are busy, and some hitherto undeveloped portions of the county are receiving the attention of prospective purchasers.

MEXICO.

**JESUS MARIA.**—The twenty-stamp mill is nearing completion, and will be running shortly. The mine is looking well.

MICHIGAN.

The January output of the mines mentioned was :

	Tons.		Tons.
Calumet & Hecla	1836	Huron	71
Quincy	184	Wolverine	56
Franklin	176	Copper Falls	47
Atlantic	166	Hancock	36
Alouez	100	Grand Portage	33
Peninsula	89	Pewabic	30

Official figures show that the production of refined copper in 1883 of the companies mentioned has been as follows :

	Lbs.
Alouez	1,751,377
Atlantic	2,682,197
Central	1,268,556

**ALLOUEZ.**—The directors have issued the following circular: It having become apparent that while copper sells at the low prices that have ruled for some months past, any considerable profit in working the Alouez mine must arise from treating a larger quantity of material, and thereby reducing the average cost, the directors have determined to increase the capacity of the stamp-mills 50 per cent by erecting a third head of stamps, and to make other additions to the mine plant that will be required for handling the increased output. When the last call on the stockholders was made, about a year ago, the directors hoped that the improvements could be paid for out of the earnings of the mine, which would have been the case if the market value of copper had been maintained. The heavy decline in price has, however, rendered this impossible, and the call now made has become necessary in order to promote the

improvement named, which the directors believe to be essential to the future of the enterprise.

**BELT.**—The new mineral dressing-works at this mine started up for the first time February 4th. The machinery worked smoothly.

**FRANKLIN.**—From official sources, it is stated that the bottom level at No. 5 shaft is opening up a good lode for barrel and stamp copper, and No. 2 shaft, sinking below the 24 level, is showing good paying ground. The January product shows a gain of 42½ tons on January, 1883.

**OSCEOLA CONSOLIDATED.**—The official statement of business for the year ended December 31st, 1883, shows that every thing in connection with the mine, both underground and on the surface, is in a most satisfactory condition. A new and improved plant and head of Ball's stamps was put up in the mill last fall for use as an alternate in connection with repairs, or in cases of emergency, making four heads now available in the dressing-works, equal to crushing 800 tons of rock per day, if required to do so :

From sales of 4,256,409 pounds of copper at 14 96-100 cents.	\$636,846.83
From sales of silver	3,757.78
From interest receipts	4,876.22
Total receipts	\$645,480.83
Expenses at mine were	\$435,201.57
Other expenses, such as smelting, transportation, insurance, etc., were	84,733.46
Making total cost of copper	519,935.03
Leaving as mining profit	\$125,545.80
Add balance of assets, January 1st, 1883	\$312,650.82
Less dividends paid, and expenses of construction, etc., in 1883	176,008.12
Leaving balance of assets, January 1st, 1884	\$262,188.50

MONTANA.

SILVER BOW COUNTY.

**ALICE.**—Local papers state that the operations of this company are somewhat mysterious, owing to the apparent disinclination of the president of the company to make his report as promised. A correspondent of the Salt Lake Tribune, however, states that this report is now in the hands of the printer. Work at the mines shows that at the Alice, operations are chiefly confined to the 800-foot level, which is producing some ore, and to the workings on the south vein, which are producing the bulk of the Alice output. The Magna Charta is looking about as usual, and is a steady and reliable producer of workable ore of a fair grade. Pulp-assays from the mills, as compared with those of last year, show considerable improvement, and the bullion output for the past five months is considerably larger than for any corresponding period for the past two years.

**ANACONDA.**—For the twenty days ended February 1st, the Anaconda Company shipped 1620 tons of crude copper ore. This month, and monthly hereafter, the shipments of the company will aggregate 25,000 tons. The amount of ore now raised from the mine is 14,000 tons per month. Over 200,000 tons of ore are on the dump. This is all workable ore, and will be shipped to the smelter on the completion of the Anaconda branches. The smelter will start up in September. The concentrator will have a capacity of 500 tons per day, and additions will be made to the capacity of the works until they will be able to treat 1000 tons of ore every twenty-four hours in addition to that which will be shipped in a crude state. The smelter will consume 50 tons of coal and 30 tons of coke per day. The matte shipments to Europe will exceed 100 tons daily. The shipments to the mines will consist principally of timber, of which 12,000,000 feet a year will be consumed. The daily ore-production of the mine will be 1000 tons, and the company will probably give employment to 1200 men, according to the Butte *Inter-Mountain*.

**MONTANA.**—It is announced that the product of the smelter, which is now 100 tons daily, will be doubled in the near future, and that plans and specifications for the work are now preparing.

LEWIS & CLARKE COUNTY.

According to the Helena *Independent*, the Helena Mining and Reduction Company, the Glover, and the Elkhorn are now paying into the First National Bank an average of about five thousand dollars daily. Other mines are paying in large sums also at the other banks.

**BOSTON & MONTANA.**—The secretary reports officially that the total amount of bullion produced since 1880 amounted to \$501,508. The company's new mill of 60 stamps, 48 settling-tanks, 24 pans, and 12 settlers, built by the Union Iron-Works of San Francisco, started up in full December 15th. The returns of the clean-ups of the overflow up to January 23d, 1884, show \$42,208.78. The amalgam (estimated at \$2000) was stolen from the mill August 21st, 1883, by Archy St. Peter, the night-engineer. The amalgam was recovered, and the thieves captured the night of January 30th, 1884. St. Peter and wife are now bound over for trial in March, and held in \$5000 bail each.

NEVADA.

EUREKA COUNTY.

An important event for the camp will be the consolidation of the Richmond and Eureka Consolidated mining companies for the purpose of prosecuting work at the McKenzie shaft. As soon as arrangements have been completed, this shaft will begin, the water will be taken out, and prospecting be carried on. There is a strong belief that the ore-bodies which were found on the lower levels of these two mines can be found at greater depths than either of them has as yet attained.

**EUREKA CONSOLIDATED.**—For the purpose of working the slag-dump, a new furnace will be erected.

**RICHMOND CONSOLIDATED.**—There is a larger number of men employed at the reduction-works than has been employed at any one time for the last three years. A large portion of these men are engaged in working on the large slag-pile at that place, and there is slag enough there to keep the present force at work for a long period.

STOREY COUNTY—COMSTOCK LODGE.

Good progress in sinking the Combination shaft is made. They are putting in a set of timbers every twenty-four hours. In the Norcross winze, they will open the 2800 station in a day or two. Cross-cutting in the Savage 2600 level will be in order the latter part of the week. Nothing of importance is to be reported from the other mines.

The Carson River is steadily rising, and the volume of water at present is sufficient to run all the mills to their full capacity, with the exception of the Brunswick.

NEW JERSEY.

The ore tonnage over the High Bridge Branch of the Central Railroad for the month of January was as follows: Through to Phillipsburg and points beyond, 22,296 tons; local, 5056 tons; total, 25,351 tons.

Over the Mount Hope Mineral Railroad, the shipments for the month were 9858 tons. The monthly shipments over the Hibernia Mine Railroad amounted to 6724 tons.

NORTH CAROLINA.

Specimens of tin ore, just discovered at King's Mountain, forty miles west of Charlotte, have been analyzed by Prof. George B. Hanna, Assistant United States Assayer. Seven analyses showed the ore to contain 43.46 per cent of tin.

PENNSYLVANIA.

The McCamant Oil Company, of Bradford, McKean County, has notified the State Department of an increase in its capital stock from \$50,000 to \$200,000.

UTAH.

BEAVER COUNTY.

FRISCO MINING AND SMELTING COMPANY.—It is rumored that operations at the Rattler and Cave mine have been suspended. The reason is said to be a disagreement in the company's management.

HORN-SILVER.—Within the next two or three months, this company will erect at the mine the largest hoisting-works in Utah. The engine is to be a double cylinder, direct acting, capable of hoisting from a depth of 2500 feet. The cylinders are to be 18 by 50 inches each. The machinery, which will be from the Union Iron-Works, San Francisco, is to be placed in a commodious and well-constructed building; and when these new hoisting-works are completed, the company will be prepared to increase the output of the mine and go to its depths.

PIUTE COUNTY.

BULLION CAÑON.—This company has recently purchased the Deer Trail mine and several others, giving the company entire possession of Baldy Mountain, which rises from the Cottonwood to Bullion Cañon, Southern Utah. A meeting of stockholders will shortly be held at Chicago.

SUMMIT COUNTY.

SAMPSON.—The mine is opening up well. A shipment of 14 tons sampled 160.41 ounces of silver and 43 per cent of lead, and netted the company \$2000. The ore-house is full of ore of similar quality. The company has broken the road down Empire Gulch, and shipments will continue to be made.

VERMONT.

The Ely copper mine controversy is ended, and work on the property is soon to be resumed.

WYOMING.

Professor Bailey, Territorial Geologist, who has just returned to Cheyenne from the Copper King Mining District, thinks that the recent strike is important. The soft ore was struck on the north drift of the 135-foot level. He says it contains a great deal of native copper and some oxide of copper. The soft ore occurs in pockets, varying from a few inches to eighteen inches in width. Nine men are at work in the mine.

ANNUAL FINANCIAL STATEMENTS.

We give below some additional reports of the financial standing of mining companies. These statements are taken from affidavits filed with the County Clerk, and are, therefore, accurate:

Company Name	Indebtedness	Reporting officer
Adams Prospecting Company of Colorado	None	W. B. Dickerman, President.
Alturas Consolidated Mining Company	10,050.00	Thomas R. White, Jr., Sec.
American Flag Gold Mining Company	15,000.00	A. J. F. Van Deventer, Sec.
American Zinc Company	372,874.00	William C. Squier, Secretary.
Amie Consolidated Mining Company	3,000.00	A. W. Gill, President.
Animas Silver Mining Company	6,000.00	L. H. Stevens, Secretary.
Arizona Consolidated Copper Company	3,813.04	Frank Radd, Secretary.
Atwood Mining Company	25,000.00	C. A. Trowbridge, Secretary.
Beaton Silver Mining Company	5,000.00	Everett Clapp, Secretary.
Belle of Ouray Silver Mining Company	25,000.00	A. G. Agnew, Secretary.
Belvidere Iron Company	70,000.00	A. S. Swain, President.
Bessie Bascom Consolidated Mining Company	30,000.00	E. H. Kellogg, Vice-President.
Bismarck Silver Mining Company	5,000.00	L. E. Granger, President.
Black Range Mining, Milling, and Land Improvement Company	None	Charles L. Wright, President.
Bliven Petroleum Company	5,000.00	H. F. Hutchinson, President.
Bonanza & Union Tunnel and Mining Company	500,000.00	Frank Gulagar, Vice-Pres.
Brittens Silver Mining Company	20,000.00	Richard J. Morrison, Pres.
Brunswick Gold Mining Company	None	C. E. Hayden, Secretary.
Buda Mining Company	600.00	Thomas R. White, Jr., Sec.
Ballard's Peak Mining Company	100.00	Edwin Baldwin, Secretary.
Eagle Gold Mining Company	3,100.00	J. A. May, President.
California Water and Mining Company	150,000.00	William M. Fliess, President.
Campbell Mining and Reducing Co	125,000.00	R. N. Woodworth, Secretary.
Canuchin Consolidated Silver Mining Company	None	L. H. Stevens, Secretary.
Carbonate Hill Mining Company	500.00	Munroe Crane, President.
Centennial Silver Mining Company	75,000.00	Charles B. Cotton, Secretary.
Champlain & Essex Mining Company	25,000.00	Sumner R. Stone, Treasurer.
Chestatee Gold Company	25,500.00	S. Nelson White, Secretary.
Chrysolite Silver Mining Company	35,000.00	Henry C. Cooper, Secretary.
Cimarron Mining Company	5,000.00	Isaac W. England, President.
Coalburg Land and Mining Company	282.52	John H. Platt, Secretary.
Codorus Mining Company	250,500.00	William W. Rossiter, Sec.
Colorado Central Consolidated Mining Company	500.00	Paul Lichtenstein, President.
Colorado Land and Mineral Company	40,000.00	O. T. Hungerford, Secretary.
Congress Copper Mining Company	12,000.00	George H. Folts, President.
Consolidated Batopilas Silver Mining Company	180,000.00	George W. Quintard, Pres.
Consolidated Bobtail Mining Company	10,000.00	John Stanton, Secretary.
Consolidated Gold Mining Company	10,000.00	S. Nelson White, Secretary.
Consolidated Mineral Point Mining Co.	3,000.00	Nathan E. Seelye, President.
Consolidated Pay Rock Mining Co.	50,000.00	M. H. St. John, Secretary.
Copper Hill Mining Company	500.00	J. H. Drake, President.
Copper Prince Mining Company	1,500.00	Robert N. Prestidge, Sec.
Cortez Mining Company	43,644.2	Leonard Richardson, Pres.
Cumberland Mining and Milling Co.	1,000.00	H. S. Vanderbilt, Secretary.
Cusihuiriachi Mining Company	345,000.00	A. H. Barney, President.
Dalhousie Gold Mining Company	10,000.00	C. A. Trowbridge, Secretary.
Deadwood Terra Mining Company	25,000.00	R. P. Lounsbury, President.
Decatur Silver Mining Company	35,441.43	W. K. Marvin, President.
Derre Townsend Arizona Mining and Mineral Land Company	50,000.00	C. A. Trowbridge, Secretary.
Descubridora Consolidated Silver Mining Company	45,000.00	L. H. Stevens, Secretary.
Dolores Valley Mining Company	1,500.00	Joseph Kunzmann, Secretary.
Dona Maria Mining Company	371.90	John S. Hulin, President.
Dorchester Copper Mining Company	None	D. B. Hamilton, President.
Dudswell Gold Mining Company	235.00	Clarence F. Jewett, President.
Eagle Silver Mining Company	26,000.00	C. H. Waterbury, Secretary.
Eames Petroleum Gold and Silver Smelting Company	1,000.00	R. J. Griffith, Secretary.
El Capitan Mining Company	70,000.00	Frederick S. Wait, President.
Equitable Silver Mining Company	30,000.00	Walter Edwards, President.
Estrella Del Norte Mining Company	20,000.00	Robert N. Prestidge, Sec.
Evening Star Mining Company	None	W. B. Dickerman, President.
Fairmount Shafter Mine	22,000.00	James L. Daves, Secretary.
First National Gold Mining Company	52,503.00	William Man, Secretary.
Fletcher Gold and Silver Mining Co.	500.00	J. J. Humphreys, Secretary.
Fo est Springs Gold Mining Company	4,000.00	Gorham Blake, President.
Friedman Mining Company	None	Henry Friedman, President.
Fryer Noble Metal Mining Company	50,000.00	Robt. L. S. Hall, Secretary.
Galatea Mining Company	25,000.00	John E. White, President.
Galveston & Santa Fé Coal Company	None	Edward R. Johns, President.
Garnet Water Power and Mining Co.	10,500.00	F. F. Randolph, Secretary.
Georgetown Eureka Mining Company	10,000.00	Rufus Hatch, President.
Gold Cliff Gold Mining Company	22,000.00	Edward W. Lowe, Secretary.
Gold Cup Mining and Smelting Company	None	Geo. W. Crane, Secretary.

Company Name	Indebtedness	Reporting officer
Gold Gravel Hydraulic Company	15,712.50	John B. Sabine, Secretary.
Golden Horn Mining and Milling Co.	170.00	H. L. Powers, President.
Gold Park Mining Company	160,000.00	C. Campbell, Vice-President.
Goldsmith Mining Company	65,000.00	S. E. Temple, Secretary.
Gold Stripe Mining Company	16,950.00	R. E. Brewster, President.
Good Return Mining Company	14,000.00	W. S. Estey, Secretary.
Goodwin Consolidated Mining Company	3,500.00	H. R. Baitzer, Secretary.
Gowan Mining Company	12,500.00	Charles R. Smith, Secretary.
Grand View Mining and Smelting Co.	242,000.00	C. F. Dean, Secretary.
Granger Mining and Reduction Co.	209.68	James H. Ferguson, President.
Granger Mining Investment Company	5,000.00	S. R. Earls, Secretary.
Granite Mountain Consolidated Mining Company	46,472.84	Samuel L. Harris, Secretary.
Granville Gold Company	10,000.00	William Brandeth, President.
Hamilton-Nevada Mining Company	5,000.00	L. E. Granger, Secretary.
Hector Mining Company	20,000.00	B. G. Noble, President.
Helmet Mountain Tunnel Company	2,000.00	John Van Nest, President.
Hering Gold Company	5,380.81	Frank Rudd, Secretary.
Herman Mining Company	5,000.00	E. C. Bridgman, Secretary.
Hite Gold Quartz Company	135,000.00	C. H. Waterbury, Secretary.
Hortense Mining Company	55,000.00	Robert Sewell, President.
Indian Rock Oil Company	250.00	E. H. Mead, President.
Iron Cap Consolidated Mining Company	1,000.00	Joseph Haight, President.
Iron Duke Mine	500.00	Levi S. Tenney, Secretary.
Iron Silver Mining Company	None	Homer A. Hoyt, Secretary.
Jefferson Iron Company	100,000.00	F. S. Salisbury, Secretary.
Jocuitita Mining Company	25,000.00	R. P. Lounsbury, President.
Kearsarge Silver Mining Company	2,500.00	William Bush, Secretary.
Kesler Mining Company	65,000.00	Francis H. Weeks, Secretary.
Kings Mountain Mining Company	53,935.00	H. N. Twombly, President.
Kismet Consolidated Mining Company	16,000.00	John P. Haines, President.
La Crosse Gold Mining Company	2,500.00	John Van Nest, President.
La Plata Mining and Smelting Co	250,000.00	Thomas P. Fowler, President.
Lexington Mining Company	500.00	Jesse W. Lilienthal, President.
Little Chief Mining Company	None	Abraham L. Earle, Secretary.
Luba Mining Company	7,500.00	W. A. Campbell, Secretary.
Maid of the Mist Silver Mining Company	6,180.00	John Stanton, President.
Mapleton Mining Company	500.00	H. G. Hull, Secretary.
Marshall Basin Mining Company	7,000.00	William W. Rossiter, Sec.
Menlo Gold Quartz Company	8,000.00	Atherton Clark, President.
Mexico-Cambell Reduction Company	10,000.00	R. S. Clark, Secretary.
Milo Consolidated Mining and Smelting Company	6,000.00	William Trotter, Jr., Sec.
Mimbres Mining Corporation	84,000.00	W. Hart Smith, Sec.
Mocupia & New York Mining Company	None	A. S. Azias, Secretary.
Morning Star Consolidated Mining Co.	None	W. B. Dickerman, President.
Moultrie Mining Company	None	E. Fellowes, President.
Negaunee Concentrating Company	100,000.00	George C. Wetmore, Sec.
Newark Silver Mining Company	143,000.00	E. B. Woodruff, President.
New England Gold and Silver Mining Co.	500.00	L. R. Hoyt, President.
New Giral Silver Mining Company	1,000.00	Geo. W. Quintard, President.
New Pittsburg Mining Company	1,000.00	Edward Earle, Secretary.
New York & Honduras Rosario Mining Company	70,727.08	J. J. Valentine, Secretary.
New York & Lone Mountain Mining Co.	None	Edward R. Johns, Secretary.
New York & New Mexico Mining and Smelting Company	7,802.11	T. T. Waller, Secretary.
New York Ore Separator Company	1,000.00	R. L. Keen, Secretary.
New York Smelting and Refining Co.	79,276.10	B. Schult, President.
North Star on Sultan Mining Company	6,000.00	W. B. Walkley, Secretary.
Ocean & Seneca Consolidated Min'g Co.	35,956.00	Edward Selleck, Secretary.
Old Furnace Mine Company	70,000.00	F. H. Smith, President.
Original Butte Mining Company	500.00	Jesse W. Lilienthal, President.
Oro Plate Mining and Milling Company	69,000.00	Charles H. Bacall, Secretary.
Ouray Union Mining Company	5,000.00	W. M. Long, Secretary.
Palmetto Consolidated Mining and Milling Company	10,000.00	George A. Smith, President.
Palmetto Mining Company	40,000.00	G. A. Laridon, President.
Parral Mining and Milling Company	250,000.00	N. A. Cowdrey, President.
Perru Steel and Iron Company	120,000.00	Harry E. Dodge, President.
Poughkeepsie Iron and Steel Company	5,000.00	Sheppard Homans, President.
Plumas Consolidated Mining Company	7,000.00	William H. Guion, Jr., Pres.
Quartz Hill Gold Mining Company	None	William Man, Secretary.
Quinnpiack Mining Company	85,000.00	G. W. Lyon, President.
Red Bird Consolidated Mining Company	5,000.00	Henry Bradstreet, President.
Red Elephant Mining Company	12,887.50	Frank Rudd, Secretary.
Republic Gold Mining Company	42,560.00	R. H. Rickard, Secretary.
Republic of Honduras Campbell Reduction Company	10,000.00	Henry Young, Vice-President.
Revere Concentrating Company	25,000.00	H. M. Benedict, President.
Rising Sun Gold Mining Company	37,000.00	R. E. Brewster, President.
Rocker Silver Mining Company	200.00	Charles L. Wright, President.
Ruby Trust Mining and Milling Company	500.00	E. G. Cushman, Secretary.
San Catarina Copper Company	50,000.00	C. A. Trowbridge, Secretary.
San Miguel Gold and Silver Mining Co.	3,000.00	William J. Osborn, Secretary.
Santa Eulalia Silver Mining Company	190,000.00	James C. Magoun, President.
Sarane Mining Company	5,000.00	H. G. Hull, Secretary.
Saturday Mining Company	78,600.00	H. P. Finlay, Secretary.
Second National Gold Mining Company	None	William Man, Secretary.
Senate Mining and Smelting Company	1,000.00	W. Weston, Vice-President.
Shenandoah Land and Anthracite Coal Company	40,000.00	A. Nichols, President.
Silver Belt Company	5,000.00	L. E. Granger, Secretary.
Silver Dale Mining, Milling, and Improvement Company	3,500.00	Theodore F. Reed, Vice-Pres.
Silver Hill Mining Company	5,000.00	L. E. Granger, Secretary.
Silver Horse Shoe Mining Company	5,000.00	L. E. Granger, Secretary.
Silver Islet Consolidated Mining and Lands Company	150,000.00	C. A. Trowbridge, Secretary.
Silver Mining Company, of Silver islet.	99,701.96	C. A. Trowbridge, Secretary.
Lake Superior	86,127.35	George E. Ford, President.
Silver Ridge Mining Company	20,000.00	S. Montgomery, Secretary.
Singleton Gold Mining Company	29,000.00	S. Montgomery, Secretary.
Siskiyou Mining Company	500.00	W. A. Darling, Pres. dent.
Socorro Milling and Mining Company	2,822.59	James Bryar, President.
South American Mines Company	17,500.00	John A. Douglas, Secretary.
South Silver King Mining Company	4,000.00	Joseph Haight, President.
South Yuba Water and Mining Company	400,000.00	W. Van Norden, Secretary.
Standard Coal Company	7,600.00	H. W. Ford, President.
Starr-King Gold Mining Company	15,000.00	C. A. Trowbridge, Secretary.
Stirling Mining Company	None	W. B. Dickerman, President.
Summit Mining Company	15,000.00	L. J. Atwood, Secretary.
Tesoro Silver Mining Company	None	W. A. Wolf, Secretary.
Thorington Gold Mining Company	17,641.84	A. Vatable, President.
Trust Gold Mining Company	None	H. B. Turner, Secretary.
Uncompahgre Mining and Smelting Co.	9,000.00	Charles G. Cronin, Secretary.
United Gregory Gold Mining Company	None	G. C. Magoun, President.
United States Bullion Refining Co.	36,212.48	Harry L. Horton, President.
Venezuela Consolidated Silver Mining Company	5,000.00	L. H. Stevens, Secretary.
Van de Water Gold and Silver Mining Company	81,500.00	William H. Duncan, Secretary.
Victorio Silver Mining Company	5,000.00	Abraham L. Earle, Secretary.
Virginia Gold Mining Company	40,000.00	S. E. Temple, Secretary.
Virginia Consolidated Mining Company	1,000.00	James Amm, Secretary.
Vulcan Mining Company	40,000.00	Jesse W. Lilienthal, President.
Waldron Consolidated Silver Mining Co.	25,000.00	Nathan E. Seelye, President.
Ward Consolidated Mining Company	None	George G. Nevins, Vice-Pres.
Way-Up Mining Company	None	John J. Anderson, President.
Wellington Mine	500.00	Levi S. Tenney, Secretary.
Wilson & Cass Gold Mining Company	323,809.43	G. B. Forrester, Secretary.
Winnebago & O. K. Mining Company	25,000.00	William F. Buckley, Pres.
Woodside Mining Company	1,000.00	Rufus Hatch, President.

**FINANCIAL.**

**Gold and Silver Stocks.**

New York, Friday Evening, Feb. 15.

There is nothing of special interest to report in the mining market this week. Business was of a smaller but more general character than that of last, and was more generally scattered over the whole list. The fancy low-priced stocks came in for a good share of the transactions, but were a little weak in price. The Bodie stocks suffered a strong decline and were rather neglected. Green Mountain and Horn-Silver recovered from the slight decline experienced last week and were quoted at stronger prices. We give a complete summary of the market below. The total number of shares sold aggregates 112,341, as against 185,237 last week.

The Comstock shares were very quiet and steady. California sold from 27@25c., with a small business. Consolidated Virginia was quiet, and ranged from 21@23c. Sierra Nevada sold at \$3.15. Sutro Tunnel was moderately dealt in at steady prices; it sold from 16@14@15c.

The Bodie stocks were not in so much favor as of late, and were moderately dealt in at steady prices. There were no shares of Bodie Consolidated sold throughout the week. Bulwer suffered a decline from its recent strong prices, and sold from \$2.40@ \$1.70, under a moderate business. Standard was quiet and steady, selling from \$6.63@ \$6.88. Bechtel sold at 10c. Goodshaw was steady at 32@30c., with a small business. Consolidated Pacific sold at 40c., and North Standard at 10c.

The Leadville stocks were quiet and prices were a little weak. Amie sold from 10@8c., and was but moderately dealt in. Chrysolite was irregular under a small business, selling from \$1.10@ \$1@ \$1.05. Brece sold from 10@8c. Iron Silver was quiet and steady, selling from \$2.10@ \$2. Leadville sold from 57@55c., and was quiet. Little Chief was weak, under a small business, selling from 53@48@49c. Little Pittsburg sold at 42c.

The Tuscarora stocks were almost neglected. Those that were dealt in were strong. Belle Isle was strong, selling from 42@56c. with a small business. Navajo was also strong during the week, but sold at a low figure to-day: it was quoted at \$3@ \$3.20, selling at \$2.60 to-day. North Belle Isle sold at 12c. assessment unpaid.

In the miscellaneous list, Alice was quiet and steady, selling from \$2.05@ \$2. Bassick sold at \$9 25, with one transaction. Eureka Consolidated sold at strong prices under time sales; it was quoted at \$2.60@ \$2.50. Green Mountain rallied from last week's prices, and was liberally dealt in at better figures: it sold from \$1.80@ \$2.10@ \$2.05. Advices from the mine state that it shows a decided improvement in its condition, and that there are indications of a fine body of good paying ore. Hall-Anderson was quiet and steady, selling from \$1.25@ \$1.35@ \$1.30. Horn-Silver advanced this week and was strong; it sold from \$6.25 @ \$7. Robinson Consolidated suffered a decline, under a moderate business, and sold from 40 @ 34c. Sierra Grande was also a little weak, selling from 85@80c., with small transactions. Silver King suffered a decline, and was dealt in at irregular prices; it sold from \$6.13@ \$6.38@ \$6.25. Stormont was also irregular, under a moderate business, selling from 15@10@13c. Bonanza King was sold for the first time on this market on Tuesday last. The mines of the company are situated in Providence, San Bernardino County, Cal., and produced last month about \$57,000. The total production last year was about \$600,000. The company has paid three dividends to date, one in December last, one in January, and one this month, amounting in all to \$75,000. The stock was fairly dealt in, and sold at strong prices, being quoted throughout at \$10.

American Flag sold at 5c. Barcelona was quiet and steady at 13@16@14c. Central Arizona was a little weak under a small business, selling from 30@25c. Decatur was quiet at 4c. Harlem was quiet and steady at 9@8c. Oriental & Miller was fairly dealt in at steady prices; it sold from 15@18c. Rappabannock was quiet and steady at 13@14c. Sonora was very actively dealt in and was weak; it sold from 11@8c. The State Line stocks were liber-

ally dealt in at steady prices. Nos. 1 & 4 sold from 5@4c., and Nos. 2 & 3 from 6@9c.

The financial statement of the Father de Smet Consolidated Gold Mining Company for the year 1883, has just reached us from San Francisco. It was submitted at the annual meeting held in that city on February 7th last, and from it we learn that the total receipts were \$354,554.42; disbursements, \$258,747.13; leaving a net profit of \$95,807.29. The following statement is given in detail:

Jan. 1st, 1883—Balance on hand as per last report	\$14,131.20
Net earnings for fiscal year, 1883.	95,807.29
Dec. 31st, 1883—Disbursed 6 dividends, Nos. 25 to 30, inclusive.	\$120,000.00
Balance, overdraft	10,061.51
	\$120,000.00

The following remarks at the conclusion of the statement will no doubt prove of interest:

Total number of tons of ore milled during the year, 104,100 tons; average value per ton	\$3 40
Total number of dividends paid during the year, six, (Nos. 25 to 30, inclusive), at 20c. per share	\$120,000.00

The annual meeting of the stockholders of the Standard Consolidated Mining Company was held in San Francisco on the 4th inst., and the following named gentlemen were elected directors for the ensuing year: John F. Boyd, W. S. Wood, M. R. Cook, L. Osborn, Thomas Brown, Richard H. Laimbeer, and William Willis. At a subsequent meeting of the directors, John F. Boyd was elected President and M. R. Cook and W. S. Wood, Vice-Presidents. Mr. Boyd presented the resignation of William Irwin, the superintendent, who has served the company for the last seven years, which was accepted, and Mr. W. A. Irwin, son of the late superintendent, was elected to fill the vacancy.

**MEETINGS.**

The Cumberland Coal and Railroad Company, No. 17 Place d'Arms, Montreal, Canada. Special general meeting for the purpose of sanctioning the issue of bonds by the directors of the company to the amount of two hundred and fifty thousand pounds sterling, under section seven of the act of incorporation of the company, February 26th, at eleven o'clock A. M.

The Iron Silver Mining Company, of Colorado, No. 12 Wall street, New York City. Annual meeting of stockholders and election of trustees, March 6th, at twelve o'clock M.

The United Verde Copper Company, of Arizona, Temple Court, Nos. 3-7 Beekman street, Room 154, New York City. Annual meeting of stockholders and election of trustees, February 18th, at twelve o'clock M.

**DIVIDENDS.**

The Montana Flume and Mining Company, of Montana, has declared a dividend of \$1300, payable at Butte.

The Plymouth Consolidated Mining Company, of California, has declared a dividend of \$50,000, or fifty cents a share, payable immediately. Total dividends to date, \$450,000.

The Small Hopes Consolidated Mining Company has declared a dividend of \$50,000, or twenty cents a share, payable on and after February 14th.

**PIPE LINE CERTIFICATES.**

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

On Saturday and Monday, the market hung about \$1.09 and seemed to be pegged at that figure. On Tuesday, it weakened to \$1.07½, closing on a rally at \$1.08½. On Wednesday, began a decline which continued through yesterday and to-day, showing from highest point Wednesday to lowest Friday a net decline of 7 cents per barrel. The market during these three days has been on the down grade, and the decline was only checked near the close to-night.

Large blocks of "long" oil have been "dumped out," owing to exhausted margins and general disgust. The selling on Wednesday for long account was very heavy, and while the break looked like a purely speculative one, there were vague rumors of a wild-cat well, and small traders inferring that the larger ones must know more than themselves, began to sell. The decline was greatly aided by the increased production of the McCalmont and Porter wells, but the stories circulated concerning them were

greatly exaggerated; as a matter of fact, they have run down to 200 barrels each, but being torpedoed, responded by a heavy flow, and the latest advices this afternoon show that McCalmont is yielding 14 barrels per hour, and the Porter 30.

The great event Thursday was the sudden drop in refined from 9% to 8½. This arbitrary act of the Standard Company was generally criticised, as there appeared to be no commercial reason for such a sudden drop, and it was believed that, coming on top of an already demoralized market in crude, it was designed to shake out marginal holders.

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

	Opening.	Highest.	Lowest.	Closing.	Sales.
Feb. 9	1.09½	1.09½	1.09½	1.09½	1,430,000
11	1.08½	1.08½	1.08½	1.08½	2,309,000
12	1.08½	1.08½	1.07½	1.08½	3,967,000
13	1.08½	1.08½	1.05½	1.05½	5,420,000
14	1.05½	1.05½	1.03½	1.03½	7,930,000
15	1.03½	1.03½	1.01½	1.03½	10,000,000
Total sales					31,056,000

**SAN FRANCISCO MINING STOCK QUOTATIONS.**

*Daily Range of Prices for the Week.*

NAME OF COMPANY.	CLOSING QUOTATIONS.					
	Feb. 8.	Feb. 9.	Feb. 11.	Feb. 12.	Feb. 13.	Feb. 14.
Albion						
Alpha						
Alta	1¾	1¾	1¾		1¾	1¾
Argenta						
Bechtel					90	
Belle Isle	.50	.55	.60		.45	.40
Best & Belcher	2¼	2¼	2¾			2¾
Bodie	11½	10½	8¾		7¾	6¾
Bullion						
Bulwer						
California		.25				.25
Chollar	2½	2½	2½		2	2
Con. Pacific	.55	.60	.50		.45	.45
Con. Virginia	.25	.25	.20		.20	.20
Crown Point			.95			1
Elko Cons						
Eureka Cons	1¼	1¼	1¾		1¼	1¼
Exchequer						
Gould & Curry	1¾	1¾	1¾		1½	1½
Grand Prize	.20		.20		.15	.15
Hale & Norcross	1½	1½	1¾		1¾	1¾
Independence						
Martin White					.60	.75
Mexican	2¾	2¾	2¾		2¾	2
Mono						
Mount Diablo						
Navajo	3¾	3¾	3¾		2¾	2¾
Northern Belle						
North Belle Isle						
Ophir	1¼	1½	1¼		1¼	1¼
Overman						
Potosi	.60	.55	.55		.35	.40
Savage	.65	.60	.50		.50	.50
Scorpion						
Sierra Nevada	2¼	2¼	2¼		2¼	2¼
Silver King						
Tip Top						
Union Cons	2¾	2¾	2¾		2¾	2¾
Utah	2¾	2	2		1¾	1¾
Wales Cons						
Yellow Jacket	2¾	2¾	2¾		2¾	2½

The following are the financial balances of the various mining companies on February 1st:

CASH ON HAND.	
Alta	\$15,377.87
Argenta	2,770.37
Andes	9,060.51
Benton Con.	7,018.02
Best & Belcher	613.82
Bulwer	8,836.93
Bodie Con.	30,429.71
*Belcher	16,941.20
Crown Point	23,709.14
*Con. Virginia	35,511.13
California	\$334.45
Chollar	37,401.61
Day	1,000.00
Gould & Curry	21,819.40
Mono	14,283.04
Martin White	995.38
Occidental	4,442.79
Sierra Nevada	1,775.37
Standard	61,251.82
Utah	91.52

INDEBTEDNESS.	
*Grand Prize	\$31,248.79
Hale & Norcross	17,899.67
Lady Washington Con	4,209.30
Northern Belle	1,385.34
Savage	2,736.51
Ophir	29,284.55
Potosi	6,150.75

Albion indebtedness exact amount not known; proximate, \$60,000.  
 \* Due Sutro Tunnel Company, \$10,920.  
 † Monthly expenses at mine: amount unknown  
 ‡ Overdraft at Nevada Bank, \$20,204.69.  
 § Bills payable \$76,567.57.  
 ¶ Indebtedness, \$7734.33.  
 \* Bullion on hand about \$10,000.

**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, February 14.

The investment demand for the dividend copper stocks continues active, and more Calumet & Hecla

has changed hands the past week than for a long time. The stock seems to be growing in favor, and orders from all parts of the country show that it is looked upon as something permanent, and sure to pay liberal dividends for a long time to come; sales at \$234@235, closing at \$234½. Franklin sold at \$11½ in the early part of the week, advanced to \$11¾, and reacted to \$11¼ to-day, which was the bidding price at the close. Quincy very steady at \$42@42½, with less doing in it than last week Atlantic sold at \$8, same as before, and Osceola advanced from \$14@16 on sales of 10 shares. Pewabic advanced from \$1¼@1½. Brunswick Antimony sold at \$1 per share, a decline of \$9 per share since last sale, October 27th. It is stated that the company is largely in debt, and that the market for the golden sulphuret does not come up to the expectations of the projectors, and that some measures will have to be taken to raise money to pay the debt.

In silver stocks, there is but very little doing at either of the Boards. Bonanza sold at \$1½ for 25 shares, and 600 Catalpa at 30c. At the Mining Board, mining stocks seem to be almost entirely neglected, and a larger business is now transacted in miscellaneous stocks. American Electric and Illuminating Company stock advanced from \$4¼@5 for the common, and \$11@11¼ for preferred. The company has declared a dividend, payable March 1st, of 4 per cent on the preferred regular semi-annual, and 2 per cent extra; also 2 per cent on the common stock. Standard Water Meter has also become quite active of late, and advanced from 25@60c. per share, and much higher prices are predicted. Empire Mining Company dull at 22@23c. Bowman Silver neglected at 14c. bid, 16c. asked. Dunkin, 24@25c. Sullivan has lost its prestige, and, apparently, its friends; there is but little demand for it, and a few sales at 30c. are reported for the week, closing 25c. bid.

3 P.M.—There is no change in the market this afternoon. Quincy sold at \$42½. Catalpa, at 30c. Empire, 22c. regular; 23c. buyer 30; 24c. buyer 60. Standard Water Meter, 60c. regular and \$½ buyer 60. American Electric Light, \$5 buyer 10; \$4½ regular. Closing prices: Atlantic, \$7½ bid, \$8 asked. Calumet & Hecla, bid \$234. Franklin, \$11 bid, \$11¼ asked. Huron, \$1½ bid, \$1½ asked. Osceola, \$15½ bid, \$17 asked. Pewabic, \$1¼ bid, \$1¼ asked. Quincy, \$42½ bid, \$42½ asked.

**BULLION MARKET.**

NEW YORK, Friday Evening, Feb. 15.

An advance in the London market for silver and in sterling exchange here has advanced the rates for silver in our market at per figures of accompanying table:

DATE.	London.	N. Y.	DATE.	London.	N. Y.
	Pence.	Cents.		Pence.	Cents.
Feb. 9	51 1-16	111½	Feb. 13	51½	112¼
11	51½	111½	14	51½	112¼
12	51½	111½	15	51 3-16	112¼

**BULLION PRODUCTION FOR 1884.**

MINES.	States.	Month of January.	Year from Jan. 1st, 1884.
		\$	\$
*Bonanza King, s.	Cal	56,278	
*Chrysolite, s. L.	Colo	4,721	
*Contention, s. G.	Ariz	80,439	
*Deadwood-Terra, s.	Dak	49,196	
*Father de Smet, s.	Nev	25,095	
*Grand Prize, s.	Dak	104,231	
*Homestake, s.	Utah	174,000	
*Horn-Silver, s. L.	Mont.	110,446	
*Lexington, s. s.	Colo	8,588	
*Little Pittsburg, s.	Nev	24,820	
*Mount Diablo s.	Utah	163,576	
*Ontario, s. L.	N. S.	3,660	
*Oxford, s.	Cal	102,438	
*Plymouth Consolidated, s.	Cal	21,923	
Syndicate, s.	Cal		

Total amount of shipments to date...\$952,411

\* Official. G, Gold; S, Silver; L, Lead.

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 3½ per cent. During the

week, the bank gained £410,000 bullion, and the proportion of its reserve to its liabilities was raised from 40½ to 40 13-16 per cent, against 44 15-16 per cent at this date last year. The weekly statement of the Bank of France show an increase of 5,325,000 francs gold, and of 475,000 francs silver.

**METALS.**

NEW YORK, Friday Evening, Feb. 15.

**Copper.**—The market is very quiet, Lake selling at 14½@15c., while outside brands fetch from 14@14½c. Mr. A. Harnickell, of this city, a well-known authority on matters pertaining to copper, has compiled the following statistics:

	For the arts.	Argen-tiferous.	Total, 1883.	Total, 1882.
STOCK:	Lbs.	Lbs.		
Lake not counted.	6,400,000			
PRODUCTION:				
East.....	59,000,000		59,000,000	
East and South.....	2,400,000		2,400,000	
New Mexico.....	600,000		600,000	
Nevada.....	50,000		50,000	
Arizona.....	20,500,000	1,500,000	22,000,000	
California.....	700,000	800,000	1,500,000	
Wyoming, etc. }	500,000	1,500,000	2,000,000	
Colorado and Utah }	6,000,000	18,000,000	24,000,000	
Montana.....				
	86,150,000	21,800,000	117,950,000	88,062,000
IMPORTS:				
Pyrites.....	2,000,000			1,000,000
	88,150,000	21,800,000	119,950,000	89,062,000
EXPORT:				
Ingot, 14,000,000.				5,850,000
Pig, etc., 4,000,000.				
Pyrites, etc. }	20,000,000	21,800,000	41,800,000	3,212,000
2,000,000 }				
	78,150,000		78,150,000	6,812,000
CONSUMPTION.....				
SURPLUS.....	None.			6,400,000

Messrs. James & Shakspeare, of London, have compiled the following statistics of copper:

	—Jan. 1 to 31—		
	Imports.	Deliveries.	
	Tons.	Tons.	
Fine foreign, chiefly Aus-tralian.....	638	508	London.
Chili.....	1,590	2,088	
American.....	185	350	Liverpool
Spanish precipitate and sun-dries.....	802	393	and Swansea.
Totals, England.....	1,377	1,338	
American.....	100	180	France.
Chili bars, ingots and Barilla.	339	794	
Sundries.....	5	10	
Totals, England and France.....	6,897	8,343	

	—Stocks—		
	Jan. 31.	Dec. 31.	
	Tons.	Tons.	
Fine foreign, chiefly Aus-tralian.....	3,318	3,188	London.
Chili.....	25,574	26,072	
American.....	139	304	Liverpool
Spanish precipitate and sun-dries.....	2,585	2,176	and Swansea.
Totals, England.....	267	228	
American.....	195	275	France.
Chili bars, ingots, and Barilla.....	2,280	2,735	
Sundries.....	25	30	
Totals, England and France.....	38,397	39,843	
Advised by mail and telegram:			
Chili.....	7,925	7,800	
Australian.....	1,00	1,000	
Stock and afloat, gross totals.....	47,422	48,643	

**Tin.**—The market has weakened, particularly so far as spot is concerned, and large lines have been sold at 17½c. for Straits. Futures are stronger. England cables to day £81 2s. 6d.

**Lead.**—The parties who have for some time attempted to manipulate the market have again appeared as buyers, and are taking all the lead they can secure at 4.10c. The sales during the week figure up to about 900 tons at that price. The stock, whatever it may be, is certainly strongly concentrated in three hands, one of these being the Richmond Company, whose views are pretty high. Many of the refining-works not in alliance with those manipulating the market are sold ahead for periods varying from 20 to 40 days. An argument, of which much is made in connection with the present outlook, is, that the ore deliveries to smelting-works are small. It is urged that this means the beginning of a serious

falling off in the production. This may be so, but it should not be forgotten that in deep winter it could not be expected that ore-shippments should continue heavy. With the market in its present shape, influenced entirely by the buying and selling of one party, powerful, it is true, but slightly erratic, it is difficult to judge the metal on its merits.

Messrs. John Wahl & Co., of St. Louis, send us the following dispatch to-day:

Our market continues very strong, and since our last report prices have further advanced, and sales of 200 tons of Chemical lead have been made at 3-75c. and 3-80c. Offerings are very light. Holders, anticipating better prices, have withdrawn from the market at present and refuse to make sales for future delivery at present quotations. Receipts during the week foot up to 900 tons.

Messrs. Everett & Post, of Chicago, wire to us to-day:

Business has been quiet and of a limited character, with quotations at 3-75@3-80c. Producers for the most part are not willing to sell ahead.

**Spelter.**—The market shows no signs of gaining strength. We quote Common domestic at 4¼@4½c. Sheet-zinc is again undergoing a period of low figures, quotations being 5-10c. England cables £14 15s. for Silesian Spelter.

**Antimony.**—We quote Hallett's 11¼c. and Cook-son's 12c.

**IRON MARKET REVIEW.**

NEW YORK, Friday Evening, Feb. 15.

Mr. Edward J. Shriver, Secretary of the New York Metal Exchange, has compiled the following report of the stocks in bond at New York, Boston, New Orleans, Philadelphia, and Baltimore:

Pig-iron.....	5,268	6,433	7,360
Spiegel iron.....	3,074	3,394	3,739
Old rails.....	1,995	2,032	6,236
Scrap iron.....	2,345	2,355	2,782
Scrap steel.....	806	806	456
New iron rails.....	457	457	6,646
New steel rails.....	1,335	1,292	5,116
Grand total.....	15,280	16,769	32,335

The following is the report of 209 furnaces, for February 1st:

ALL GRADES.	UNSOLD STOCKS.	
	Jan. 1.	Feb. 1.
Anthracite; 19 in, 33 out.....	30,294	26,282
Bituminous; 14 in, 63 out.....	47,648	39,650
Charcoal; 21 in, 59 out.....	42,054	36,323
Total.....	119,996	102,255

ALL GRADES.	PRODUCTION.	
	In Dec.	In Jan.
Anthracite; 19 in, 33 out.....	20,637	18,545
Bituminous; 14 in, 63 out.....	43,678	37,068
Charcoal; 21 in, 59 out.....	15,605	9,018
Total.....	79,920	64,631

**American Pig.**—The business is quiet, though the market displays a tendency to stiffer figures, causing a somewhat greater anxiety to buy and less general disposition to sell. It is reported that the Crane Company has standing on its books orders for 20,000 tons of pig-iron, the bulk of which has been taken at good figures. Other makers are similarly well off, so far as foundry irons are concerned, the demand being now for small lots chiefly. Mill irons are barely steady. The Crown Point iron reported as sold in the daily papers was chiefly Nos. 3 and 4, and was at special terms. 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.

At the Exchange, no transactions were recorded during the week:

**Scotch Pig.**—The market is firm and quiet. Spot lots can be had cheaper than iron to arrive, as freights for April and March are higher.

We quote ex ship and to arrive: Coltness, \$22.50



NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

Table with columns: NAME AND LOCATION OF COMPANY, HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE (Feb. 9-15), SALES. Lists various mining companies like Alice Mon., Amie Con., etc.

NON-DIVIDEND-PAYING MINES.

Table with columns: NAME AND LOCATION OF COMPANY, HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE (Feb. 9-15), SALES. Lists various mining companies like Alta-Montana, American Flag, Barcelona, etc.

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 46,951. Non-dividend shares sold, 65,391.

BOSTON MINING STOCKS.

Table with columns: Feb. 8-14, Sales. Lists various mining companies like Allouez, Amie, Atlantic, Aztec, etc.

PHILADELPHIA MINING STOCKS.

Table with columns: Feb. 8-14, Sales. Lists various mining companies like Amer. Cons., Argent., Arizona So., Battle Mt., etc.

@\$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, f. o. b. Glasgow: Coltness, 57s. 6d.; Langloan, 54s. 3d.; Summerlee, 52s.; Gartsherrie, 53s., at Ardrossan; Glengarnock, 52s.; Dalmellington, 48s. 6d.; Eglinton, 46s.; and Warrants, 42s. 9d.

**Steel Rails.**—No business of importance has been done; \$35 at mill may be shaded under especially favorable circumstances for small lots.

**Old Rails.**—We quote nominally \$21.50 to \$22 for Ts.

**Philadelphia.** February 15.

[From our Special Correspondent.]

**Pig-Iron.**—Erroneous reports have been given out as to the volume of business transacted in this city. The demand for crude iron has not increased any during the past week or two, and is quiet, and prices are firm. Production shows no increase, and there is a steady decline in unsold stocks, which shows that producers are still acting very cautiously, and that consumers are purchasing rather more freely than during the latter part of last year. Current requirements are steadily filled. The larger consumers have placed contracts for iron for two or three months; hence the business of the past week has been confined chiefly to small lots. There is no tendency to fluctuations on prices. Whatever activity there is in iron is in Forge—\$18 to \$18.50 are the ruling prices at tide-water, but an occasional lot is heard of a little under \$18, but the amount of iron to be had at that is not large. The trade is in a healthy condition, but there is no room for an increase in production or improvement in price. Foundry iron sells at \$20 for No. 1, with occasional lots as high as \$21. Two hundred tons of No. 2 sold at \$18.50 yesterday. A number of small lots were sold during the week from that up to \$19.50. The agents representing Southern furnaces said to-day that they had more orders on hand than they could accept.

**Foreign Irons.**—Four or five inquiries have come to hand within forty-eight hours for spiegeleisen, and one or two bids were as low as \$27.75. The asking price is from \$28 to \$29 for 20 per cent. Very little has been done in other foreign material. Bessemer is held nominally at \$20, and Scotch is moving as usual, in small retail lots. Very little pig-iron has come here lately, but the arrivals of ore are quite frequent.

**Muck Bar.**—The active demand for muck bar has hardened prices for some two or three of the best makes, and as high as \$33.50 has been asked this week and paid. It seems to be the policy of users of muck bar to defer purchasing until they can crowd down the market by offers for heavy lots, after manufacturers have become tired of waiting for a market.

**Blooms.**—Two or three Eastern bloomeries report an improvement in inquiry this week, and a few good orders at the old figures, which seem permanent.

**Merchant Bar.**—One or two city mills, and some country mills, have begun to sell iron on better terms than during January. The storekeepers are able to get somewhat better prices. More of the withheld requirements are coming along. At the same time, there is no rush for iron, but a steady, quiet improvement, which keeps prices between 1'85 and 2'10c., for large to small lots. A few twenty-five to fifty-ton lots of common iron were crowded in at 1'65c.

**Nails.**—The action of the Western nail makers was anticipated here, and prices are now nominally the same in both markets, \$2.50@\$2.60, \$2.60 being the card rate West. The tone of the Eastern nail market is not very favorable, and some manufacturers are disposed to anticipate a drop, and make the best terms they can for large orders.

**Sheet-Iron.**—The market has gained a little more strength in small lots. Large lots are still very low.

**Wrought Pipes and Tubes.**—Pipe manufacturers report a good deal of business in sight, but no heavy transactions to report at present. The discount on lap-welded tubes 47½ for black, 30 per cent on black butt-welded steam-pipe, 20 per cent on galvanized, 35 per cent on lap-welded galvanized, 50 per cent on black lap-welded pipe.

**Plate and Tank Iron.**—Quotations are 2'25c. on Boat Plate, 2'30c. for Tank Iron, 2'75c. for Shell, 3'75c. for Flange, and 4'75c. for Fire-Box. All these

figures are shaded to meet the sharp competition, which seems to be on the increase rather than the decrease.

**Structural Iron.**—Quotations are to-day 2'20c. for Angles, 2'25c. for Bridge Plates, 2'75c. for Tees, and the usual combination rates for Beams and Channels.

**Steel Rails.**—Business has declined to the placing of small orders at \$35, and there is no particular pressure on the part of makers to secure business.

**Old Rails.**—Old rails are nominally \$23@\$23.50 for tees, but very little business has been closed. A good deal of old material could be sold, if \$22.50 were to be taken. Bridge rails are nominally \$23.75; no transactions reported. Crop Ends, nominally \$19 to \$20.

**Scrap-Iron.**—The yards are not very well supplied with first-class scrap. Poor stuff, cheap and plenty. Cargo is quoted at \$22.50, but none is changing hands, and no orders are coming.

**Pittsburg.** February 13.

[From our Special Correspondent.]

During the greater part of the past week, the business in iron and steel has been limited, on account of the flood, which has seriously damaged a number of mills. Some will not be able to resume for a week or two; and this fact, together with the ordinary dullness of bar iron, has curtailed the demand for pig-iron. Quotations are, \$18@\$20 for foundry grades. One sale of Charcoal Foundry No. 1 was reported at \$28. Five hundred tons of extra Gray Forge sold at \$18. A 300-ton lot of silvery sold at \$16.50. Nails are quoted at \$2.40 for car-load lots, with from 10 to 15 cents more in a jobbing way. Steel Rails, \$35@\$36 at mill. Old Rails are quoted at \$23@\$24—no sales. The demand for nails, pipes, track supplies, and bar iron is quiet, with prospects of an improvement next month. Prices are, as a general thing, steady.

The iron manufacturers of the Mahoning Valley have appointed a committee to appear before the Ways and Means Committee at Washington in reference to the Morrison bill on next Saturday.

Several of the window-glass firms will start up on Thursday. Some other firms would have started up at the same time, but have been delayed by the flood, and will not begin work until next week.

About three hundred miners on the Monongahela River have struck for the district price.

## COAL TRADE REVIEW.

NEW YORK, Friday Evening, Feb. 15.

### Anthracite.

The unfavorable weather during the greater part of the current week has reacted upon the trade, though a continuance of the present frost may cause some buying. The competition of bituminous coal is assuming a grave aspect. The anthracite companies can not expect to obtain the contracts of the Eastern mills unless they come down to \$4, delivered at Boston. When we state that last year contracts were made on the basis of about \$4.75, the gravity of the situation will be appreciated. Unless the smoke of poorly managed bituminous fires is a serious drawback, consumers will prefer the soft coal when prices are the same. Assuming that the trade for steam purposes aggregates about 3,000,000 tons of anthracite per annum, of which the bulk is broken, it will be seen that the companies will have to turn quite a heavy quantity into domestic sizes. On the other hand, it may be considered that the natural increase in the consumption of anthracite for household purposes is not, on an average, much less than 10 per cent annually. The possible loss of the steam trade, therefore, means only a slight and temporary halt in the development of this great industry.

The Philadelphia & Reading Railroad has issued the following circular:

On and after this date and until further notice, our prices for Lykens Valley coal will be as follows:

	Broken.	Egg.	Stove.	Chestnut.
F. o. b. Port Richmond...	\$4.60	\$5.00	\$5.50	\$5.15
F. o. b. Elizabethport.....	5.10	5.50	6.00	5.65

### Bituminous.

During the past weeks, bituminous coal companies

have secured a number of contracts, aggregating fully 200,000 tons. Among them, are a number of Eastern mills, like the Pacific mills, which have hitherto used anthracite. We discuss this movement editorially.

**Philadelphia.** February 15.

[From our Special Correspondent.]

The anthracite coal trade is resting on its oars, to use a figurative expression, and so far as developments are concerned, no one in the trade here seems to be in possession of any very interesting facts. The half-time output seems to fill every requirement. The warm weather has caused a falling off in demand in the local and line trades, while the outside markets have not been heard from as freely as appearances indicated a week or two ago. Private advices from several New England points substantiate the statement made recently, that consumers in New England markets are moderately supplied with stocks, and no very urgent demand is likely to arise in that quarter, at least, until the ability of the companies to hold prices at their present limits has been severely tested by the longest delay which consumers can indulge in, before placing their spring orders. There is no occasion for hurrying into the market at present; at least, so they say. Visitors from New England coal interests have been in this city investigating the situation, and have gone home, satisfied that their policy is the right one, and that they can afford to wait, to see what thirty days will bring forth. Buyers are of the opinion that the hanging back policy is the best in the coal trade, as in several others, and they will very likely run their coal-bins very low. The statement that transient orders are sufficient to keep down stocks under the present half-time rule is denied. A good many buyers seem to think that the statements of declining stocks are not correct, and have gone to Perth Amboy and Elizabethport, and have visited Port Richmond in person. One thing can be relied upon, the spring demand for anthracite will be very large, but the present contest, below the surface, is as to what spring prices are to be. Buyers, especially the larger consumers, affect to believe that coal will drop in March more than usual. Considerable inferior anthracite coal has been offered during the week, below regular prices. Considerable damage has been done by the flooding of mines. To-day's advices from the West are not as encouraging as last week. Very little coal is going that way at present. Buyers there will probably follow the course of New England buyers, and hold back their orders, in order to profit by any weakness which may be developed. The manufacturing demand in Eastern Pennsylvania has not improved. In the iron trade, there seems to be no particular improvement, and rather less than more pig-iron is made. Facilities for mining coal have been extended during the winter, and especially in the Reading collieries will there be increased production, as compared with last year. Whatever the course of the market may be, restriction will be applied until supply and demand are equalized.

A great deal of uneasiness is expressed by bituminous coal operators, over the fixing of freight rates between the Pennsylvania and the Baltimore & Ohio people. Mr. Wilson returned this morning from a conference in Baltimore with Mr. Garrett, but the result has not been made known. The two coal fields are jealous of each other, and each claims that the other is to receive the greatest advantages. Some importance is attached to the fact that two large Cumberland contracts have been taken by Baltimore people, in advance of the fixing of freight rates, and the Clearfield people are anxious to know why and how this is done. The same thing was done last year, and two months afterward, the thing was fixed up satisfactorily to all concerned. At the prices at which the Cumberland people are taking contracts, the Clearfield operators will have only 40c. per ton for their coal at mines. The fact that Boston prices are \$3.80@\$3.90, Philadelphia \$2.50@\$2.60, shows that there is trouble ahead. The Clearfield region is producing about one half its average capacity. The Mountain mines are not doing very much. As to the talked-of combination, there is nothing in it, although it serves as something to talk about and to hope for, in the absence of any thing to do in coal.



**The Production of Bituminous Coal for the week ended February 9th was as follows:**  
Tons of 2000 pounds, unless otherwise designated.

	Week.	Year.
	Tons.	Tons.
Cumberland Region, Md.	26,497	174,779
Barclay Region, Pa.	10,061	42,147
Barclay RR., tons of 2240 lbs.	10,061	42,147
Broad Top Region, Pa.	2,774	20,911
Huntington & Broad Top RR., of 2240 lbs.	2,774	20,911
East Broad Top	2,774	20,911
Clearfield Region, Pa.	5,075	26,682
Snow Shoe	5,075	26,682
Tyrone and Clearfield	37,372	285,529
Allegheny Region, Pa.	7,422	57,328
Gallitzen & Mountaintop	7,422	57,328
Pittsburg Region, Pa.	5,910	45,292
West Penn RR.	5,910	45,292
Southwest Penn. RR.	3,464	18,863
Pennsylvania RR.	5,635	32,814
Westmoreland Region, Pa.	17,756	131,100
Pennsylvania RR.	17,756	131,100
Monongahela Region, Pa.	3,631	19,405
Pennsylvania RR.	3,631	19,405
Total	125,597	854,850

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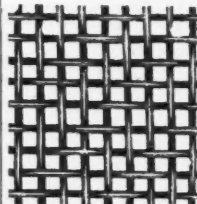
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COLORADO.—Topographical and Township Map of Part of the State, exhibiting the San Juan, Gunnison, and California Mining Regions. By Louis Nell. Substantially same as above. Post-offices, March 1st 1880. Scale, 1 inch : 9 miles, 1-570,240. Plain sheets for wall, 90 cents.

COLORADO.—Cannon's Map of the Mineral Belt of Colorado. Taken from the Records of the Surveyor-General's Office, and other reliable Official Sources. Showing, in colors, the Mineral Belt, Gold Districts, Silver Districts, Coal Districts, County Lines, and Boundaries of Land Districts. There are also given the Capital, County Seats, Township Lines, Railroads, and Projected Railroads. Scale, 1 inch : 10 miles. Size, 26x30 inches. Pocket form, \$1.50; as a wall-map, \$2.

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BAILLES, W. The Student's Guide to the Principles of Coal and Metal Mining. Vol I. (only). 8vo, half morocco. Lond. 1879. \$8.

BELL, I. LOWTHIAN, F.R.S. Notes of a Visit to Coal and Iron Mines and Iron-Works in the United States. 8vo, paper. Lond. 1875. \$1.

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COAL. Its History and Uses. Edited by Professor Thorp. 8vo, cloth. Lond. 1878. \$3.50.

COLLINS, J. H., F.G.S. Principles of Coal Mining. With 139 illustrations. 12mo. Lond. 1878. 50 cents.

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FAIRLEY, W. The Theory and Practice of Ventilating Coal Mines. 12mo, cloth. Lond. \$1.20.

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