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COAL

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CONTENTS.

ON another page will be found a letter from the Director of the Mint, Mr. E. O. LEECH. It was not our intention to disparage the admirable work of our mint in collecting the statistics of the precious metal industry, but in the case referred to and in a few others we believe some of the production has escaped even so expert and experienced a statistician—our mint reports are classic and their value for many years has been chiefly due to Mr. LEECH'S painstaking efforts.

THE gold output of the Witwatersrandt (South Africa) mines in 1891 amounted to the sum of 729,223 ounces: the output in 1890 was 494,801 ounces; in 1889, 379,733 ounces; and in 1888, 230,640 ounces. Such an increase in 1891 was hardly expected at the beginning of the year even in Johannesburg, but the monthly production rose steadily from 53,209 ounces, in January to 80,312 ounces in December. Estimating the value of this gold at £3 10s., or $17.50 per ounce, as is done by the Johannesburg Chamber of Mines, the total value of the output in 1891 was, in round numbers, $12,750,000, or more in value than was produced by all the mines of Leadville, Colorado, and more than was produced by any gold and silver mining district in the United States, with the exception of Butte, Montana. Yet it is expected on the Randt that 1892 will show another phenomenal output.

THE HONORABLE MEMBERS OF THE COMSTOCK MILL RING.

The Comstock mill ring is being hard pressed by the persistent and ably conducted suit of M. W. FOX *vs.* the Hale & Norcross Mining Company. This is shown by the tremendous efforts the rings are making to escape, and to the support now given to the plaintiffs by the local press. The rats are deserting the sinking ship. The honorable gentlemen who have been proven to have in their capacity as owners of the Nevada mill, which treats the ore of the Hale & Norcross, the Savage, the Chollar and Potosi mines, swindled the stockholders of the Hale & Norcross, are:

ALVINZA HAYWARD .. ..Owner of one-fifth interest.
W. S. HOBART.....Owner of one-fifth interest.
United States Senator JOHN P. JONES...Owner of one-fifth interest.
SAMUEL JONES.....Owner of one-eighth interest.
EVAN WILLIAMS..... Owner of one-eighth interest.
A. C. HAMILTON..... .....Owner of one-eighth interest.
Unknown..... .....Owner of one-fortieth interest.

and the Comstock Milling Company, which does a like service to the stockholders of the Consolidated Virginia & California, is owned by JOHN W. MACKAY, JAMES L. FLOOD, and Senator JOHN P. JONES.

It has been proven in court that the Nevada mill gang paid the dummy president, LEVY, whom they had put in to manage the Hale & Norcross Company, some $30,000, being one-eighth of the net profit on some 79,000 tons of Hale & Norcross ore milled, and at that time the stockholders of the company were assessed to pay for producing and milling the ores which netted a profit to the "ring" of at least $240,000.

Never in the history of mining have such outrageous frauds been perpetrated on stockholders as those by the Comstock mill ring whose eminent and enriched partners are highly esteemed for the wealth they have thus accumulated, and one of whom honors the Senate of the United States with his presence.

Even the United States Mint, the administration of which has always been above reproach, and which has in its present director a thoroughly able and upright officer, has been dragged in the mire through the acts of the Carson, Nevada, branch mint. Every one knows that the Comstock rings own the votes of the State of Nevada, and its eminent representatives, United States senators and congressmen, "control the patronage" of the Government in Nevada, including the appointment of mint officials at Carson. It has been openly charged in court, and much evidence has been brought out in support of this charge that the Carson Mint has been used as a "fence" for the disposal of the bullion stolen from the mining companies.

Whether these specific charges be fully proven or not, our mint administration should everywhere be above suspicion. It is not sufficient that the director himself and the other branch mints should receive and deserve our confidence. The Carson mint is bringing disgrace upon every one responsible for its administration. It should be closed if none but the representatives of the mill ring can be appointed to manage it.

In our mining news columns will be found interesting details of the evidence brought out in court in the case of FOX *vs.* the Hale & Norcross Mining Company, *et al.*

THE FREE COINAGE QUESTION.

SHALL WE ADOPT WHAT ALL OTHER NATIONS DISCARD?

The free coinage debate goes on in Congress. The majority of the Committee on Coinage, Weights and Measures reported in favor of it and repeated the threadbare arguments, among others, that because the coinage ratio of silver in Europe is 15½ to 1, and here 16 to 1, no silver would come from there here. Some Congressmen and others "banked" on this argument a couple of years ago when our Government decided to buy 4,500,000 ounces monthly, and they paid for their experience. The silver they held for a rise went down and down because there was always more offered than the Government could take, though its purchases exceeded the entire output of our mines.

Perhaps some of these men who tried to get up the corner in the metal may have found out where the unexpected silver came from and may enlighten the committee. One thing is certain: with every rise in the price silver flowed in just as copper flowed in until it broke the French syndicate, long after it had concluded—and to its own satisfaction, at least, had proved by statistics—that it controlled all the copper of the world.

Everyone, even to the most ignorant inhabitant of India or China, knows enough to sell when prices are abnormally high, and as long as silver would bring $1.29 an ounce in gold, or in what could be converted

into gold, this country would be deluged with the white metal. Our gold would quickly disappear and the price of silver would then go lower than ever in the world's markets. The chief object in bringing silver here would then be to use it in paying wages to workmen and farmers at $1.29 an ounce, while the rest of the world would pay only about 75 cents an ounce for it. What our workmen, and particularly our farmers, would produce would have to be sold in Europe at its gold value, and would be paid for in goods on which the workman would have to pay the gold premium. Every one knows that the home market for everything which we export or produce in greater quantity than the domestic consumption calls for is regulated by the foreign prices. Hence every one producing any of the articles in which we have an export trade, and every one who consumes anything imported, would be directly a loser by the depreciated silver basis, and every workman paid in legal tender silver dollars worth in the markets of the world 60 or 70 cents each would lose heavily. The poor, the wage earners, the savings of the thrifty poor, would be the chief losers by free coinage. No wonder the shrewd Englishmen and Germans would be delighted to see us adopt free coinage and put this country on the silver basis like India or China or Mexico.

Our sharp speculators count that the depreciation in the value of our currency would make a "boom" in which they could grow rich by buying and selling on the rise, each expecting, as in all such booms, to get his profits out before the collapse came, and put them into some security that would have a gold value. What all these men want (and they compose a very large part of the free silver advocates) is cheap money. Paper would suit them still better than silver if it were issued in greater volume; it would cost the Government, or the taxpayers less than silver does—and prices would fluctuate more and rise higher, as was witnessed during the war None of them count the cost of the final settlement when we try to bring our currency back to the basis of the great commercial nations, as every silver basis country is longing and trying to do to day.

Why should we adopt free coinage, which is equivalent to-day to adopting the single silver standard, when every European country that had it has abandoned it and every country that still has it is endeavoring by every means to get rid of it and get on to a gold basis? What every nation in the world that has tried it has found injurious and has abandoned or is seeking to abandon is surely a good thing for us to keep out of. What weight have specious arguments in the balance against the experience of the whole civilized world? Why do not the committee cite examples of nations that have the silver basis and like it; or of nations that have abandoned it and want to get back to it? Such examples would carry weight.

THE LATE THOMAS STERRY HUNT.

Although the ENGINEERING AND MINING JOURNAL so recently contained a portrait of Dr. HUNT, accompanied with a sketch of his career (November 7th, 1891); and although, moreover, my personal recognition of his genius and eminence was, still more recently (Jan. 16th, 1892) expressed in a notice of his latest book, I am unwilling to let the occasion of his death pass without further comment. Like other men who have passed the meridian of life, and before whom the afternoon shadows are beginning to lengthen, I am made painfully aware that with every added year I lose more old friends than I make new ones. A fresh generation presses forward into the scene hitherto filled with familiar faces; and already it begins to seem as if the chief occupation of those of us who remain would be henceforward the friendly and mournful celebration of the virtues and labors of our departed colleagues.

Yet I can hardly claim STERRY HUNT as a cotemporary. He was not only my elder by many years, but the exceptional precocity and industry of his career had made him famous among the leaders of science before I had joined its ranks. His authority and fame were so well established 30 years ago as to be part of the necessary knowledge acquired by a beginner, especially in geological chemistry. And through the period that has since elapsed, he has continued, with amazing acuteness, vigor and fertility, to pour forth his contributions to technical literature and to technical progress. As I remarked the other day, in my notice of his book, he was master both in the laboratory and in the library—a rare combination of accomplishments.

I will not here rehearse his literary and scientific achievements. The long catalogue of his publications, many of which are imperishable classics, sufficiently attests the rank which the abundant degrees and honors bestowed upon him did not confer, but simply recognized. Let it suffice for me, at this time, to recall some of the traits with which I became familiar, more particularly in my relations with him as member and officer of the Institute of Mining Engineers. He joined the Institute in 1871, the first year of its existence, was manager in 1873, 4 and 5, president in 1877, and vice-president in 1888 and 1889. Some of his most interesting observations, and some of his most brilliant generalizations, may be found in the volumes of the *Transactions*. I may mention particularly his address on "The Origin of Metalliferous Deposits" (*Trans.* I. 413), which was reprinted in his "Chemical and Geological Essays," and the history of which, as I happen to be able to furnish it from personal knowledge, offers a striking illustration of those features of Dr. HUNT'S peculiar ability which I wish particularly to emphasize.

It was during the first New York meeting of the Institute, in May, 1872, that Dr. HUNT was requested to deliver a lecture before "The Polytechnic Association of the American Institute," a local society. It was afterward arranged that this lecture should be published as a part of the *Transactions*, though not delivered, strictly speaking, before the Institute of Mining Engineers. The fact was, that we could not afford to go without it. Yet, according to my recollection, it was an improvised generalization, presenting, out of the fullness of the speaker's knowledge of the subject and its history, such a lucid, logical, comprehensive and consistent view as few other men could have framed, even with prolonged toil.

On several later occasions I had the opportunity to witness similar intellectual feats. I remember when, at the Philadelphia meeting of 1878, Dr. HUNT (being then the president of the Institute) was suddenly informed that by reason of some failure in the arranged programme, he would have to open an evening session with something in the way of an address. He was at dinner when he received this announcement; and he could not have had 10 minutes for preparation before the session began; but the exquisitely clear and suggestive address on "The Chemistry of the Atmosphere" (reported in substance only, in Vol. VI. of the *Transactions*) could not have been improved by any amount of preliminary labor. A similar occasion occurred during the next meeting, held at Chattanooga, when a party gathered on the projecting cliff of Lookout Mountain called upon Dr. HUNT to describe the geology of the scene spread out at their feet. That fascinating address was never reported—more's the pity.

Extempore speakers of the first rank are rare enough, but clear and close extempore thinkers are rarer yet. I mean that men who can employ felicitous epithets or construct off-hand correct and forcible sentences, or even frame effective periods and paragraphs, are still in many cases, not masters of the higher art of the logical presentation of an entire theme. They must help themselves with notes and skeletons, or they must go back in their speeches to pick up some thread of the argument which they had overlooked. In short, they would not care to have their off-hand addresses printed, without revision, exactly as they were delivered.

In this particular STERRY HUNT was, I think, unrivaled among the scientific men I have known. His manuscript could go to the printer without "editing," and a stenographer's report of an address by him needed (barring the stenographer's own blunders) no reconstruction to make it perfect in form. I do not speak of the modifications which he might himself introduce into the proofs, particularly of a book on which his reputation was to rest. I think his publishers can bear witness that in this respect he was infinitely industrious and acute. But no one except himself would have perceived the need of such improvements.

Such thorough discipline of thought and expression is indeed uncommon; and I sometimes think it is becoming less frequent every year. The habit of dictating to stenographers (an excellent discipline, if employed as a discipline, but highly demoralizing when resorted to merely as a time-saving and thought-saving device) seems more and more to lead to diffuse, ill-ordered and inaccurate statements, even of technical propositions, in which clear thinking and clear expression are indispensable. How Dr. HUNT acquired his astonishing perfection in "the art of putting things," I do not know. He had it certainly from the time I first encountered him. It may have been for him a gift of innate genius. But I am convinced that the rest of us can attain to it by patient practice only; that in that way it can be reached by every intelligent and determined student of it; and that it is worth, over and over again, all the trouble it may cost. The cut of expression is of course worth little to a man who has nothing important to express (though I have known such men to win, by means of it, much more success than their merits deserved); but, joined to such knowledge, industry and zeal for scientific inquiry, as STERRY HUNT possessed, it constitutes a tremendous power.

As I have already observed, I shall not attempt here to estimate his rank and achievements in science. That his name will be permanently placed high on the list of American authorities and pioneers I do not doubt. Yet, to speak frankly, I think he was wrong on some points concerning which he was most positive; and, in the later years of his long career I fancy that he was tempted to stand by his earlier conclusions through thick and thin, and to see in all new facts confirmations of his own theories. With the last remnants of his failing strength he collected and revised the scientific treatises by which his position must be finally determined. The books thus compiled and edited by his own hand constitute a monument to his genius, industry and learning which certainly cannot be overlooked by the historian of science.

Many of us could speak, partly in admiration, partly in affectionate pity, of Dr. HUNT'S personal characteristics. The alternations of temperament, from the utmost courtly dignity to petulance and

waywardness, from high and serene philosophy to the depths of morbid despair, were all the more remarkable in one who, as a student and expositor of science, seemed lifted above such weaknesses of ordinary minds. In his chosen pursuit he was a strong man; outside of it he was a child, to be judged with the charity and affection which we freely grant to children. I shall remember him at his best—brilliant, earnest, and charming; a delightful acquaintance and a loyal friend.

R. W. R.

CORRESPONDENCE.

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

The Santa Fe Copper Company's Concentrating Mill.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: An article in your issue of January 30th, 1892, pages 165 and 166, taken from the Boston *Herald* concerning the production, etc., of Santa Fe Copper Company, stated that the concentrator purchased at Fort Scott had a guaranteed capacity of 100 tons per day, and that a capacity of only 40 tons per day was reached. It is true that though we had given the Santa Fe Company an estimate for some of the machinery for remodeling their old amalgamation mill into a concentration plant, we did not furnish the Blake crusher, steam plant or shafting. When we made the estimate for this machinery, we understood that all the ore hoisted was to be handled by the concentrator, and not simply the old dumps, with a poor part of the hoisted ore, which consisted of garnet rock and copper pyrites, very finely disseminated. Upon ascertaining this we made tests of the ore, finding that it was worse than it first appeared and that it was very difficult to handle, and we at once refused to enter the order and warrant any capacity whatever, as it was impossible under the circumstances. When it is considered that Lewisohn Bros. were in reality buying from us about $4,000 worth of machinery, it can hardly be thought possible with such a small amount of machinery to erect a complete concentrator with a guaranteed capacity of 100 tons per day.

Notwithstanding our refusal to guarantee any capacity, Lewisohn Bros. gave us the order, and, as they state, they have a concentrator of 40 tons capacity per day, working on very difficult ore at a reasonable cost. The trouble is a lack of crushing capacity, as the surface of the sizing and separating machinery is sufficient for possibly 75 tons. The company has only to enlarge its crushing plant.

THE WALBURN-SWENSON MFG. CO., by F. DE STWOLINSKI, M. E.
FORT SCOTT, Kan., Feb, 8, 1892.

The World's Production of Silver.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your issue of the 13th inst., in the article entitled "The Free Coinage Question," you say: "Soetbeer is unquestionably the best authority in Europe on the production of the precious metals, and in his last report he puts the silver production of the world for 1889 at 4,237,000 kilos., or, say, 10,500,000 ozs. more than our mint report gives. An underestimate of this kind is certainly sufficient to mislead our legislators."

In the same article you quote from Mr. Robert Bassermann, of Manheim, as follows: "Mr. Soetbeer published his last statistics in *Jahrbuecher für National-Oekonomie*, Jena, April, 1891. He puts the silver production of the world for 1889 at 4,237,000 kilos. Mr. Leech estimates it only at 3,842,000 kilos., or 10% less. Mr. Leech persists in ignoring the great quantities of silver that are being extracted from German lead and copper ores, the Mansfield Company alone producing 86,000 kilos. pure silver from its own ores a year."

I fully agree with you in your estimate of the high authority of Dr. Soetbeer as a statistician, especially on the subject of the precious metals and all kindred subjects; and I am glad to be able to add that Dr. Soetbeer, however his figures may differ occasionally from those of the Bureau of the Mint, considers its statistics of the production of gold and silver the most reliable published. The article to which Mr. Bassermann refers is before me, and what Dr. Soetbeer says in it will serve for the present and until the appearance of my next production report as a sufficient explanation of the variance between his estimate of the world's production of silver in 1889 and my own.

I shall, therefore, allow Dr. Soetbeer to answer your criticisms for me. I quote from Dr. Soetbeer's article in the *Jahrbuecher*, April, 1891:

"The Annual Reports issued from the Bureau of the Mint in that country (United States), besides containing information on the management and administration of the Mint of the United States, present statements and tables which have been becoming more extensive, from year to year, of the production and employment of the precious metals, not only in the United States, but in foreign countries also, together with tables of coinages, of the imports and exports of the precious metals, and information on other matters relating thereto. The several Directors of the Mint, viz.: Lindermann, Burchard, Kimball, and, at present, E. O. Leech, have one and all, but more especially the last named, devoted themselves to this task with great zeal as well as with the caution of experts.

* * * * * * * * * * *

"It will be easily understood why the material supplied in this manner, and the tables based on it, in the Reports issued by the Bureau of the Mint, which have now been published for about ten years, has become the foundation for the current statistics of the precious metals, and why, since that time, further calculations, estimates and investigations in this domain can consist only in a critical examination of the material so afforded, and the supplementing of it by other reliable data.

"That the estimates of the production of the precious metals made after the reception and elaboration of the material for a given year are modified or altered, during the following years, need not surprise us, and proves only the continued attention bestowed on subsequent data, even when such data do not seem of any great importance. Subsequent additions and changes, however, have exercised no great influence on the aggregate results reached by the Bureau of the Mint, from the material furnished and published by it at the time.

"If, notwithstanding the agreement just referred to, when final results are considered, and the fact that the same bases are taken for the several tables, our data on the production of the precious metals in some of the most important countries vary largely from those given in the United States statistics, the reason must be sought for in the different way of calculating the share of the aggregate production of gold and silver which should be credited to each of the producing countries.

"In the tables of the reports issued by the Bureau of the Mint, the production of the precious metals is traced to its sources, is given according to mining countries, and is based on the amounts exported from such countries, while our estimates and tables leave out of consideration the quantities of the exported precious metals contained in the *ores and metlatic products* of the several mining countries, but credit the amounts of silver and gold extracted from imported ores in smelting works and parting establishments to the countries in which such establishments are located; that is, of those countries that put the finished product on the market.

"How great variations are caused by this difference in the mode of calculation is most apparent in the case of Germany, and we shall notice and explain it right here.

"The production of the precious metals in Germany, in the years 1888 and 1889, is given in the reports of the Bureau of the Mint and in our tables as follows:

IN THE YEARS	Our Statistics.		Bureau of the Mint Statistics.	
	Gold.	Silver.	Gold.	Silver.
	Kilos.	Kilos.	Kilos.	Kilos.
1888.....	1,793	406,603	1,793	32,051
1889.....	1,958	403,037	1,958	32,040

"Our data are taken from the publications of the Imperial Statistical Bureau, based on the reports handed in by the smelting works in the German Empire. So far as gold is concerned these data have been adopted unchanged in the statistics of the Director of the United States Mint. In the case of the production of silver in Germany they give only the amount which is presumed to have been obtained from domestic German ores.

* * * * * * * * * *

"According to the method of calculation of the Bureau of the Mint, the silver furnished by the German smelting works should, as far as it has been extracted from foreign ores, be distributed among the several countries that have produced these ores (Chili, Bolivia, Colombia, Mexico, etc.)

* * * * * * * * * *

"Apart from these variances, caused by assigning different sources to the final product, which do not affect the aggregate result, other differences will be found, in the case of individual producing countries, in our statistical tabulations and those of the Director of the United States Mint. The reason of this is that we have been able to take into account, in several instances, other material than that furnished by the reports issued from the Bureau of the Mint, especially such as is contained in the *Deutschen Handels Archiv*, and other official publications. But even these differences are not of such a character, when considered in the aggregate, as to cause any great lack of agreement in the end. The material and tables contained, since 1880, in the Reports of the United States Mint Bureau constitute, as has been frequently, frankly and gratefully acknowledged, the principal foundation of recent statistics of the production of the precious metals in the world."

E. O. LEECH, Director.

TREASURY DEPARTMENT, Bureau of the Mint, Feb. 16, 1892.

The Cost of Producing Copper.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I read with great interest your able editorial on the cost of producing copper in the United States, and on the attempt of the Census Bureau to determine such costs. My object in addressing you is not to criticise the statistics of the Census Bureau, though I am convinced that a good many of the companies have not given the exact returns. Nor is it to determine whether the price paid at present for copper stocks is justified as compared with the actual price of the raw material. I intend, however, to demonstrate that some of our largest copper producers can by strict economy and by stopping all improvements not absolutely necessary not only work without loss but even earn some profit at the present price of copper, which is 10¼ cts. per pound.

In studying the official reports, some of which are made out, according the great French financier Pereire's motto, "*C'est l'art de ranger les chiffres*," the following results were obtained:

COST OF PRODUCTION OF LAKE SUPERIOR MINES.

	1889.	1890.
Allouez	11½c. per lb., incl'd'g betterments	16¾c. per lb. incl'd'g development.
Atlantic	9·41c. "	12·91c. " " mine plant .
Central.	.....	13·72c. " " construction.
Huron.....	14·40c. per lb., incl'd'g development	18½c. " " development.
Osceola.....	10·76c. " " ·71c. per lb. for mine plant.....	11·24c. " " 1·42c. per lb. for mine plant
Kearsarge	9·51c. per lb., incl'd'g betterments	10·68c. per lb., incl'd'g betterments
Franklin.....	9·41c. "	7·34c. "
Cal. & Hecla .	*9 16c. "	9·31c. "
Quincy	7·94c. per lb., incl'd'g betterments	8·20c. " incl'd'g betterments
†Tamarack ...	7¾c. " " 1·46c. per lb. for mine plant	11·32c. " " 4·06c. per lb. for mine plant.

*Estimated, no statement published.
†1891—9·11c. per lb., including 2·42c. per lb. for mine plant.
Of the total Lake production in 1891, namely, 109,000,000 lbs., the Tamarack, Calumet & Hecla, Quincy, Osceola and Kearsarge, produced 94,000,000 lbs. or 86%.

A glance at this tabulated statement will show that the survival of the fittest applies first to the Tamarack, which can produce copper as low as seven cents per pound, its mine plant account being closed, and because its management has been careful enough to heed the advice of the ENGINEERING AND MINING JOURNAL and not pay excessive dividends during the last two years. Next in order is the Quincy, which can produce at about eight cents. The Quincy, also, did not distribute all its earnings the last two years.

The Calumet & Hecla can produce in an emergency even much lower than nine cents. The balance of the Lake Superior mines will have a hard time to pull through, and sooner or later, with the exception of the Osceola and Kearsarge, will have to shut down. I left out the Franklin, though its costs of production are below eight cents, for the reason that its ore body will be exhausted pretty soon, and its management has not been able enough to secure the adjoining Pewabic mine.

To arrive at the actual cost of production for Butte, Mont., copper, only the reports of the Boston & Montana are available. The net cost of copper, for the year ending June 30th, 1891, is 9·58 cents per pound, which includes interest and amortization of bonds and mine constructions, but does not include the construction of plant at Great Falls, equal to 1·73 cents per pound of copper produced. The construction account at Great Falls will be closed finally by July 1st next, and therefore I do not take it into consideration for the present purposes. The company will then have clear sailing, and its able manager, Thomas Couch, expects to lay down copper in the form of "electrolytic" at the sea coast 1 to 1½ cents per pound cheaper than this figure. The facilities at Great Falls are unsurpassed; water-power, cheap coal ($1.75 per ton) and saving in freight of the product formerly shipped to the seaports as a 55% matte,

a difference alone of $\frac{55}{100}$ cent. per pound of copper, he thinks. will enable him to do this. The copper being shipped direct from Great Falls to consumers forms an additional saving. The ores,of course, have to be shipped from the hoisting plants at Butte to Great Falls, which. however, is done very cheaply. This company expects positively to be able to produce at about 8 cents, especially having already increased the production since the 1st of January by 25%. The intention is to produce 10,000,000 pounds more, or 40% addition to last year's production, as soon as it starts at Great Falls.

The Anaconda will soon use for its production the electrolytic process entirely and no doubt lay the copper down at about 8¼ to 9 cents. The Anaconda ores are leaner than those mined by the Boston & Montana, while the cost of fuel is much higher. The financial management has not shown itself very able to dispose of the production, nor was it very lucky last year in keeping mine and smelter shut down, while the high prices for copper prevailed.

The Parrott, Anaconda and Boston & Montana, with their production of electrolytic copper, will soon prove a serious competitors to Lake copper. The Butte & Boston Company, as well as the Van Zandt properties and others, will also play an important part in influencing the copper market.

It is safe to say that the production of Montana copper is increasing at an alarming rate, and that the cost of such copper delivered at the seaports can be made less than 8¼ cents per pound.

In Arizona one producing mine was shut down last month. The other mines will probably work even without profit at 10 cents, waiting for better times to come, rather than discontinue operations.

Undoubtedly it would be a good thing for the price of the raw material if the small fry should be compelled to stop production, then the price would go higher, for consumption is certain to increase considerably if the present price of 10½ cents is maintained. Our exports to Europe will also become larger. It is a fact that consumers and traders in Europe hold but very small stocks.

Rio Tinto, Mansfield and Chili cannot produce with profit at £44 for G. M. B. brands, and while all these large producers are at their wit's ends to make further economies (labor strikes in Spain, poorly paid labor in Germany) and reduce the costs, we here in the United States are in the happy position of being able to pay our skilled miners, mechanics and laborers the same wages as before, and all we have to do is to stop work which is not profitable and which cannot be deferred to a time when a more prosperous condition of the copper market will prevail. Unfortunately, however, with such good prospects for an advance, or at least for no decline, in the price of copper, our large producers contemplate an increase of their production in order to reduce costs, and in this way to obtain the same profits earned formerly with a smaller quantity and a higher selling price. They overlook the fact that such an increase will cause a fearful overproduction, and will have a natural tendency to lower the selling price still further, and thus make futile their endeavors. It should be the policy of our large producers, such as the Calumet & Hecla, the companies controlled by Bigelow and Lewisohn and the Anaconda Company to come to an arrangement with the large Enropean and Chilian concerns to restrict pro rata their output for a couple of years and equalize it with the actual consumption. They would be better off, obtain perhaps 12 or 13 cents per pound and consequently make fair profits. Otherwise I cannot look at the situation as very hopeful.

In an able letter published in the ENGINEERING AND MINING JOURNAL February 13th, and signed "Copper," I notice that the bears are blamed for the present situation of copper. I fail to see the point. Where are these bears on copper? Certainly not at the New York Metal Exchange; there is hardly any business done in copper, and the little which is is simply the transactions of brokers acting between consumer and producer. They cannot be in London as long as futures of G. M. B. and all other brands are quoted 10 to 12½ shillings higher than spot, which rather points to a bull speculation.

Your mode of calculating cost, by deducting the dividends paid from the proceeds of the copper, would be an excellent one provided the copper were always sold. There are a few companies which have not sold, but have speculated and kept it even for a couple of years for higher prices, to the detriment of their stockholders. In one dividend paying company's balance sheet it figures at 4 cts. per pound higher than it would actually bring. This is but one instance. On the other hand, some of the companies, especially the Bigelow-Lewisohn companies and the Quincy carry over a surplus of a more or less considerable amount.

Your suggestion to add to the actual cost of copper an interest on the capital and an allowance for depreciation on account of the exhaustion of the mines, should be taken in consideration and heartily indorsed by the directors and managers of the companies. I think, however, 10% a little too much at the present time, but all construction should be invariably charged at once to the cost of copper. As mentioned before, only a mutual friendly and honestly kept understanding among the chief producers on both sides of the Atlantic in checking overproduction will bring about such a price for copper as will allow a reasonably fair margin of profit.

S. E. RAUNHEIM.

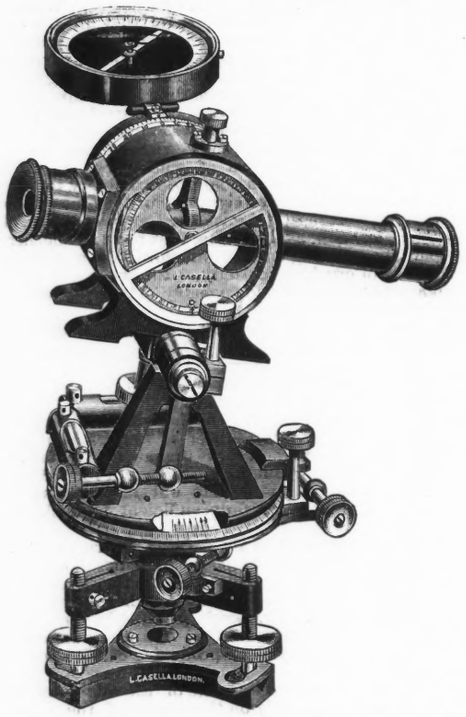
NEW YORK, Feb. 15, 1892.

GOAD'S GEODETIC ALTAZIMUTH.

This instrument is an adaptation of the Casella-Galton pocket altazimuth, designed for use in reconnoissance on preliminary or rapid exploring work, as well as for surveys of precision above and below ground. Altitudes, azimuths, compass bearings, clinometric degrees and levels are all obtainable by this handy little instrument, whose diameter is 2¾ in., thickness 2 in., length of telescope 6 in. and weight about 10 oz. Combined with a theodolite limb and extension tripod for precise work (Fig. 1), it weighs about 6½ lbs., in leather swing case for portability. The stops, *EE*, can be turned on or off to stop or liberate the clinometer or compass respectively ; the eye lens, *F*, is pushed in or out to focus the stadia lines as well as the divisions on the inner edge of the ring. Angles of ground, dip of veins, etc., may be taken by resting the base of the instrument and fixing the inner circle by turninb the stop, *E* or *E*, when the instrument may be raised and the angle read off from the clinometer dial outside. Instead of the theodolite limb the hand piece may be used with a Jacob's staff and universal joint.

The ordinary altazimuth comprises a combined telescope, clinometer and azimuth, the clinometer and compass being contained within the opposite sides of a box or drum traversed diametrically by the telescope. In using this instrument the drum must be in a vertical plane for ascertaining angles in azimuth, and it is necessary after sighting the station to turn the instrument from the one to the other position in order to ascertain the combined angle or true bearing, and then only when the station sighted is on the same plane with the telescope. This alteration in the position of the instrument is apt to cause considerable error in the observation, and the object of this invention is, while retaining the portable form of the ordinary Casella-Galton altizamuth, to enable the compass to be accurately adjusted by reference to the clinometer or otherwise, to the horizontal position necessary for the swinging of the compass, while the telescope is held at any angles of elevation or depression, so that both vertical and horizontal angles may be ascertained without altering the position of the instrument. For this purpose the compass box is so connected to the clinometer drum that it can either be folded flat against the end of the same or turned to a position in which the axis of the compass is so mounted that it may be rotated about the axis of the clinometer, a circle graduated to correspond to the clinometer scale being provided to enable the compass to be adjusted to a horizontal position by reference to the reading of the clinometer.

The telescope and clinometer are both constructed and combined in the ordinary way. The compass fits on to a ring so connected to the drum as to revolve in use on its axis, and provided with an index moving upon a scale upon the periphery divided to correspond to the divisions of the clinometer. The compass box, *A*, when turned down on its hinge closes firmly against the ring. and so occupies no more room than the ordinary altazimuth. The hand-piece is provided with four feet, *BB*,



for application to a straight edge. and adapted (when work of extra precision is required) to be clamped to the cradle, *C*, carried by a horizontal axis mounted on the upright or alidade, *D*, movable about a vertical axis over a graduated horizontal circle resembling the lower limb of a transit theodolite. A suitable form of connection by binding screw is adopted which permits of the easy and secure attachment and removal of the hand-piece. The axis of the cradle is provided with an arm adapted to be clamped to it by a screw for micrometer adjustment. Upon the base of the upright are mounted two levels, and for fine adjustment in azimuth a clamp is adapted by means of a screw to grip the edge of the graduated plate at any point, and carries a micrometer screw, working in a nut carried by an arm fixed to the base of the upright. A similar clamp and micrometer screw connects the axis of the plate with the leveling frame, in which it is mounted and provided with adjusting screws and means of attachment to a tripod stand. The combined instrument can be centered from above or below in the ordinary way; the centering plates having 1¼ in. scope.

This instrument is the invention of Mr. Thomas W. Goad, M. E., F. R. G. S., of Denver, Colo., in conjunction with Mr. Chas. F. Casella, M. S. E., of London, and is made by L. Casella, the well-known instrument maker, of London, England.

A New Dry Cell Battery.—Himmer & Anderson, of New York, are introducing a dry cell battery, constructed as follows : The shell of the battery, which is circular, 3 in. in diameter and 7 in. in height, is composed of zinc and contains a powdered substance, the nature of which is kept secret. A carbon. introduced in the center of the battery, has on its exposed end a nut that forms the wiring connection for one pole, while the other pole is arranged on the edge of the zinc shell. The whole battery is incased in a pasteboard covering, except the top, which is hermetically sealed. The battery registers 11 ampéres and 1·8 volts. The manufacturers claim that it will work successfully for 13 months, with a possibility of its giving good results for 18 months, without any care or replenishing. The battery is particularly adapted for call bells and gas lighting. It is sold at retail for 85 cents.

THE BALTIMORE MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS, FEBRUARY 16-20, 1892.

The 61st meeting of the American Institute of Mining Engineers opened at Johns Hopkins University, Baltimore, on the 16th inst. In the afternoon the members congregated at the Hotel Rennert, where they registered and received handsome badges, and, what was a complete surprise prepared by the local committee, a well bound and neatly arranged volume, descriptive of Baltimore's institutions, industries, and places of interest, as well as containing an exhaustive article by Prof. George H. Williams on the geology of Baltimore and its vicinity. It contained, moreover, a map of the city and geological maps of the surrounding country.

The session proper opened at 8 P. M. at Johns Hopkins, where an address of welcome was delivered by James W. Tyson, Chairman of the Local Committee, who was followed by Mayor Ferdinand C. Latrobe, who assured the members that they were most welcome, and, in a jocular way, guaranteed them that should they meet with trouble while in Baltimore he would use the prerogative of the mayoralty and discharge them without mulct.

President D. C. Gilman, of Johns Hopkins, followed the mayor, and referred to the ties between all scientists. "While the mavor says he will let you out," continued Mr. Gilman, "I shall be glad to take you in, as the Institute has won such distinction among scientific societies. This university is built upon rocks, and I am glad of any new discoveries that are made among them. You are original researchers, who forsake fertile soil for barren ground, and render that productive, and it is well; we cannot have too much gold, coal or iron; we are afraid only of too much silver." Mr. John Birkinbine, President of the Institute, responded to the three addresses, thanking the speakers for their kind words of welcome. He warned President Gilman, however, that though the Institute could supply him with rocks, they were not the "rocks" a university needed.

Dr. R. W. Raymond, secretary of the Institute, after proposing a number of new members, read an obituary of Edward Nichols, of the Rogers Locomotive Works, and a member of the Institute, and then alluded to the death, but a few days previous, of Thomas Sterry Hunt, and said that he could not let the occasion pass without saying a few words in his memory, although he felt sure that Mr. James Douglas, Jr., Dr. Hunt's intimate friend, would prepare an obituary. He referred to the high qualities of the late scientist, and especially remarked the brilliancy of his latest productions, which showed that while his body was enfeebled his mind was in its full power to the last.

Mr. Geo. F. Kunz then read a paper, illustrated by lantern views, descriptive of his recent trip to Russia, the gem mining of the Urals and the lapidary work of that country.

The Tuesday morning session opened at the Lovering Hall of Johns Hopkins, with the nomination of the scrutineers for the coming election of officers. The first paper read was that of Henry M. Howe on the copper mines of Vermont.

THE COPPER MINES OF VERMONT; BY HENRY M. HOWE.

According to Mr. Howe the ancient slates of the Appalachian Range contain a series of large beds of iron pyrites extending from Alabama to the St. Lawrence. These deposits occur in the form of enormous lenses, and though they have many of the characteristics of fissure veins are not generally thought to be such, but to be true ore beds, their irregularities being due to folding and distortion during metamorphism. In the majority of cases, although there are marked exceptions, these lenses pinch out in depth. In the Southern States the upper part of the ore body has been decomposed and the copper leached out. Below the gossan is found a rich layer of copper ore, resulting, perhaps, from the reprecipatation of the leached copper. Below this again is the region of undecomposed sulphides which become impoverished in depth.

In the Northern States both the gossan and richer portion are eroded, leaving the undecomposed sulphides exposed at the surface. The sulphides continue in depth without loss of their percentage of copper, and in some cases are said to have been enriched. In the Elizabeth mine the ore has been worked down on the pitch for 1,500 ft., and in places some 60 ft. in width. At the Union mine, while the ore body does not extend continuously to a great depth, yet continuations of new lenses are found by cross-cutting when the lense pinches.

Although at present the pyrrhotite ores are placed at a disadvantage with the pyrite ores, as far as utilization for acid making is concerned, they contain a larger proportion of copper, and when the gigantic sulphur beds of Louisiana are developed they will be on a par, at least, with the pyrite ores.

THE MAGNETIC ORES OF ASHE COUNTY, N. C.; BY H. B. C. NITZE.

These iron ore deposits, situated in an area of crystalline rocks and embracing an extent of 150 square miles, are practically undeveloped, though some small prospecting has been carried on, and one small Catalan forge, making a very superior tough iron, is in operation. The ores are principally magnetites, suitable for the manufacture of Bessemer pig iron, though hematites and red specular ores of excellent quality are also found, but in very limited quantities. Mr. Nitze divides Ashe County into three main belts—the Ballou or River belt, the Red Hill or Poison Branch belt, and the Titaniferous belt.

The Ballou belt has been opened at several points showing thick beds of ore material running from 41·36% metallic iron to 60·48%, and extremely low in phosphorus and sulphur, but high in silica. The Red Hill, or Poison Branch belt has been opened at numerous points along its out crop, showing large bodies of ore. In addition, the bodies have been traced over unopened ground by the dipping needle. The ore generally is good in character, although certain portions are high in sulphur. The Titaniferous belt is extensive and persistent, and shows large quantities of ore, but the percentage of titanic acid from 8·8% to 9·7% condemns it for blast furnace use.

TITANIFEROUS IRON IN THE BLAST FURNACE.

After Mr. Nitze had explained certain points in his paper by the aid of a large map, an interesting discussion arose. Dr. R. W. Raymond suggested that for the benefit of iron workers the boundaries of the titanic ores, which seem to run in a belt from the large developments in the South, through New Jersey, New York and into Canada itself, should be determined. Dr. Raymond stated that the Durham Furnace had been paying a rental for 20 years on a magnificent body of iron ore which was absolutely useless to it on account of its high percentage of titanic acid, although it was extremely low in phosphorus. The titanic acid ran as high as 14%. It was well known to metallurgists, he said, that titaniferous ores could be treated in the blast furnace by carrying large quantities of alumina in the slag; but at Durham, where they relied upon the Trenton dolomite as a flux, the alumina was not obtainable. Many of the metallurgists of the Lehigh Valley had found accretions of nitro-cyanide of titanium in their furnaces, showing that where titanic acid occurred in small quantities it was accumulative. In the late T. Sterry Hunt's classification of crystalline rocks the titaniferous ores had been placed as characteristic of a certain era, and although this hypothesis has not been proved conclusively it was in his (Dr. Raymond's) opinion most likely to be correct. The aluminous and titaniferous slags, Dr. Raymond said in reply to a question, ran poorly and were difficultly fusible. They were sometimes used to "heal" a damaged hearth.

President John Birkinbine stated that the titaniferous iron deposits of Northern New York and Canada were bounded on either side by bodies free from that element. Titaniferous bodies, strange to say, were placed in the most inviting of positions; huge outcrops enticed the miner. It was Mr. Birkinbine's opinion that the salvation of the titanum difficulty lay in the use of large hearths removable while in blast if necessary. This has been done on a small scale, he said, and why not on a large one.

Dr. Raymond thought the remedy, if any, would be the employment of some of the modern direct open-hearth processes. Mr. Henry M. Howe, however, coincided with Mr. Birkinbine. Mr. Birkinbine continued by saying that magnetic concentration reduced materially the amount of titanic acid in the product. Dr. Eggleston said that this was true, but that he had made a number of experiments, which showed plain jigging would effect the separation of certain titaniferous minerals from magnetite.

GRANULATING MAGNETIC IRON ORES WITH THE STURTEVANT MILL; BY W. H. HOFFMAN.

These mills, which were described by Mr. Hoffman in a general way at the Glen Summit meeting, have been in use at the Croton Magnetic Iron Mines for two years past. As is well known, the ore is crushed in these mills by attrition of the particles of ore in the revolving bushings and the stationary particles in the central casing. The wear of the bushing and screen blocks, which had frequently been considered abnormal in this mill, Mr. Hoffman did not find excessive, the regular wear of a well chilled bushing being $\frac{1}{4}$ in. in 20 hours; but if irregularly chilled would increase to $\frac{3}{4}$ in. in the same time. The screen blocks wear somewhat faster. The chill should extend inward to a depth of $1\frac{1}{2}$ in. The fineness of the product of these mills depends, Mr. Hoffman found, upon the speed of revolution. At 870 revolutions per minute, 80% of the product passed through a 12-mesh screen, while at 950 revolutions, 80% passed through a 14-mesh screen. A 15 in. mill will handle $3\frac{1}{2}$ in. cubes and a 20 in. mill, $4\frac{1}{2}$ in. cubes without reducing the capacity materially. Repairs on all parts are easily made, Mr. Hoffman said, at slight cost. The 20 in. mill at the Croton Works crushing 24 tons of well roasted magnetite through a 12-mesh screen per hour, using 96 H. P., at an expenditure of less than $\frac{5}{8}$ cts. per ton for renewals of parts, and producing almost perfect cubes, so essential in magnetic separation.

ORE CRUSHING MACHINERY.

After Mr. Hoffman had finished Dr. Raymond said that at the next meeting he hoped to have a series of papers on various crushing machines used for different purposes. He thought that such papers and the discussions arising would prove of inestimable value. The secretary then read the following paper by Mr. Moxham:

THE GREAT GOSSAN LEAD OF VIRGINIA; BY EDGAR C. MOXHAM.

This lead, according to Mr. Moxham, is a continuous belt, apparently a fissure vien, of "mundic," both pyrite and pyrrhotite, extending through Carroll County, Va., for 23 or 24 miles, with a northeast trend and a dip of 45° to the southwest. The country-rock is usually soapstone and talcose and micaceous slate. From the surface to the depth of 40 ft. to 175 ft. the mundic is decomposed. The ore bodies are from 12 ft. to 40 ft. wide, at the surface, to 40 ft. to 70 ft. at the bottom. These bodies are being worked at either extremity and now are producing from 800 to 1,000 tons of ore per day, although it is little more than a year since railroad connections made possible their economical exploitation.

The ore is found excellent for use in the blast furnace, especially when mixed with the cheap and high in phosphorus mountain ores. It is reported that these gossan ores assist in obtaining a uniformly large percentage of foundry iron.

While occasional samples yield as much as 48% iron, the average of these ores is as follows: Fe, 41·28%; SiO_2, 9·74%; Mn, 0·306%; P, 0·064%; S, 1·13%; Ca, 0·293%. The mundic itself contains no phosphorus. Its depth has not yet been determined, nor has it been utilized, although the sulphur can be reduced by heap roasting from 34·06% to 7·69% in the roasted lump ore and 5·51% in the roasted fines.

DESULPHURIZING PYRITE AND PYRRHOTITE.

Mr. Moxham's paper elicited considerable discussion. Mr. E. C. Pechin thought that both the width and depth of these bodies had been overestimated, and that the iron men who were using the ore would be glad to get an average of 41% metallic iron. The mechanically combined water, he said, ran all the way from 12% to 18% in winter. He thought mining should be suspended at this season, and that for winter use the ore should be stored. However, the utilization of the pyrites deposits of Louisa County was a very interesting question. One shaft was down 500 ft. and still in ore. If some means could be devised of thoroughly expelling the sulphur it would be of inestimable value to the owners and iron men. Interesting experiments have been made in the Davis-Colby kiln, but as far as he knew without success. The ore had sintered and was not reduced below 5% or 6% sulphur. He thought that if the ore were finely crushed before roasting it might solve the problem.

Mr. W. H. Hoffman gave his experience at the Croton Iron Mines in roasting magnetite with a low percentage of sulphur with the Davis-Colby kiln, using Lima oil as a fuel. The fuel consumption was low,

the sulphur itself furnishing a portion of the heat, and the results obtained were excellent.

Dr. Eggleston said that the reduction of pyrite to protosulphide of iron was simple, but the further reduction was the difficulty. It had to be heated almost to the fusing point before it would give up the last atom of sulphur. The difficulty with such a process was the skilled labor needed. He knew, however, that in Sweden pyrrhotite was mined, the ore shipped to be utilized for the sulphur in the manufacture of sulphuric acid, shipped again to works where the copper and silver were extracted by a wet process, and, the residues, iron oxides, shipped finally to Duisbourg, where a fine grade of iron was manufactured.

Dr. Raymond did not consider the matter worth attention. He thought that the titaniferous deposits discussed before, and these bodies of pyrite and pyrrhotite were a providential investment for posterity.

Mr. D'Invilliers thought, from investigations which he had made, that Mr. Moxham had overestimated the quantity of gossan covering the mundic. It was merely a superficial capping extending over the slope of a hill, and estimates considering the whole mass from the lowest point of the slope to the crest were erroneous, as the central core was mundic. At the Cranberry mines the gossan cap did not extend over 70 ft. in depth nor more than 40 ft. in width. He did not think that the gossan improved in depth; it was the same, virtually, as on the surface.

WEDNESDAY AFTERNOON SESSION.

The Wednesday afternoon session might well have been called the phosphate session, as a series of articles on that interesting subject as well, the discussions upon them occupying the whole time. President John Birkinbine fortified himself behind a copy of Dr. Wyatt's "Phosphates of America," to settle mooted questions from a point of advantage and authority, yet the discussions were not as warm as were expected, but were confined, for the most part, to questionings and explanations. A collection of specimens belonging to Mr. Geo. H. Eldridge were displayed for the inspection of the members and Mr. Eldridge, himself opened the sessions with a paper on the Florida deposits.

THE PHOSPHATE DEPOSITS OF FLORIDA; BY GEO. H. ELDRIDGE.

After a topographical and geological description of Florida, in which he said that the formation was of the Tertiary age, divided into Eocene, Miocene, Pleiocene, Post Pleiocene and Recent, Mr. Eldridge said that the principal portion, as far as the phosphate deposits were concerned, was Eocene, the age of the friable white limestone underlaying the surface being determined, without question, by its fossils. A portion of the median portion had been metamorphosed principally by alteration into phosphate of lime. The Miocene limestones were confined to a small territory in the viciniiy of Tampa Bay and the upper western portion of the State. These limestones were always bedded, whereas the Eocene was never bedded. But the Miocene limestone itself had suffered alteration to phosphate of lime, differing but little from that of the Eocene. The Pleiocene covers a large section of the State, the constituents being clays, marls and limestones.

Phosphate deposits in the Recent are in the course of a number of rivers where it occurs as pebble phosphate. The Lafayette occurring at the northern border of the State was a formation very interesting, since it was the southern continuation of the red clays and marls which extend from the Potomac.

There are four classes of phosphates, he said: The hard rock, the soft rock, the land pebble and the river pebble. The gradations from the laminated variety, continued Mr. Eldridge, as he exhibited a fine specimen of the former, strengthen the theory of deposition especially as specimens of rock entirely similar in appearance were found at the Mammouth Spring in the Yellowstone, where they were deposited by the geyser mineral waters. The origin of the phosphates is in doubt, but phosphate of lime is found in many sea plants and animals. To account for these deposits through deposition and substitution there are four requirements: phosphate of lime, carbonate of lime water and a reagent to dissolve those minerals. Evidence goes to show that the surface waters in Florida carry to-day large quantities of carbonate of lime, carbonic acid, the real solvent, and humic acid, derived from the soils. These waters may have passed through fissures, and the phosphate of lime deposited as the carbonic acid was neutralized by the limestone. The age, however, was the Eocene. The boulders were formed by cavities in the limestone, being filled with phosphate of lime and the exterior casing being washed away.

Mr. Eldridge introduced Professor Shaler's theory as to the formation of the pebble phosphates from marls, and spoke of certain experiments made by Dr. Chatard, of Washington, in which he proved that when crushed phosphate was passed through a screen the greater percentage of phosphoric acid was in the fines.

Mr. Eldridge's paper was followed by one by Dr. T. M. Chatard, of Washington, D.C., on "Phosphate Chemistry as it Concerns the Miner," which paper the author said, was calculated to strengthen the ties between chemist and employer by showing the former how his sphere of usefulness could be increased. This paper was read in part only.

THE APATITES OF QUEBEC; BY JOHN STEWART.

Dr. Chatard was followed by Dr. Raymond, who read a paper by Mr. John Stewart on the Apatites of Quebec and New York. These apatites, according to the author, could not be mined and shipped at a profit unless they contained from 75% to 90% of the pure mineral. The apatite, as it is found, is divided at the mines into four classes, the first consisting mainly of the pure mineral, the second of apatite mixed with pyroxene and hornblende, the third containing mica and calcite and the fourth containing pyrite and pyrrhotite, or magnetite and hematite. Mr. Stewart suggested that the second class could be crushed to powder and used as a fertilizer at once, but the unprogressive farmers of Quebec did not recognize its value and had no use far it. He also recommended that it be roasted in a mechanical furnace such as the Stetefeldt stack or one of the mechanical roasters used in the West, amid SO_2 and SO_3, as well as N_2O_5 vapors. These would form a large quantity of superphosphate at once. There were a number of veins of apatite in Quebec, crossing the Laurentian rocks in every direction. These were not rich enough to follow alone, but if the mass was mined, the apatite could be separated mechanically by concentration, after roasting in kilns. He recommended the "twin sisters" double kiln. If mica alone were present the ore would not have to be roasted. The roasting and concentration would cost, in a well-appointed mill, not over 90 cents a ton, according to Mr. Stewart.

The separation of the metallic minerals from pyrites and pyrrhotite from the apatite might prove valuable, as it has been proved that both those minerals carried considerable quantities of nickel and cobalt.

Two papers of Prof. W. P. Blake were read by the Secretary, one on "The Association of Apatite and Magnetite" and the other "A Contribution to the Early History of the Phosphate Industry in the United States."

Dr. Raymond here called attention to a recent paper by Dr. Hitchcock, of Dartmouth College, in which he suggested that as Reddingite occurred, overlain by volcanic rock in the West Indies, the eruptive rocks might have been the origin of the phosphoric acid.

THE GREEN MARLS OF NEW JERSEY.

A contribution from Professor Smock mentioning the use of immense quantities of the green marls of New Jersey containing small percentages of phosphate of lime and suggesting that as the use of this had proved successful, from an agricultural standpoint, that crushed phosphate rock might also be beneficial.

NOTES ON THE GEOLOGICAL ORIGIN OF PHOSPHATE OF LIME IN THE UNITED STATES AND CANADA; BY WALTER B. M. DAVIDSON.

This paper, as its title indicates, describes the phosphate deposits of Canada, South Carolina, and Florida. The author states that he is of opinion that the various deposits had their origin as follows:

Canada.—The phosphoric acid was secreted by animal agency in sedimentary beds, afterward subjected to heat and pressure—causing folding—and the apatite crystallized out in pockets, the location of which was determined by the folding of the strata.

Carolina.—The phosphate beds are sedimentary estuarine deposits, brought to their present location in suspension in an ancient river which flowed through a district of Vicksburg limestone exposed to decay and denudation—the waters of this river being probably very "hard," and carrying large quantities of carbonate of lime in solution. The calcareous phosphatic silt has since been altered by molecular and leaching action. The prevalence of fossils is due to the preserving action of the phosphate of lime, and the phosphoric acid in the beds is not derived from the bones, but most of that in the bones is derived from the beds.

Florida.—The geological conditions of Florida and some of the West Indian Islands are identical, and the "bowlder" rock is derived from leaching of the limestone, the material being washed into hollows and caves and deposited by water, while the limestone walls have been since washed away during subsidence.

Mr. Davidson said, in addition, that he believed, owing to the reported discovery of phosphates in Guatemala and the peculiarities of the West Indian phosphate deposits, as described in a former paper by Mr. E. V. D'Invilliers, that the whole Gulf region was covered by the Vicksburg limestone, and that Mr. D'Invilliers, in believing that the phosphates of Navassa were leached guano deposits, was mistaken, as, undoubtedly, their origin was similar to that of the Florida land, pebble, and bowlder formation, but that the walls of the caverns, unlike those of Florida, had not been leached away.

THE PHOSPHATE DEPOSITS OF NAVASSA. BY E. V. D'INVILLIERS.

The Island of Navassa, the author said, was pear shaped and of small size. The phosphates were found in irregular bodies in two divisions: the one on the perimeter of the island and the other in the center. The quality of the phosphates differed. The exterior ones were purer, while in the upper position both iron and alumina were found, but combined with phosphoric acid. The occurrence was in irregular caves in the limestone. There was a distinct cleavage between the phosphates and the walls of the caverns. The origin, he thought, and he quoted Dr. Francis, of the Geological Survey of Alabama, to support his theory, was the deposition of sea fowl guano, filling these caverns, afterward being leached, and through the contact with limestone, calcium phosphate was formed.

DISCUSSION OF THE PHOSPHATE PAPERS.

In the discussion which followed these papers Dr. Eggleston thought that there was a great and open field, as suggested by several of the papers, for the use of ground phosphate rock as a fertilizer.

Dr. Francis Wyatt said that while from a geological standpoint there might be many reasons to believe the theory of leaching from the limestone, yet chemical reasons should be considered, and he, therefore, would ask Dr. Chatard, who made the analyses for Mr. Elridge, if in his study of the Florida phosphates he had found an appreciable percentage of fluorine in the phosphates

Dr. Chatard said that he had and that it occurred with remarkable regularity; that if the percentage of phosphoric acid was divided by 12½ it would give the percentage of fluorine. In reply to another question of Dr. Wyatt he said that he had not found it in any of the limestones analyzed by him. He did not consider this strange, for if the percentage of the phosphoric acid in the limestone was divided by 12½ the quantity of fluorine would be so infinitesimal that it would be out of the reach of modern analytical methods. He considered, moreover, the remarkable regularity of ratio between the phosphoric acid and the fluorine to be proof of the theory of the leaching of limestones and the simultaneous deposition of the two elements, fluorine and phosphorus in these combinations.

Mr. Davidson thought that if any one imagined the origin of phosphates to be due to guano alone he would have to suppose the phosphatic territory inhabited by countless millions of birds in a rainless climate.

Dr. Wyatt said that if Mr. Davidson thought he was advancing a theory he was mistaken. He had simply asked a question and was answered.

Mr. D'Invilliers said that Navassa had the requisites of an almost rainless climate, and if not millions of birds, there were sufficient numbers to make it uncomfortable for a man to seek an abiding place on the island.

To the surprise of all, the discussion ended here, and President Birkenbine adjourned the meeting until 8 P. M.

WEDNESDAY EVENING SESSION.

The evening meeting opened at Lovering Hall at 8 P. M. Mr. Spencer Miller delivered an address accompanied by lantern slides, illustrating a system of telepherage in use at the Florida phosphate mines, the Dun-

ellen particularly. Mr. James Gayley, manager of the Edgar Thompson furnaces, Braddock, Pa., read a paper on "The Preservation of the Hearth and Bosh Walls of the Blast Furnace," which is published elsewhere in this issue.

DISCUSSION OF MR. GAYLEY'S PAPER.

At the conclusion of Mr. Gayley's paper President Birkinbine asked whether it would be possible to make a monolithic hearth of the carbonaceous material which was described. Mr. Gayley doubted this, but said an entire bottom could be constructed of it. As for the process of manufacture, he said that the coke and clay bricks were made by hand pressure and carefully dried, then placed in a retort and dressed. The coke and tar brick is retorted only until the vola tile matter has passed over.

Dr. Raymond asked if they were strong. Mr. Gayley replied: As strong as refractory brick; it is considered no softer. Mr. Pechin thought that Mr. Gayley was singularly fortunate in making such a discovery and being in a position to apply it. Dr. Raymond inquired of Mr. Gayley the latest performance of furnace I of the Edgar Thompson Works. Mr. Gayley said the January run from that furnace was 12,706 tons; the greatest week's run in the month was 3,005 tons and the greatest day's run 511 tons. The ore yielded 61%. The consumption of coal was 1,700 lbs. Blast at a pressure of 10½ lbs. and a temperature of 1,200° was used. This furnace is 90 ft. high, with a bosh of 21 ft. and a hearth of 12 ft. When asked how he accounted for this increased production over that reported some time ago to the Iron and Steel Institute, which record at the time was considered marvelous, Mr. Gayley said he could not. The furnace simply kept doing better and better, without any change in ore, fuel or treatment.

THE CONTROL OF SILICON IN PIG IRON; BY WILLIAM H. MORRIS.

In this paper Mr. Morris continued a discussion raised at the Glen Summit meeting, and gave an account of his experience in the matter. In a general way, he said, the control of silicon in the iron means good management of the furnace, especially where close results are required on sulphur as well, and can be obtained only by care and watchfulness. If the furnace works slowly or has a stoppage it means more silicon in the pig, and this is true also in case of a slip with risk of increased sulphur. If the furnace is run too cold the sulphur will all be in the iron. While running on mill iron, Mr. Morris aimed to keep silicon between 0.75% and 1% and was fairly successful, but with the adoption of the basic Bessemer process narrower limits were required in keeping the conditions uniform. Both ore and limestone in work of this kind should be uniform in size, and the fuel should not be high in sulphur. Varying proporitions of coke and coal were tried, and with the furnace in question a mixture of half and half was found to work well.

Before the furnaces were remodeled and the iron stoves replaced by fire brick stoves the best week's work averaged 0·265% Si and 0·05% S. After remodeling, the furnace was run for weeks at a time upon fixed standards with variation not exceeding ·02% to ·03% Iron was made below 0·10% Si and even down to a trace, the sulphur, at the same time, not exceeding 0·017%.

DISCUSSION OF MR. MORRIS' PAPER.

Mr. Morris' paper caused considerable discussion among the iron furnace men present. None could agree on the means employed to obtain this control. The secretary read a communication from B. F. Fackenthal, of the Durham Iron Works, in which he criticised Mr. Morris' paper, inasmuch as he had neglected to give any analyses of his mixtures. Mr. Fackenthal thought that the quality of silicon in the pig depended more upon the proper admixture of ores than the good management to which Mr. Morris claimed these results were due. Others were more positive. Mr. G. F. Knapp, of Steelton, Pa., declared positively that there they has the matter under positive control at the Steelton Works, and this without change of charge, fuel, heat, quantity, or pressure of blast. This seemed paradoxical, but Mr. Knapp was positive that, at twenty-four hours notice, they could change from 0·25 % Si to 2·50 % Si, without apparent difficulty or startling the chemists. Mr. Pechin said that in Virginia similar results were obtained working on identical ores and mixtures.

President John Birkinbine then read an abstract from his presidential address, showing certain interesting statistics of iron manufacture. The meeting was then adjourned until Friday, after Dr. Raymond had announced the election of Mr. Birkinbine to the presidency for the ensuing year, and the election of Thomas M. Drown, Boston; David T. Day, Washington, and John Stanton, New York, to the vice-presidency, and the following board of managers: H. L. Hollis, Chicago; George W. Geortz, Milwaukee, and Charles Kirchoff, New York. Theodore D. Rand and Dr. R. W. Raymond, it is needless to say, were re-elected to those offices with which they have been identified for so many years.

OTHER PAPERS.

The following papers were read by title only: "Experiments with the Roessler Converter at the Marsac Refinery, Park City, Utah", by C. A. Stetefeldt; "The Sim ultaneous Production of Ammonia Tar and Heating Gas," by Alphonse Hennin; "Eastern Kentucky Coke and Coals," by Joseph H. Allen; "La Gardette, The History of a French Gold Mine," by T. R. Rickard; "High Pressure Hydraulic Presses in Iron Works," by R. M. Dealen; "Notes on the Selection of Iron Ores, Limestones and Fuels for the Blast Furnace," by Fred. W. Gordon; "Zinc Mines and Mining Near Webb City, Mo.," by Carl Henrich; "Ancient Method of Silver Lead Smelting in Peru," by Otto F. P. Fordte; "Tests and Requirements of Structural Wrought Iron and Steel," by Gustavus C. Henning.

"A New Method for Removing Scales from Direct Metal Ladles," by David Baker; "The Rock Drill Applied to the Opening of Blast Furnace, Holes," by David Baker; "Extraction of Ore from Wide Vein or Masses," by C. D. Delprat; "Fluor Spar Deposits of Southern Illinois," by S. F. Emmons; "The Desilvervation of Lead Slags," by H. A. Keller.

Among the papers of much interest, but which were read by title merely, were the following:

THE SELECTION OF IRON ORES, LIMESTONES AND FUELS FOR THE BLAST FURNACES; BY FRED. W. GORDON.

The author gives in the paper a number of simple formulæ to determine the choice, from an economic standpoint, of fuels, fluxes and ore. The formulæ, while of the utmost value to the working metallurgist, are very simple, and should be studied thoroughly.

A LIST OF MINERALS CONTAINING AT LEAST ONE PER CENT. OF PHOSPHORIC ACID; BY WM. B. PHILLIPS.

Thinking that a study of the naturally occurring compounds containing phosphorous in the shape of phosphoric acid might lead to some interesting conclusions, Dr. Phillips has prepared a list of the minerals carrying 1% and over of phosphoric acid. The list includes also the composition of each mineral and its crystalline form. There are 141 minerals included in the list, most of them showing no crystal system, but occurring massive. Of those which are crystallized the greater portion belong to the rhombohedral, with almost as many in the monoclinic; then the hexagonal, with about half as many as the monoclinic; and at considerable intervals the inclinic and tetragonal, with but one, pharmacosiderite, in the regular system.

THE SIMULTANEOUS PRODUCTION OF AMMONIA, TAR AND HEATING GAS; BY ALPHONSE HENNIN.

It is well known, said Mr. A. Hennin, that under certain conditions ammonia is found in the gas produced by the distillation of coal. For many years little or no importance was attached to its presence, and no attempt was made for its recovery. A. W. Hoffman was the first to establish a relation between the percentage of nitrogen in the coal and the proportion of ammonia in the coal gas. If all the nitrogen in the coal could be converted into ammonia the value of this product would, itself, give handsome profits on the operation. Indeed, a coal containing 1¾ per cent. of nitrogen would produce per ton the equivalent of 164 lbs. of ammonium sulphate, worth, at the present prices, $5. In 1877, Dr. H. Grouven, of Leipzig, discovered that in a large excess of superheated steam when the necessary conditions of temperature, time and contact are supplied, combined nitrogen is transformed into ammonia.

Between these theoretical actions, however, and the establishment of an economical manufacturing process there were many difficulties to overcome. The practical operation had to be so conducted as to maintain the proper heat, make the conditions for the decompcsition of ammonia as unfavorable as possible and at the same time to produce such a gas as is required in the metallurgy of iron and steel, where rapidity of heating and melting with the lowest percentage of waste is of prime consideration. Mr. Hennin states that he has found that when high pressure steam is moderately superheated and evenly distributed and diffused in the glowing mass in a gas-producer, a limited supply of air drawn into the generator is sufficient to maintain the temperature needed to admit continuously from 1 lb. to 1¾ lbs. of high pressure steam per pound of coal, and that this proportion of steam is ample to provoke the necessary reactions which transform into ammonia 50% to 60% of the total nitrogen of the coal and still to produce a gas of the following composition: Co^2 10·50% O, 1·00%; Co, 20.00%; methane and homologous compounds 4·50%; hydrogen, 38·00%; nitrogen, 26·00%.

This gas is rather high in carbonic acid, but the total of combustible matter is considerable and the efficiency of the gas in a regenerative furnace is very high. It burns with a sharp, white-blueish flame, not without luminosity, and heats more rapidly and more economically than the ordinary Siemens gas. With well designed producers and the proper plant, when the art of managing and controlling the heat in the different zones has been mastered, there is no difficulty in producing regularly, with the proper amount of steam, from each ton of coal, 70 lbs. to 80 lbs. of sulphate of ammonia 130,000 cu. ft. to 150,000 cu. ft. of heating gas of high quality, and, in addition, some 15 galls. to 20 galls. of tar, according to the nature of the coal.

EXPERIMENTS WITH THE ROESSLER CONVERTER; BY C. A. STETEFELDT.

In this paper Mr. Stetefeldt gives an account of his attempts to manufacture sulphuric acid from sulphurous acid gas at the Marsac Mill, Park City, Utah, by means of the Roessler converter. Mr. A. F. Wendt (*Trans.* XII., 274) states that from 80% to 90% of the sulphurous acid can be converted to sulphuric of 15°–20° B., but Mr. Stetefeldt's results were poor. The copper sulphate solution used would retain no more than 1½% of free SO_3, though when metallic copper was charged the strength of the solution in $CuSO_4$ increased 8% every six hours. Mechanically the converter worked well, and had the advantage of saving any silver volatilized or carried mechanically from the roasting of the silver-bearing sulphides, the source of the sulphurous acid.

EXCURSIONS.

Wednesday afternoon, in the interval between the morning and afternoon sessions, many of the members took advantage of the invitation extended by Mr. William T. Walters, to visit his private collections and art gallery, both of which are unsurpassed for beauty and art in this country. The examples of the modern school of painting, in which Mr. Walters is a connoisseur shown there, attracted the gentlemen, while the ladies could not help being enraptured by the collection of ceramics and artistic bronzes.

Thursday there was an excursion to Annapolis, where the Institute was received by his Excellency the Governor of Maryland. The Naval Academy was then visited, and after admiring the drill of the cadets the members inspected the various engines of war used by the navy. Returning to Baltimore, they attended the banquet at the Hotel Rennert—a most enjoyable occasion.

Friday the Maryland Steel Company's Works, nine miles from Baltimore, were visited, and through the courtesy of Mr. James W. Tyson, the Baltimore Chrome Works, which excited much interest. The Baltimore Copper Smelting Works were also visited. This company handles the entire product of the Anaconda Smelter, refining a portion of the ingot copper and shipping the balance to Eurore. It also manufactures its own sulphuric acid, used in the production of bluestone. In 1891 it produced 32,000,000 lbs. of refined copper. Nearby is the electrolytic establishment of the Baltimore Electric Refining Company, said to be the largest plant of the kind in the country.

The Sulphur Mines Company of Virginia works were visited by a number of the members. These sulphuric acid works, using pyrites from Louisa County, Va., consumed 46,000 tons of ore in 1891.

The continuation of the article, "Failures in Boomed Towns," begun in our last issue, is postponed until our next, owing to press of matter, as is the official report of the Horn Silver Mining Company

THE PRESERVATION OF THE HEARTH AND BOSH WALLS OF THE BLAST FURNACE.*

By James Gayley.

The lining of the hearth and bosh of a blast furnace has naturally come to be considered its weakest part, being subject not only to abrasion, but also to intense chemical action. In order to provide against rapidity of wear, it was formerly customary to build the lining from the mantle to the top first, and to put in afterward the hearth and bosh, drawing the latter into a recess that had been reserved for it in the upper lining. At some works this practice still prevails, but through the progressive development of cooling devices it has become possible to protect the bosh so well as to make it the most durable part of the furnace. The main question now is, by which one out of several methods the best economic results can be obtained. The plain bosh jacket, made of wrought iron or steel, and frequently called the air-cooled jacket, was a great improvement over the crinoline-construction formerly in vogue; but it was difficult in many cases to persuade furnace-managers that, in order to secure its best effects, they must discard the thick bosh-walls, and put in comparatively thin ones. Mr. John M. Hartman, who did more perhaps than any one to extend the use of these jackets, invariably contended for a 13-in. wall, the thin wall being an essential part of this construction. Later, a coil of pipe was placed just inside the jacket, through which water, circulating freely, contributed further to the proper maintenance of the walls. Undoubtedly much better results have been obtained in practice where the iron jacket has been supplemented by a coil in this way. It is safe to say that this combination of water-coil and jacket is much better than external sprays on the jacket; but it does not prevent the brickwork from cutting entirely away, which enlarges the bosh to that extent, and interferes with the economy and output of the furnace. In case of leakage or stopping-up of the pipes, they cannot be replaced. A leading blast-furnace manager who is now using this construction advises me that "while the furnace is not particularly unsatisfactory, yet the fuel consumption is much higher than that of a year ago, and the product less." Such, in fact, has been the common experience of users of this arrangement. On the other hand, there is nothing else that has proved so durable a protection for the bosh in the manufacture of ferro and spiegel, both of which are unusually severe on the lining. Nevertheless, I believe it is generally agreed that in a furnace making pig iron, a cooling plate or box inserted in the brickwork will not only afford equal protection against breaking out, but will prove more economical.

*From a paper read at the Baltimore meeting, American Institute of Mining Engineers, February, 1892.

Among the first plates that came under my notice were those used by Mr. Joseph Hunt at the Crane Iron Works in 1877, a section of which is shown in Fig. 1.

Each of these plates was an iron casting, containing a single coil of pipe, located near the inside edge. They were cast in segments, and were made to serve, by means of the projecting edge, the double purpose of coolers and binders to the brick work. They were built in flush with the outside of the lining. The water-pipe did not extend in as far as is now customary; and hence, as the cooling was done nearer to the outside of the lining, not so much benefit was derived as if the pipe had been placed further in; yet even from this inefficient arrangement much advantage was realized.

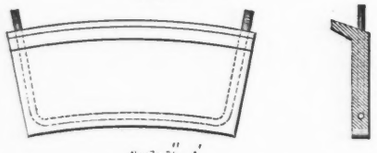
Another form much used had a snake-shaped coil in the casting, cooling more of the sectional area.

The importance of a durable bosh-wall, requiring the cooling agent to be closer to the inner edge of the wall, led to the employment of the two-arm cast-iron plate, shown in Fig. 2.

In order to have a reserve water way a second pass was added. These passes were coupled together and in many cases the water circuit was through two plates. Unless the water is pure and free from sediment this kind of plate is not very durable. It frequently happens that quite early in the blast the inner coil is destroyed; and although the water is kept running through the outer one, yet the furnace lines are widened out and an irregular shape is given, depending on the position of the destroyed passes.

From the success of the bronze over the iron tuyere, it was a natural inference that a bronze bosh plate would in the same manner surpass one made of iron; consequently, a two-pass bosh plate was made by Messrs. Best, Fox & Company, of Pittsburg, from the designs of Mr. Julian Kennedy, and built into the bosh of one of the Lucy furnaces. About this time, or a little earlier, other experiments were made in the direction of using copper and bronze for bosh cooling. In 1884 Mr. Cremer equipped one of the Edgar Thomson furnaces with cooling-plates, inserted vertically around the bosh, only one row being used. Some of these plates consist of cast iron, inclosing a single copper tube; the others were hollow boxes of copper-bronze, 4 ft. long, 2 ft. wide, and 3 in. thick on the outside; if I remember rightly, they were given a slight taper. These plates and boxes were inserted alternatively in the vertical slots in the iron bosh-jacket, and were held in position by suitable fastenings at the top and bottom, in such a way that they could be readily removed. I had an opportunity of seeing one of each type removed. In that one having the copper pipe, about half the cast-iron had been melted off, and the coil had sagged down along the bosh-wall, affording little or no protection against the cutting back of

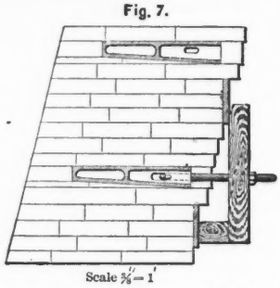
Fig. 1.



Scale 3/4" = 1'

Hunt's bosh cooling-plate.

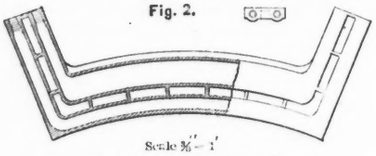
Fig. 7.



Scale 3/8" = 1'

Apparatus for removing the Gayley plate.

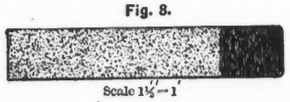
Fig. 2.



Scale 3/8" = 1'

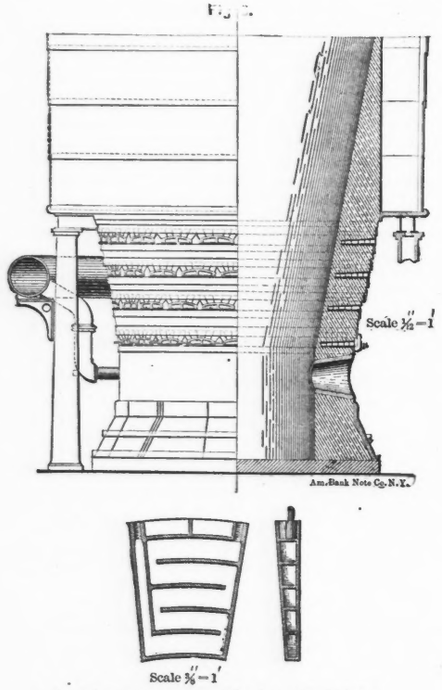
Kennedy's bosh cooling-plate.

Fig. 8.



Scale 1 1/2" = 1'

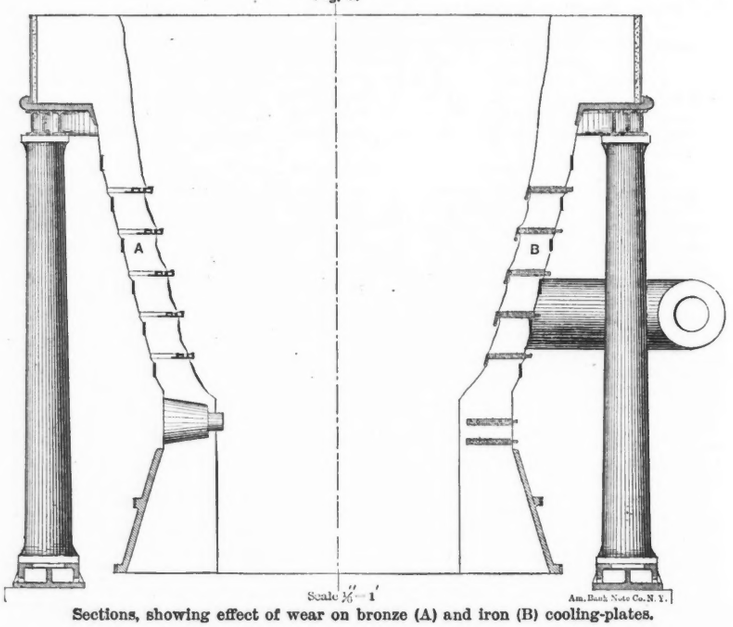
Firebrick, showing carbon substitution on end.



Scale 3/8" = 1'

Scott's arrangement of bosh cooling-plates.

Fig. 3.

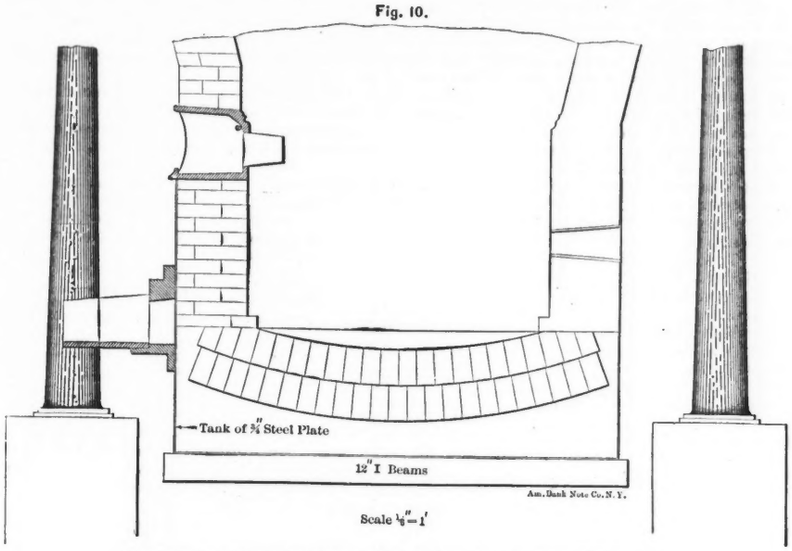


Sections, showing effect of wear on bronze (A) and iron (B) cooling-plates.

the walls. On the other hand, the bronze box-casting was taken out in perfect shape and was easily withdrawn. It showed in a marked degree the superiority of a bronze water-way over a coil in cast iron. The test showed, besides, that vertical plates are not suited for cooling purposes; for the boshes were corrugated vertically.

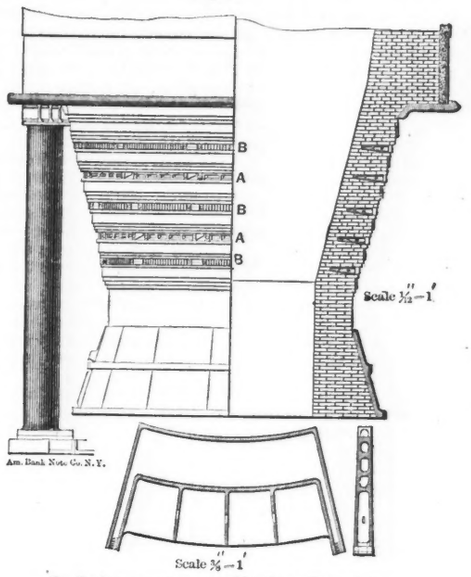
In the two-pass plate designed by Mr. Kennedy, the water ways are simply openings in the bronze casting, no coil being used. These plates are placed horizontally in the brickwork in rows about two feet apart, and connected singly or together according to their location and the head of water. The frequent losing of the inner pass in the two lower rows not only permits the furnace to widen out considerably, and at the same time position, as shown in Fig. 3 on the side marked "A"; proving that in operation the furnace lines had been uniformly maintained. In the case of the iron coil plates it was found that although water was passing through the inner coil, all the cast iron had been melted off up to the second coil, and, as is shown on the side marked "B," the inner coil was hanging down almost beneath the other, widening the furnace to that extent. This demonstrated conclusively that, while from an external point of view the indications of efficiency (*i. e.*, the passage of water through both coils) were present, yet they were not proof positive of the preservation of the bosh-walls. In these cases the wall between the plates is

Fig. 10.



Furnace hearth, enclosed in a steel tank and resting on "I" beams.

Fig. 6.



Gayley's arrangement of bosh cooling-plates.

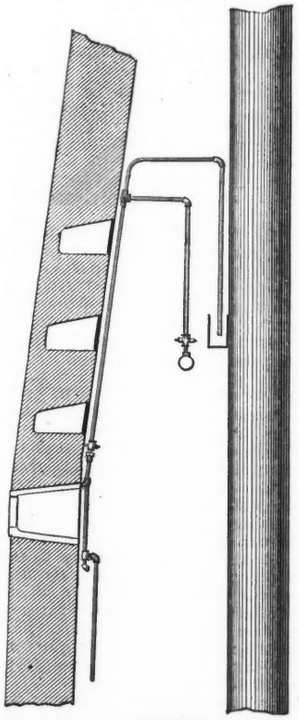
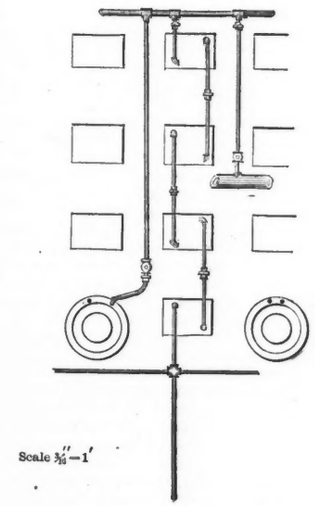
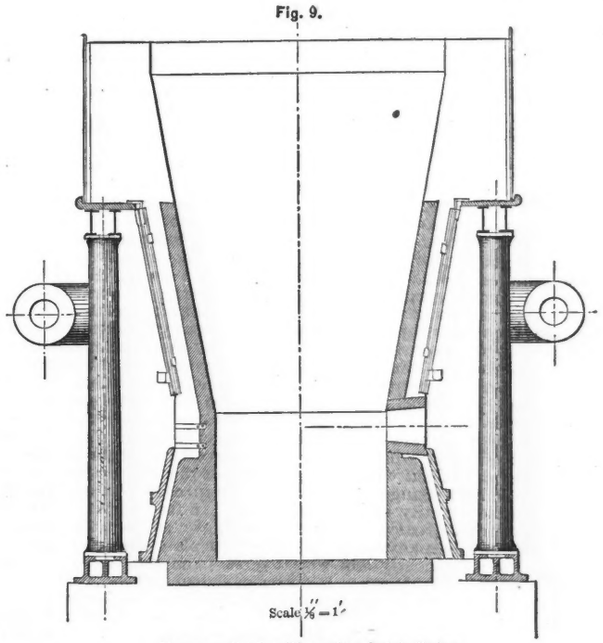


Fig. 4.



Fronheiser's arrangement of bosh cooling-boxes.

Fig. 9.



Furnace "A" with carbon-brick lining.

irregularly, but on account of their irremovability (without cutting a large mass of brickwork away) a great loss ensues through the waste of bronze metal, my experience being that not over 40 per cent. of the bronze was obtainable at the end of the blast. Nevertheless, the bronze plate was in every way more economical than the iron coil.

Concerning the comparative effect on furnace walls of bronze and iron coil plates, I would mention a case in which our furnaces were banked for several months, On cleaning out the hearth, preparatory to starting up, it was found that, through the gradual combustion of the coke, the ore in the charge had fused into a large compact mass, and was suspended from the top of the bosh. This mass was in the shape of an inverted cone, and securely held the stock above, thus presenting a complete view of the bosh-walls. It was found that the bronze plates extended about 4 ins. through the bosh-coating, and had preserved their horizontal shown to be cut back, making horizontal corrugations. This condition does not exist, however, when the furnace is in operation; since these cavities are then filled with carbon and cinder material out to the edge of the plate, which determines the straight line of the bosh.

The changing of the furnace-shape through loss of water ways in the plate, and, in addition thereto, the great waste of metal occasioned by such loss, has naturally resulted in a demand for a horizontal plate that can be withdrawn.

Fig. 4 shows a furnace equipped with a bronze bosh-cooling box, designed by Mr. Fronheiser. of Johnstown, and used for the past ten years at the Cambria Iron Company's furnaces, where it has given satisfaction. This is an ingenious arrangement whereby the waste-water from the coolers issued for cooling the bosh. The boxes are made tapering on the sides and top for the purpose of easy removal. The waste-water from

the cooler is carried up through a vertical pipe and discharged into a 2-in. circular main above the topmost row of boxes; from this distributing main it flows into the upper boxes through an opening at the bottom, discharging through an opening at the top into the next lower course, and so on. A main supply is provided in case more water should be needed than is obtained from the tuyeres. It is claimed that leaks are readily detected, as the back of the boxes is open at the top. The water being used at low pressure, not much would penetrate the furnace even in case of a leak. These boxes are built in the bosh when the bracing is done with steel rails bent to conform to the slope of the bosh; and also when the bosh is held by an iron jacket, openings being cut wherever necessary for the insertion of the box.

Another form of cooling plate, shown in Fig. 5, was designed by Mr. James Scott, of the Lucy furnaces, Pittsburg, and is now being built in one of their furnaces. This plate combines the removable feature of the Fronheiser box and the high pressure water feed of the two-pass bronze plate. By a reference to Fig. 5 it will be seen that the cooling surface extends the full length of the plate, the course being interrupted by baffles to induce a more rapid current for efficient cooling. The top of the plate is curved and tapers toward the inner edge. The inclosing brick work is patterned to the curvature of the plate. Mr. Scott claims in his patent specifications that "the destruction of bosh plates has not been due so much to burning as to the manner in which they have been set in the walls, it being the practice to build them in the walls with the bricks bearing directly on them from above and at the sides, so that when the brick work expands by reason of the heat of the furnace, it strains and breaks the bosh plate." In order then to relieve the plate from any pressure, an arch is sprung from a skewback between the plates, of such radius as will be necessary to conform to the curvature of the top. The space between the plate and the arch is filled with a packing of fireclay. The bricks used here are preferably made in special shapes, and while making a strong arch also contribute to the ease and rapidity of construction. A heavy iron band passing over the top of these arch bricks holds them securely in place. Five rows of these plates will be used at the Lucy furnace; and although they have not had thus far a practical trial, yet they have been carefully designed and will give good results. The construction will permit the easy removal and rapid replacement of a plate when necessary from any cause.

Fig. 6 shows a cooling plate of my own design, prepared to meet the requirements of the Edgar Thomson furnaces. It is wedge-shaped, with plain surfaced top and bottom, the water-way being confined to the inner half of the plate and made 10 in. wide, providing a large amount of cooling surface; the outer half is open and divided by webs, which support the upper side of the plate. It is unnecessary to extend the water-way any further back, since frequent observations of the bosh-wall have shown that this is sufficient to cover the highly heated section. In the water-chamber are vertical studs for supporting the upper side, although I question much if this is necessary, as the bosh brickwork is so well set and firmly braced that when we have had occasion to change some of the two-pass Kennedy bronze plates, we were able to cut an opening extending 7 ft. around the furnace, and of the width of three bricks high, in which the upper course remained intact. No special brick are required; the common 9-in. and 13-in. brick, such as we ordinarily use for our furnacelinings, answers the purpose in every way.

In a furnace newly lined and put in blast in May, 1891, the two lower rows were fitted with these plates (which were made by Best, Fox & Company, of Pittsburg), and in another furnace, blown in in the following June, the three lower rows were fitted in the same way, the upper rows being supplied with plates of the old pattern that we had on hand. In January, 1891, three of these plates were first used in repairing an old furnace, and since then we have used them extensively in repairing our other furnaces. At the present time we are using them in six of our furnaces, and out of the number used we have had to change three on account of leaking, the time of removal occupying from twenty to twenty-five minutes, and no trouble being found in inserting the new plate, as the brickwork remained intact. A fact worthy of notice is. that the plates found leaking were invariably in an old furnace that had been repaired, the reason, I presume, being the difficulty of getting a substantial support at the inner side in an old wall. In cases where these plates were built in at the time of re-lining, we have never had the least indication of a leak. This has also been the experience elsewhere.

As already observed, this plate is provided with only one water-way. The back space could be converted into a water-way, but it is unnecessary; in fact, the value of a two-pass plate is delusive. Theoretically, it is a splendid thing to have a course in reserve when the inner one has become destroyed; but with the description of the inner course there follows not only a change in the shape of the furnace, but also the loss of a considerable quantity of valuable bronze. In fact, a plate without any reserve course is particularly to be desired, as it necessitates an immediate withdrawal. In many cases the withdrawn plate can be plugged and reinserted, as is frequently done with tuyères. In building these plates into the wall, the exposed side can be left open, as shown at *A*, or, if desired, to preserve the continuity of the brickwork, a few loose bricks can be inserted, as at "B;" but these bricks are no part, and contribute nothing to the strength of the walls. This plate can be withdrawn by means of an extemporized screw-jack, applied in the manner shown in Fig. 7.

Although the first cost of bronze plates is somewhat greater than that of iron ones, the difference is covered many times over by increased economy. Before the introduction of bronze plates, the usual experience as to fuel consumption was a minimum quantity at the commencement of the blast, gradually increasing until at the end it was abnormally high. On the other hand, it has been a common experience, where the walls were equipped with bronze cooling plates, that the fuel consumption at the end of the blast was very little in excess of that at the early part.

There is much difference of opinion with regard to the height above the tuyères at which bosh-plates can be used with advantage. We have not placed them above 12 ft. at the Edgar Thomson furnaces, but they have been used higher at other works with good results.

Besides the use of cooling plates for the preservation of the bosh, the bricks themselves are a matter of equal importance. In recent years there have been changes in design and method of construction, but very little in the brick material. This, I think, is proper enough, as the fireclay bricks now available are about as good as can be made. Moreover, very little depends on the durability of the brick. I question very much whether the bricks in any lining would last a week were they subjected directly to the tremendous scouring action of the cinder that prevails in the bosh inclosure.

It is through the protection afforded by carbon that the bricks of the bosh are thoroughly preserved. Simultaneously with the commencement of the smelting operation, there is deposited a coating of carbonaceous material on the walls, which, as the process advances, replaces the brick to the depth of several inches; and investigations have shown that this substitution is best promoted through the medium of a basic cinder. This may explain, in a measure, a common saying in the anthracite iron district that "it is best to blow in hot and limey."

This coating of carbon material is also exceedingly tough and durable. We have frequently cut out the brickwork to replace bosh plates (of the two-arm pattern, built in the wall), and have invariably found this material far more difficult to penetrate than the bricks, showing that it is valuable, not only as a protective covering, but as contributing materially to the strength of the wall.

It has been frequently observed by blast furnace managers that under certain circumstances the bosh would "build up," and that during this period the results would be surprisingly good; while, subsequently, owing to the widening out of the bosh by some cause, the results would be quite inferior.

On blowing out a furnace it is invariably the case that the walls are found protected with a carbon coating, and it would appear that this carbon substitution is done very thoroughly at an early period in the blast. In 1890 I had some samples taken from two furnaces that we had blown out, the results of which are as follows:

	I. One sample. Per cent.	II. Average of two samples. Per cent.	III. Special sample. Per cent.	IV. Average of six samples. Per cent.
Carbon	46·62	28·15	23·79	35·75
Silica	17·50	22·05	26·57	24·70
Iron	5·12	2·01	16·40	4·78
Alumina	7·07	8·63	8·71	10·89
Magnesia	3·01	3·76	2·85	6·78
Lime	15·78	27·63	17·96	14·22
Calcium sulphide	2·35	2·89	3·76	2·85

Nos. I. and II. are from one furnace; III. and IV. from another.

From this it will be seen that the limits in carbon are from 23% to 6%, with an average from all the analyses of 33·58%. Analysis No. IV. embraces more samples, and is, therefore, more representative than either of the others.

In October, 1891, furnace "A," having sheared the rivets half way round on one seam of the jacket, and leaning over to such an extent that it was impossible to remedy it, was dismantled preparatory to erecting a new stack. In the process of tearing down the lining it was noticed that the bricks in the upper part of the bosh had on their exposed ends a substitution of carbon material to the depth of over 2 in. The bricks, as shown in Fig. 8, were of standard length, and the dividing line between the carbon and the clay was well defined. The material had the appearance and consistency of plumbago. An analysis of it showed as follows: Carbon, 35·71%; silica, 20·90%; iron, 4·50%; alumina, 7·71%; magnesia, 3·26%; lime, 3·12%; barium oxide, 1·01%; sulphur, 0·24%; manganese, 17·70%. The presence of such a large quantity of manganese is due to the fact that the furnace was making ferro-manganese at the time. Comparing this with analysis IV., given above, it will be seen that the carbon percentage is identical. In appearance, however, the samples of IV. were more like coke than plumbago.

In 1890 we used some bricks made of fireclay and graphite for repairing a badly worn spot in the bosh wall of one of our old furnaces where previously it had been difficult to get any kind of firebrick to stand, the result being that we had no more trouble with it during the blast. Arrangements were subsequently made with Messrs. Harbison & Walker, of Pittsburg, to furnish us with carbon brick in sufficient quantity to reline a hearth and bosh. A considerable time was spent in experimenting with bricks of a great variety of compositions, and requiring different treatment. As a result of this thorough testing they have been able to make a very superior quality of carbon brick. Three different kinds of brick were furnished, viz., graphite and clay, coke and clay, and coke and tar. These brick have been built in the lining of furnace "A," as shown by the shaded portion of the drawing in Fig. 9. In order to make a test of the different kinds of carbon brick the bottom of the hearth was built of those made of graphite and clay, while along the hearth wall and bosh there were used those made of clay and coke and tar and coke, each being placed in a separate location for the purpose of testing its durability. The material used for joining the bricks was a mixture of fireclay and ground coke. It was the intention to build the brick clear out to the jacket, but the supply on hand would not permit such extensive use. The carbon brick lining along the bosh was therefore made 9 in. thick, and was carried up a distance of 12 ft. above the center line of the tuyères. In the drawing, Fig. 9, the unshaded portion represents firebrick. The analyses of the coke bricks are as follows: Coke and clay: Carbon, 64·23%; silica, 21·51%; oxide of iron, 1.41%; alumina, 12·05%; lime, 0·67%, magnesia, 0·29%. Coke and tar: Carbon, 87·36%; ash, 12·74%.

In order to protect the carbon bricks during the periods of drying-out and blowing-in, a wall of 9-in. fireclay bricks, placed on edge, was built in front of them.

In Germany, carbon bricks have used for the construction of the bottom and hearth walls up to the tuyères, the practice being to use bricks and blocks, and in some cases to ram the carbon material in.

Hitherto the practice has been not to extend these bricks above the tuyères; but at the Gelsenkirchen furnace, which was to be relined last year, it was proposed to build the bosh with carbon brick. They have proved very beneficial in preventing break-outs of iron and cinder; in fact, since the use of them began, no break-outs have occurred.

Although the hearth cooling jacket is not dispensed with, yet the indications are that it will be, as no water is required for cooling except at the tuyères.

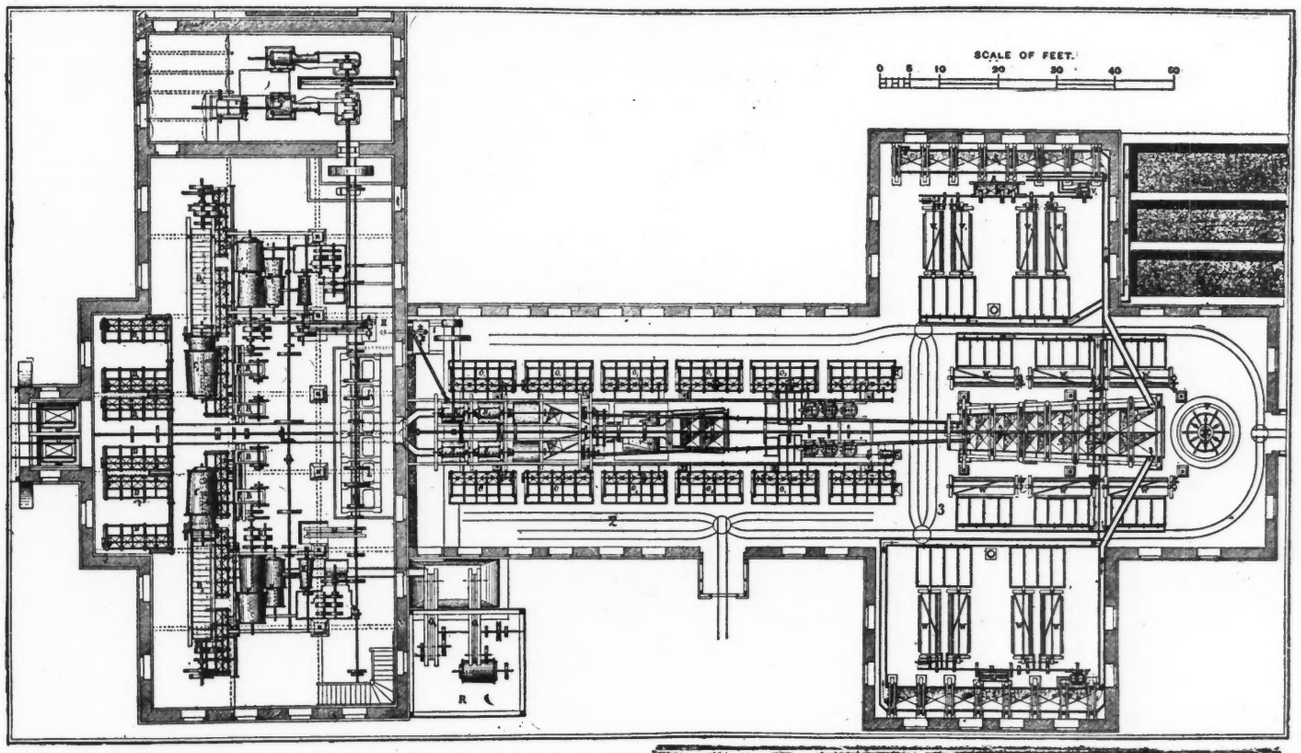
In some furnaces where the carbon bricks are used, the hearth stands free, being inclosed in a steel tank and supported on I beams, as shown in Fig. 10. In fact, one can crawl under the bottom if he so desires. On account of not using water around the hearth, and not having break-outs,

a comparatively safer practice is obtained; and besides, there is no troublesome salamander to deal with after blowing-out.

While these carbon-bricks are serviceable in the hearth for the reasons above given, I consider that their greatest value will be realized from the use in the bosh, contributing to the regular working of the furnace, and the attainment of low fuel economy. When the bosh-walls are in good shape the best work is obtained, and the converse of this is likewise true.

THE NEW ORE DRESSING FLOOR AT FREIBERG.

The new central dressing floor at the Himmelfahrt mine, Freiberg, Saxony, has been erected to replace five old floors. The installation was designed by Mr. C. Lührig,* whose name is well known in connection with coal washing and ore dressing. We are indebted to *Industries* for this description of the new installation and the accompanying illustration. The ores treated in the new dressing floor are obtained from the various shafts of the Himmelfahrt mine. They consist, as is well known, of argentiferous galena, zinc blende and pyrites, while the gangue consists of gneiss. On account of the variety of ores the dressing floor from the stone breaker to the last settling tank has been constructed in duplicate. It is thus possible to dress ores from other mines without mixing them with the Himmelfahrt ores. The annual production of the Himmelfahrt mine is about 45,000 tons of crude ore, of which about four-fifths is of lead ore. The floor has therefore been designed to dress 150 tons per day of 10 hours. The water required is collected in a reservoir, wtth a capacity of



350,000 cu. ft., the average consumption of water being 35 cu. ft. per minute. The whole of the machinery is driven by steam power.

At the shaft the best ore and the absolutely worthless gangue are picked out by hand, and the remainder is taken in trams pulled by horses to the dressing floor. The ores contain galena with 0·15% to 0·20% of silver, iron pyrites, copper pyrites, and, more rarely, zinc-blende with gneiss, or quartzose and spathic gangue. Iron pyrites and galena predominate. The zinc-blende is black and contains some 33% of iron. Its specific gravity, consequently, is nearly the same as that of iron pyrites.

The dressing floor, of which the accompanying drawing shows the plan, is arranged in terraces so as to render the work as continuous as possible. The first building of the washing floor, numbered 1 in the plan, consists of four floors 12 ft. apart, and covers an area of 19,300 sq. ft., or three-quarters of that of the entire works. The topmost floor, to which the ore is raised by a steam elevator, is 36 ft. above the lowest floor, on which are situated the stamps, and 48 ft. above the floor of the central building, numbered 2 in the plan, containing the jigging machines, and that of the end building, numbered 3, in which the slimes are treated. These three sections are, as has already been remarked, divided into two similar series, in order to treat ores containing different proportions of silver or coming from other mines and requiring separate accounts. Each series of apparatus is able to dress 75 tons a day.

The trucks from the mine, containing 22 cwt., after having been raised by the elevator, are tipped into one or other of four large 6-ton hoppers A A and A^1 A^1 of the four stone breakers B B and B^1 B^1. The stone breakers are fed automatically, the fine material under 30mm. passing through a screen to a hopper below, and the coarser material passes through a stone breaker to the same hopper. Each pair of stone breakers has one of these hoppers as well as a trommel C C^1 common to the two.

* Mr. F. Andre, of London, wrote a letter to *Industries*, after the publication of this article, stating that the new installation was designed by Mr. O. Bilharz, who has charge of the Royal Mines at Freiberg, Mr. Lührig being intrusted with the erection of the machinery for the coarse crushing and concentration.—ED. ENG. AND MIN. JOURNAL.

The trommel is provided with screens with apertures 16 mm., 12 mm., 9 mm., and 7 mm. in diameter. Lumps from 16 mm. to 30 mm. pass from the trommel to a band-picking table D^2 and D^3, which carries the ore for further comminution down to the coarse rolls E and E^1 on the third floor, while the pure ore and worthless gangue is picked out by hand. Material of smaller size passes direct to the jigging machines D and D^1.

The material crushed by the coarse rolls is separated by the trommel F F^1 into three sizes: 7 mm. to 9 mm., 5½ mm. to 7 mm., 4 mm. to 5½ mm. The first of these is treated in jigging machines, similar to D and D^1, below the trommel. The material above 9 mm. falls from the trommel upon the medium rolls G G^1, whose trommel H H^1 has apertures of 7½ mm. and 4 mm. The products are treated in jigging machines not visible in the plan. The material above 7 mm, passing through the trommel is further crushed in the fine rolls I I^1, and then passes to the trommel K K^1 on the lowest floor, where it is separated into material above and below 4 mm. The smaller material passes to the trommels N N^1 of the fine jigging machines, while the grains above 4 mm. are taken by the elevator MM^1 to the stamps L L^1. Thus there is a continuous comminution from the coarsest to the finest—to 30 mm. in stone breakers, to 9 mm. in coarse rolls, to 7 mm. in medium rolls, to 4 mm. in fine rolls, and to 2 mm. in stamps.

The two trommels NN^1, with which the washing floor for fine material begins, have apertures of 3 mm. and 2 mm., and the products pass to the jigs O O^1, while the material that does not pass through the screens proceeds to the sand-classifiers P P^1, where it is separated into three sizes—1½ mm. to 2 mm., 1 mm. to 1½ mm., and ½ mm. to 1 mm., which pass to three fine jigs O^2 O^3. The material flowing over from the classifier is collected in a reservoir, whence it is pumped up through the pipes p p^1 to the pointed box concentrator S S^1, where a further concentration of the fine particles it contains takes place. In this way six classes of sand are obtained. The three first, under ½ mm., flow from three pointed boxes to a Bilharz jig.† The three classes of finest slimes deposited in the following pointed boxes proceed to the jigging machine T, whence the concentrated product passes to six Stein vanners W W^1, where a marketable product is obtained. The waste water passes to three large reservoirs, where it is clarified.

The machinery is driven by a compound steam engine, which indicates 105 H. P. Throughout the works 44 workmen are engaged, with three overseers, one engine driver, one stoker and five fitters—in all 54 men. The cost of dressing one ton of ore amounts to 20 cents.

PATENTS GRANTED BY THE UNITED STATES PATENT OFFICE.

The following is a list of patents relating to mining, metallurgy and kindred subjects issued by the United States Patent Office:

TUESDAY, February 16th, 1892.

468,788. Apparatus for Cooling Steel Rails and Bars. John W. Cloud, Chicago, Ill.
468,805. Mining Machine. Charles W. Hottman, Philadelphia, Pa.
468,931. Ore Concentrator. Hannibal Scovell, Portland, Colo.
468,935. Dust Collector. Orville M. Morse, Jackson, Mich., Assignor to the Knickerbocker Company, same place.
469,065. Ore Pulverizer. Jacob A. Pearce, Denver, Colo., Assignor to the Mechanics' Milling and Amalgamating Company, same place.
469,120. Ore Crusher. Joseph Brumbgauh, Gold Hill, Ore.
469,121. Fire Proof Ceiling. Preston M. Bruner, St. Louis, Mo.
469,187. Steam Stamp. Charles W. Tremain, Portland, Ore.
469,202. Ore Concentrator. Gustavis L. Cudner, New York, N. Y.
469,211. Oil Burner for Boilers, Furnaces, etc. David Kline, Akron, O., Assignor of two-thirds to Augustus D. Power and Edward A. Stouffer, same place.
469,219. Earth Boring Apparatus. John H. Stokesbary, Highlands, Colo., Assignor of three-fourths to Robert H. Porter and Frank P. Arbuckle, same place.

† A patented, round, pulsating jig.—ED. ENG. AND MIN. JOURNAL.

PERSONALS.

Mr. Andrew Carnegie has increased his gift to the Pittsburg Free Library fund $100,000.

Mr. V. M. Clement, general manager of the Bunker Hill & Sullivan mine, Wardner, Idaho, is in the city.

Mr. J. Mac Tear, F. R. S. E., has just arrived from Mexico, where he has been engaged in mining works. He sails for Europe to-day.

Mr. F. C. Wood, of St. Louis, president of the Garnet Mining Company, of Pony, Mont., was in New York this week on business of the company.

Dr. R. A. F. Penrose, Jr., mining engineer, of Philadelphia, left for Texas and New Mexico this week on professional business. His address until February 29th will be Galveston, Tex.

Mr. John Hays Hammond, of San Francisco, president of the Bunker Hill & Sullivan Mining and Concentration Company, Idaho, is in this city on business connected with his company.

Mr. Alfred Walter, general superintendent of the Baltimore & Ohio Railroad, has left the service of the company to become general manager of the New York, Lake Erie & Western Railroad.

Mr. Richard T. Ely, Associate Professor of Political Economy in the Johns Hopkins University, Baltimore, Md., has placed his resignation in the hands of the Board of Trustees to take effect June 1st. Professor. Ely has accepted a professorship in the University of Wisconsin.

Robert Peele. Jr., it is announced, will resign his position with the Peruvian Exploration Syndicate, of London, to accept the Adjunct Professorship of Mining Engineering at the School of Mines, Columbia College. Mr. Peele has had extensive experience in the field both in this country and South America, and will be a valuable acquisition to the School of Mines.

Mr. John Fulton, general manager of Cambria Iron Company, has resigned from the arduous duties of that office, his resignation to take effect March 1st, 1892. Mr. Charles S. Price has been appointed to succeed Mr. Fulton as general manager. Mr. Fulton has been reappointed to his former position of general mining engineer, his appointment to take effect at the above date.

Mr. James Butterworth Randol, manager of the New Almaden quicksilver mines, has resigned, to take effect March 6, 1892, when he will have completed 29 years of service for the Quicksilver Mining Company, seven years as secretary of the company in New York and 22 years as its sole representative and manager of its operations in California. Mr. Randol will not sever his connection with the quicksilver industry, being now largely interested in the Bradford mine. He goes abroad for a few months for much needed rest.

OBITUARY.

William A. Clark, chief engineer of the Western Union Telegraph Company, died in this city on the 16th inst., aged 61.

John W. Howard, founder and senior member of the firm of Howard & Morse, of New York, died at his home at Brooklyn, N. Y., on the 10th inst., aged 66 years.

William Sexton, for many years superintendent of the Gloucester Iron Works and well known in the iron trade, dropped dead at his home in Camden, N. J., on the 16th inst.. aged 55 years.

Dimetri Mindeleff, the inventor of terrorite, died at San Francisco, last week. Mindeleff was a well known chemist and the author of several important inventions, among them being a method for the reduction of cobalt and nickel ores and the destruction of phylloxera by means of pyroligneous acid.

Ludwig Marx, member of the New York Stock Exchange since 1869, died on the 14th inst., aged 60 years. He amassed a fortune, but lost it in following Franklin B. Gowen in his scheme to consolidate the coal interests of the anthracite regions. Mr. Marx failed on December 15, 1886, when the Reading-Richmond Terminal deals collapsed, but he was subsequently readmitted to the Exchange.

John J. Williams, a member of the firm of Bisbee, Williams & Co., of San Francisco, died at San Diego, Cal., on the 16th ult., at the age of 47 years. Mr. Williams was born at Swansea, Wales, where he received his early training in the Vivian Smelting Works. His father, John Williams, was also an experienced and well known smelting man. For many years Mr. Williams was identified prominently in the development of the copper mines of Arizona, and under his direction the Old Globe copper mines of Arizona were developed and placed upon a paying basis. Latterly he had been in the employment of Messrs. Phelps, Dodge & Co., of New York, looking after their interests in Arizona.

Wm. Rhodes, of Quebec, late Minister of Agriculture of the Province of Quebec, died at his home, "Benmore," Quebec, on the 17th inst. He was a prominent citizen of Canada and exerted great influence with all classes. Though a Liberal in politics, he was warmly supported by the Conservatives. He was a man universally respected and honored for his unflinching integrity and his devotion to the interests of his country. He leaves a large family, among whom are five sons, all of whom have studied engineering in the United States and have attained distinction in the practice of their profession. Two are connected with railroading and three with mining and metallurgy. Col. Rhodes was also prominently identified with mining investments in Canada.

SOCIETIES.

The Engineering Association of the South held its regular monthly meeting at the headquarters of the association at Nashville on February 11th. The standing committees for the ensuing year were announced by the board of directors as follows: Committee on finance, W. F. Foster, W. L. Dudley and John McLeod; committee on rooms and library, E. C. Lewis, Jas. Geddes and F. P. Clute; committee on papers and printing, Olin H. Landreth, W. B. Ross, Chas. B. Percy, Hunter McDonald and John B. Atkinson. The president of the association, Mr. A. V. Gude, of Atlanta, who was unavoidably absent, sent a communication inviting the association to hold the March meeting at Atlanta. The invitation was accepted. The committee on highway machinery contest reported progress in the preparation of a detailed scheme for carrying out the contest. Mr. Olin H. Landreth then spoke on the subject of "The Calorific Power of Southern Coals." One of the results presented was that a series of coal tests covering a large number of Southern coals had developed the fact that there were at least three Southern coals which were superior in calorific power to the standard second pool Pittsburg coal and but slightly below Cumberland, Md., semi-bituminous coal. The paper was discussed by Messrs. Hunter McDonald, J. B. Atkinson, W. L. Dudley, J. S. Walker, W. G. Kirkpatrick and Gordon Hicks.

INDUSTRIAL NOTES.

Furnace A, of Carnegie Bros. & Co., Braddock, Pa., has been rebuilt. It will make spiegel iron, as heretofore.

The annual meeting of the Tamarack-Osceola Copper Manufacturing Company was held in Boston on the 17th inst. The old board of directors was re-elected.

The Chesapeake Nail Works and the puddling department of the Central Iron Works, at Harrisburg, shut down on the 13th inst., throwing between 200 and 300 men out of work.

The Potts Valley Mining and Manufacturing Company, it is stated, has purchased 70,000 acres of iron and timber lands on Potts Creek, and will develop the same in the spring; also build iron furnaces.

The Pottsville Iron and Steel Company made a general reduction of 10% in wages at its Fishback, Pa., plant, which took effect on the 18th inst. Six hundred men are employed. Another strike is expected.

The Berlin Iron Bridge Company, of East Berlin, Conn., has taken the contract for a new boiler shop for the Dry Dock Engine Works at Detroit, Mich. The building will be 68 ft. in width by 201 ft. in length.

The Beckwith Iron Mills, of Paterson, N. J., are to be moved to Curtis Bay, Md., and operated under the name of the Baltimore Rolling Mill Company. Steel plates will be the principal article of manufacture.

The steel workers of the Columbia Iron and Steel Works, at Uniontown, Pa., on the 16th inst., rejected the proposed reduction in their wages, holding that the present charge should remain in force until July.

The firm of James B. Scott & Co., of Allegheny, Pa., has commenced the manufacture of tinned plate. The firm is experimenting with, one train of rolls, but if the scheme proves a success they will put in an extra number. About $30,000 is invested in the enterprise.

The Union plant, owned by Carnegie, Phipps & Co., is being reconstructed. All the devices for the use of natural gas will now give way to appliances for coal. Among the improvements is a battery of boilers, equipped with the Roney automatic stoker and automatic coal handling apparatus.

The enormous steel trusses to sustain the roof of the Manufactures Building at the Columbian Exposition are about to be erected. These trusses are the largest, it is said, ever made for architectural purposes. They span 368 ft., and rise to a height of 211 ft. The contract for them calls for about $460,000.

The cut nail manufacturers of Canada met at St. John, New Brunswick, on the 16th inst. and agreed upon the union of the Eastern and Western associations and the adoption of a uniform card list of extras. These prices are now the same all over the continent, but the base prices are higher in Canada than in the United States.

The Phillips Mine Supply Company, of Pittsburg, Pa., is now running its extensive works night and day to complete a large order from Mexico. The company reports a large and increasing demand from abroad for its car wheels and wagons. It has lately issued a new illustrated catalogue, which will be of interest to all needing this class of goods.

The Sharpsville Furnace is making a record. This furnace has made a run of five years without relining, about three years with the same back, during which time it has been damped three times, covering a period of about seven months. The last time the furnace was damped the fire went out. A fire was made at the bottom, and the furnace was blown in without being shoveled out. The furnace is at present averaging over 100 tons of No. 1 Bessemer iron.

The Jeffrey Manufacturing Company, of Chicago, Ill., informs us that it has furnished complete outfits of elevating and conveying machinery for the Crescent Paper Company, Marseilles, Ill.; the Lafayette Paper Company, Lafayette, Ind., and the Pioneer Paper Stock Company, of Chicago, Ill.; elevating machinery for Montana, elevators and conveyors for the Deadwood Consolidated; coal handling machinery for W. L. Pierce & Co., Peoria, Ill., the Springfield Iron Company, Springfield, Ill., and the Washington & Georgetown Street Railway; sawdust handling machinery for Paducah, Ky.; barrel conveyors for the Graham Pressed Granite Company and the Val. Blatz Brewing Company, Milwaukee, Wis.; conveyors for San Leandro, Cal.; sand drying machinery for La Salle, Ill. A reduced price list of machine belting, and a special circular showing many of its applications, both of which will be furnished on application, have recently been issued by the company.

The Pelton Water Wheel Company has recently furnished the Commercial Mining Company of Arizona a power plant which affords a good illustration of the extraordinary results that can be obtained from a small quantity of water under a high head, as also the estimate of value placed upon water power where so large an outlay is made for a comparatively small amount of power. This plant consists of a 4-ft. Pelton wheel, which runs under a 1,200-ft. head at 699 revs. per min., developing 45 H. P., using a nozzle tip fifty-three one hundredths of an inch in diameter; also a 24-in. Pelton wheel running under the same head at 1,380 revs., developing 20 H. P. with a nozzle tip thirty-five one hundredths of an inch in diameter. These wheels run a concentrating and smelting plant. The pipe line is 20,000 ft. in length, the upper end being 6-in. and 5-in. casing and the lower end 5-in. lap-welded pipe. All the water supply that can be counted on during the dry season is a flow of about 30 cu. ft. per min.

The Bucyrus Steam Shovel and Dredge Company, of Bucyrus, O., reports that it is much busier than usual at present. Besides filling a large number of important orders for steam shovels and dredges from the United States Government and others, the company is actively engaged in preparing for the removal of its works and business to Milwaukee, Wis. The change of location will be made about July 1st of the current year. It has acquired 15 acres of land in South Milwaukee, of which 13 are on the upland, located on the main line of the Chicago & Northwestern Railway, and the remaining two on Oak Creek, where it debouches into Lake Michigan. The large upland tract of 13 acres will be used for general manufacturing purposes, and the major part of the buildings will be located there. The Oak Creek location will be used for shipbuilding purposes, the plan being to build there the dredge hulls intended for lake service; also scows, tugs, yachts and other small craft, the machinery of their equipment to be made in the upper works and transported thither over the connecting track. The plans for the buildings are now nearly completed. The shops will all be of modern construction, attractive, substantial and commodious. Special attention will be given to the important question of light, heating and ventilation. Electricity will be used extensively in the Milwaukee works. They will be lighted by a combination system of arc and incandescent lights. Many of the power applications will be made by electricity, and electric motors will be used for various purposes. One of the most interesting departments will be that devoted to the manufacture of placer mining outfits, which are used in combination with the steam shovels and dredges.

The Edison General Electric Company has installed a central power plant at its works in Schenectady, N. Y., from which power is transmitted to all parts of its works by electricity. The power-house is situated in the middle of a piece of land 12 acres in extent, and is surrounded on all sides by the different buildings to which it supplies the necessary power. This house contains a battery of boilers of over 2,000 H. P. capacity, the engines necessary to drive the electric generators and the generators themselves. Radiating in all directions run the conductors through special Edison underground tubes to the different buildings, where they are connected to Edison motors, which in turn are connected by belts to the shafting serving to operate the machinery. The power plant comprises an Armington &

Sims 10 × 12 engine of 150 H. P., driving one 100-kilowatt railroad generator and two 100-kilowatt standard generators, and another Armington & Sims engine of same proportions, in reserve, coupled to one 50-kilowatt and one 100-kilowatt generator. A small engine of same make of 25 H. P. drives three 8·5-kilowatt generators. There are also two 300-H. P. Edison triple automatic engines, each driving two of the new Edison 100-kilowatt multipolar dynamos, and a 150-H. P. triple automatic engine driving two 60 kilowatt generators of former standard Edison type. The boiler battery consists of three boilers of 500 H. P. each, and three of 250 H. P. each, making a total of 2,250; this will eventually be raised to 3,000 H. P. when the three additional 250 H. P. boilers are put up. The present generator or dynamo capacity is about 1,000 kilowatts. This will be increased to 1,400 kilowatts as soon as possible, and the normal capacity of the power station will then be 1,900 H. P. The normal output is about 950 H. P., at the present moment, but this is increasing as the new shops go up. The present floor area of the Schenectady Works is 11·84 acres. Current is distributed to 43 motors of standard Edison type, which would represent a capacity of 1,324 kilowatts if run in their full capacity. About 20,000 ft. of single conductor wire is used to convey the power from the central house to the motors, and this does not include the wiring of the buildings or the conductors laid in Edison underground tubes. The voltage of the motor circuit is 250 volts, the lights running on 125-volt circuits.

MACHINERY AND SUPPLIES WANTED AT HOME AND ABROAD.

If any one wanting Machinery or Supplies of any kind will notify the "Engineering and Mining Journal" of what he needs, his "Want" will be published in this column, and his address will be furnished to any one desiring to supply him.

Any one wishing to communicate with the parties whose wants are given in this column can obtain their addresses from this office.

No charge will be made for these services.

We also offer our services to foreign correspondents who desire to purchase American goods, and shall be pleased to furnish them information concerning goods of any kind, and forward them catalogues and discounts of manufacturers in each line, thus enabling the purchaser to select the most suitable articles before ordering.

All these services are rendered gratuitously in the interest of our subscribers and advertisers; the proprietors of the "Engineering and Mining Journal" are not brokers or exporters, nor have they any pecuniary interest in buying or selling goods of any kind.

GOODS WANTED AT HOME.

2,566. A small 30-in. or 36-in. round copper smelting water jacket furnace, with fittings complete; must be in good condition. Georgia.

2,567. A 9 × 12 cylinder Atlas engine and a 16-ft. long, 36-in. diameter steel 2-flued boiler with 30 ft. of stack. Louisiana.

2,568. A 4-sided planer and matcher. North Carolina.

2,569. Belting, shafting and pulleys. North Carolina.

2,570. Dry kiln, for 4,000 ft. daily; exhaust fan and blower. North Carolina.

2,571. A 25-h. p, return tubular boiler (3-in. tubes), half front, with all fittings complete. South Carolina.

2,572. An entire outfit of second-hand barrel heading machinery; also, a good wood turning lathe for making handles. Virginia.

2,573. A complete line of hoop machinery. Florida.

2,574. An outfit of machinery for a flour and meal mill with a capacity of 150 bbls. per day. Kentucky.

2,575. A second-hand Sullivan diamond prospecting core drill, size "E" (on frame, for surface prospecting), or size "M" (hand power). Virginia.

2,576. A machine to make two tons of ice in 24 hours and cool a meat room 14 ft. × 20 ft. × 8 ft. high to a temperature of 38° West Virginia.

2,577. A machine for stamping padlocks. Texas.

2,578. A full outfit of machinery and tools for quarrying brown stone, including derricks, engines, boilers, drills, pumps, channelers, saw mills, planing mills, etc. North Carolina.

2,579. A 10-ton artificial ice machine. Alabama.

2,580. Heating apparatus, good bell and pipe organ for a $20,000 church. Texas.

2,581. A machine that will crush soft phosphate rock to an impalpable powder. Florida.

2,584. An entire outfit for manufacturing buckets. North Carolina.

2,585. Spoke and handle lathe. North Carolina.

AMERICAN GOODS WANTED ABROAD.

2,582. Catalogues, prices and discounts of pulverizing and conveying machinery. France.

2,583. A small sized mill suitable to grind large leaves and stalks to an impalpable powder. The leaves and stalks resemble the tobacco plant and are well dried in an oven before grinding. The mill would have to take in leaves which should be sorted out afterward perferably by air current and if not that by sieves. Italy.

GENERAL MINING NEWS.

The Executive Board of the United Mine Workers held a session on the 15th inst. at Columbus, O., and discussed plans for building up the organization. The policy of the new officers will be to avert strikes as much as possible and give the miners a chance to recuperate. Vice-president John R. Penna and John P. Jones, senior members of the board, go immediately to West Virginia. Organizers were appointed in the Pennsylvania, Ohio, Indiana, West Virginia, Kentucky, Tennesseee and Indian Territory mining districts, who will not be in the field constantly, but will simply hold commissions to act when called upon. George Douglas is to be assistant secretary for two years.

The following is the text of a message transmitted to Congress on the 16th inst., by the President:

There was passed by the last Congress an act for the protection of the lives of the miners in the Territories, which was approved by me on the 3d day of March, 1891. That no appropriation was made to enable me to carry the act into effect resulted, I suppose, from the fact that it was passed so late in the session. This law recognizes the necessity of a responsible public inspection and supervision of the business of mining in the interest of the miners, and is in line with the legislation of most of the States. The work of the miner has its unavoidable incidents of discomfort and danger and these should not be increased by the neglect of the owners to provide every practicable safety appliance. Economies which involve a sacrifice of human life are intolerable.

I transmit herewith memorials from several hundred miners working in the coal mines in the Indian Territory, asking for the appointment of an inspector under the act referred to. The recent frightful disaster at Krebs, in that Territory, in which 67 miners met a horrible death, gives urgency to this appeal, and I recommend that a special appropriation be at once made for the salaries and the necessary expenses of the inspectors provided for in the law.

ALASKA.

Advices from Alaska concerning the fate of Morris Orton and a party of 10 miners indicate that the men have been murdered by Indians or lost in the sea trying to cross the stormy waters from Cross Sound to Yukilala. Searching parties have hunted six weeks for the missing miners without success. Orton's party left Pityua Bay for Juneau in November last.

ALASKA TREADWELL GOLD MINING COMPANY.—During December bullion valued at $51,800 were shipped, 17,130 tons of ore were milled and 475 tons of sulphurets treated. Of bullion there came from sulphurets $14,775. The gross expenses for the month were $32,900.

ARIZONA.

PINAL COUNTY.

MAMMOTH GOLD MINES, LIMITED.—The bullion production for January was $12,950, but the mortars were not cleaned up. The mill ran 29 days, crushing 2,790 tons of ore. The expenses for ths month were $12,400. The clean up was small owing to the low grade ore in No, 11 slope, and it is expected that the production will increase this month.

CALIFORNIA.

SAN FRANCISCO, Feb. 11.

(From are Special Correspondent).

Delegates Niles Searles, J. K. Luttrell and J. B. Hobson, of the committee appointed at the recent Miners' Convention to visit Washington to secure legislation with a view to the resumption of hydraulic mining, left for the East on Wednesday. The rest of the committee, consisting of Frank McLaughlin, R. McMurray and J. H. Hammond will also leave next week. * *

BUTTE COUNTY.

(From our Special Correspondent.)

BUTTE QUEEN MINING COMPANY.—A suit was filed in the Superior Court by certain shareholders in this corporation, who hold a majority of the stock, to oust H. B. Blagrave, S. D. Mayer and V. Gadesden as directors. The trouble is over the matter of salaries voted by these officers to themselves. The case came before the court on Wednesday, when a new election was ordered for Tuesday next. * *

LOS ANGELES COUNTY.

(From our Special Correspondent.)

ROWLAND & LACY PETROLEUM COMPANY.—This company has been incorporated with a capital of $1,000,000 to develop oil and natural gas lands in this county. * *

MONO COUNTY.

(From our Special Correspondent.)

BODIE CONSOLIDATED MINING COMPANY.—The ore in raise No. 1, 500 level, Jupiter shaft, has improved in quality, and is from 10 to 12 in. wide. Ore is being stoped above the raise on the north side.

BULWER CONSOLIDATED MINING COMPANY.—Last week 135 tons of ore were mined. The average battery samples for the week were $41.05; tailings, $11.24. * *

NAPA COUNTY.

The total shipments of quicksilver from Calistoga in January were 1,181 flasks, or 90,346 lbs. The product of each of the four mines was as follows, the figures expressing the number of flasks: Napa C., 525; Great Western, 319; Bradford, 232; Sulphur Bank, 105. In addition to the metal shipped from the Great Western there remain at the mine, as a portion of the product of the month, 50 flasks of metal. The large amount of metal credited to the Napa Con. is to a great extent due to accumulated ore taken from the drifts or stopes previous to the burning of the Chinese quarters. The number of men now working there is below the average.

NEVADA COUNTY.

MORNING STAR GRAVEL MINING COMPANY.—This company has declared dividend No. 16, of $3 per share. The Morning Star is now said to be looking better than ever, and there is a breast of gravel 14 ft. high and 300 ft. wide now in sight.

PLACER COUNTY.

(From our Special Correspondent.)

BELVOIR MILL AND MINING COMPANY.—The property of this company has been relocated on the ground of abandonment, and the relocation has been sustained. * *

TOULUMNE COUNTY.

(From our Special Correspondent.)

About 400 miners are working in and about Sonora in the pocket mines in that vicinity. Some of the mines have proved quite rich, and most of them are doing fairly well. * *

COLORADO.

The product of the various smelting companies in Colorado in 1891 was as follows:

Company.	Tons lead.	Ounces silver.	Ounces gold	Pounds copper.
Omaha & Grant	23,991	8,914,411	80.195	1,417,750
Boston & Colorado	..	3,877,452	47,765	5,689,411
Globe	15,491	4,184,165	22,557	26,500
Pueblo	12,852	2,923,482	13,706	1,921,842
Colorado	7,996	1,386,262	7,510	...
Arkansas Valley	7,707	1,763,799	4,322	1,109,740
American	9,102	1,511,436	5,117	.....
Elgin	2,087	407.219	1,063	.....
Harrison	3,878	764,000	2,296	.....
San Juan	2,517	702,984	6,035	596,050

The Philadelphia Smelting and Refining Company of Pueblo made no report.

The *Mining Industry and Tradesman* thus describes the geology of Crippie Creek: "It is a mass of eruptive rock, whose fracture planes are mineralized. The value is in gold. In places where the eruptive rock has been most fractured and crushed. the mineralization has heen greatest, and here some good sized bodies of ore are found. It is possible that whole quarries may be opened. A quite similar formation is seen in the porphyry ore deposits near Breckenridge, and in the silver ore deposits at Silver Cliff."

BOULDER COUNTY.

ORPHAN BOY.—A strike is reported at this placer property in Copper Rock.

DOLORES COUNTY.

ENTERPRISE MINING CONPANY.—In the Laura shaft of this company a rich body of ore was uncovered recently. Assays are said to have given returns of 3,170 oz. silver and 5½ oz. gold to the ton.

FREMONT COUNTY.

BLUE BELL.—A rich strike is reported in this mine, at Cripple Creek.

CRIPPLE CREEK SYNDICATE MINING AND MILLING COMPANY.—Articles of incorporation of this company have been filed. The company has a capital stock of $500,000. It has bought the Electric, Summit, Mountain Boy, Wichita and Wichita Eagle claims on Globe and Gold hills. These were located last June by A. K. and F. P. Huffmann. Only assessment work has been done since then, but the assays are said to run from $50 to $100 gold per ton. The officers of the company are: President, J. L. Russell; vice-president and manager, Louis Youngmark; secretary and treasurer, C. S. Hooper; board of directors, W. H. Young, O. E. Harris and the executive officers.

COLORADO ALABASTER COMPANY.—According to Mr. Eugene Weston, of this company, preparations are making to develop its property, which is situated about 8 miles from Florence, on the line of the Florence & Cripple Creek Railroad. Stone-dressing works will he erected in Florence, or in some point near the railroad. An English syndicate is said to control the company.

GILPIN COUNTY.

PAUL GOLD MINING COMPANY.—Mr. William Rohinson, president of this company, operating the McCallister mine on German Mountain, in formed the Central City *Register-Call* that a vein of smelting ore which pans well in gold has heen cut in the 440-ft. west level about 100 ft. in from the shaft. The mill dirt has improved greatly. As yet no ore has been treated at the stamp mill. Development work is progressing as rapidly as possihle.

LAKE COUNTY.

Mr. Edward R. Holden said to the Denver *Times;* "I have a man at Leadville surveying for the new lixiviation works which I am about to huild there. Construction will commence about March and the works will he finished about July. They will have a capacity of 100 tons a day and

will cost about $200 000. The Aspen works will handle about 120 tons a day.

(From our Special Correspondent.)

The résumé of the work done during January at Leadville shows a marked increase over that accomplished in December, and the large increase in the capacity of the smelters at this point is having its effect, there having been 20,850 tons of ore treated by them during January, from which a bullion product of 2,480 tons ensued. This was divided as follows: Arkansas Valley, 8,100 tons, producing 900 tons of bullion with 5 stacks in blast; American, with 6½ stacks in blast, producing 920 tons of bullion from 6,800 tons of ore; St. Louis Smelting and Refining Company, with all four stacks going, treated 4,800 tons of ore, with a bullion product of 550 tons; while the Elgin Works, put out 110 tons of bullion from 1,150 tons of ore with only one furnace working.

BANGKOK-CORA BELLE MINING COMPANY.—This company is still going on with its drilling, and is now down about 480 ft. from the surface. It is probable that some arrangement will soon be made looking either to a lease or work by the company, as some 15 ft. of low-grade sulphide is reported as having been struck by the diamond drill.

GREY EAGLE MINING COMPANY.—The Penrose shaft is still going down, having cut through the grey porphyry that underlaid the body of argentiferous iron ore, and got into a decomposed mass of limestone and chert which is gradually getting harder. No particular increase in the volume of water is now had, the four sinking pumps in the bottom having no difficulty in keeping the shaft free.

HOPE.—This mine, located between East Sixth and Seventh streets, has made a strike that bids fair to rival the now famous Elk, and is probably in the continuation to the north of the same ore body. This was first found in the Far Down, but the dip was to the East, and as this claim was a very narrow one, they soon got beyond their lines in the incline, and had to stop. The Hope people carried their shaft down some 90 ft. deeper than the Far Down, and drifted toward that property. In the West drift, about 200 ft. from the shaft, the streak was encountered, when it was deemed the better plan to go back some distance and drift to the north. This was done, and they now have a breast of ore about 7 ft. thick, which assays as high as 80 oz. in silver per ton and carries about 40% of lead. As the dip is to the east and the Last Chip is located on that side of the Hope, it is now said that an immediate resumption of the sinking on that shaft will ensue.

LA PLATA MINES, LIMITED.—In the mines of this company some difficulty is being experienced just now from the influx of a volume of water that will prevent any more work being done on the lower or 500-ft. levels. The steam duplex pump has been pulled up, though they still have a 10-in. Cornish plunger pump that will enable them to keep the water below the 400-ft. level, upon which they are now working and from which and the different stopes connected with it, they are now shipping some 35 tons a day of a good grade of lead carbonate ore. The primary cause of this increase of water is the pulling of the pumps from the lower levels of the Crown Point, of the Nisi Prius Company, which has leased this portion of their property. It is hardly likely to affect the Pinnacle or the Vivian shaft on the same property, also under lease, as these folks are working at a much higher level.

STAR OF HOPE.—At the Bohn shaft on this property attention is engaged in completing the pump station, and some 16 ft. of this is now finished and timbered. It is to be 30 ft. long, 15 ft. wide and 12 ft. high.

THESPIAN.—Under the new ownership the workings here have been extended, and in addition to the continuance of the winze in the north drift of the 523-ft. level, another has been started, and is run down about 35 ft. some distance back on the same level, where an ore-bearing crevice in the limestone is being followed down. The bottom of the first winze is now in a compact blue quartzite that does not break well, so that progress is very slow, though the outlook is encouraging. * * *

MONTEZUMA COUNTY.

HUMMISTON.—A strike is reported in this property, at the head of Mancos cañon. Gold ore it is said to have been found assaying $878 to the ton, and silver running $218. While a number of small fortunes have been made in the Mancos placers, says the Denver *Times*, this is the first strike of importance in the mountains. As a result many claims are being located. The mineral characteristics there, it has been remarked, are very similar to those of Creede,

PITKIN COUNTY.

HIGHLAND MINING AND TUNNELING COMPANY OF ASPEN.—This company, which was organized recently, has received word from the superintendent that he is entering the vein on the Wilton Bell, No. 2 lode, which it owns.

SAGUACHE COUNTY.

LAST CHANCE.—A two-thirds interest in this mine at Creede was sold recently for $100,000. The property is producing 90 tons of ore per day, which runs from $50 to $150 per ton.

TENDERFOOT.—This mine at Creede has been sold to Donald McIntosh and others. The price is said to have been close to $150,000.

FLORIDA.

POLK COUNTY.

FLORIDA PHOSPHATE COMPANY, LIMITED.—The works of this company at Phosphoria commenced operations on February 1st.

IDAHO.

ELMORE COUNTY.

COMFORT CONSOLIDATED MINING COMPANY.—The United States marshal sold this property at public auction on the 10th inst., at Boise City, for $35,000. It was bid in in favor of the owners.

ELMORE GOLD, LIMITED.—During January 250 tons of ore were milled which produced $5,500. The Vishnu mine is said to be looking better.

SHOSHONE COUNTY.

(From our Special Correspondent.)

The Cœur d' Alene mine owners held an informal meeting in Spokane on the 30th inst. and discussed the trouble with the railroads in regard to freight rates. The committee appointed at the last meeting to confer with the railroad officers was enlarged and now consists of Messrs. Glidden, Estes, McAuley and Clement. They will, however, not meet the traffic managers except on an invitation from them.

ARGENTINE.—This mine is shipping from 60 to 100 tons of ore daily to the Montana Smelting Works.

BUNKER HILL AND SULLIVAN MINING AND CONCENTRATING COMPANY.—Mr. V. M. Clement, general manager of the mine, is reported to have said that he will start up with a full force of men in the spring regardless of the freight controversy. The reason for this determination is that the concentrator is run by water power, and the first six months of the year there is an abundant supply of water, while later in the season there is a scarcity. It is proposed to add still further to the concentrating plant of this mine. Plans have been approved by the owners whereby its capacity will be increased from 800 tons per day to 1,250 tons. Six tons of crude ore are now reduced to one of concentrates. Concentrates average 67% lead and 33 oz. silver per ton. As depth is gained in the mine the ore becomes richer in silver.

CŒUR D'ALENE NELLIE.—The owners of this mine have just received $5,000, being the first payment under the bond negotiated a short time ago. The total amount of bond is $50,000.

EMMA.—This mine was bonded by Colonel Muncey for $20,000 some time ago. Men have been at work, and have uncoverad, at a depth of 80 ft., a ledge 2½ ft. wide of gray copper and spathic ore. The ore is being stacked on the dump ready for shipment. It is similar in grade to that taken from the Argentine mine.

GOLD HUNTER.—The output for the month of January was 493 tons of concentrates. The mine was kept running 20 hours each day for the entire month. The February production bids fair to exceed last month's, as the ore is richer.

MAMMOTH AND LACKAWANNA.—The famous suit between these mines has been decided in favor of the Mammoth by the Supreme Court at Boise, Idaho. The case was first tried in the District Court at Murray in 1889, and the verdict then rendered was in favor of the Mammoth. The case was then appealed to the Territorial Supreme Court and was sent back for trial. The second trial occurred at Osburn in 1890, and a verdict was returned for the Lackawanna. The case was then appealed and was argued in December, 1891, before the Supreme Court of the State, and decision just rendered in favor of the Mammoth. A large amount of money was involved, and it is said $100,000 has been spent in litigation. The Lackawanna is owned by the Bunker Hill & Sullivan, and its concentrator was supplied with ore from the Mammoth until restrained from so doing by the courts.

MINERAL POINT.—Colonel Muncey bonded this mine for Eastern parties, and has just made the first payment of $2,000 to William Sewell and William Osborne, the owners. The conditions of the bond are that at least five men shall be kept at work until the bond expires, which will be January 1st, 1893. Twenty thousand dollars is to be paid in two months, and the balance, $16,000, when the bond expires.

MORNING.—The new syndicate of Milwaukee men is now in full possession of this mine, all claims having been satisfactorily adjusted. The group of mines consists of the Morning, Evening and Silver King. The developments already made are sufficient to run a 300-ton concentrator. The old one will be replaced by a new and much larger one. A narrow guage road will replace the wire eable and the new 300-ton concentrator will be located nearer the railroad and water power than was the old one. The syndicate will expend fully $100,000 in improvements. Mr. Huntley, of Denver, has been selected as superintendent. ††

IOWA.

WAPELLO COUNTY.

A dispatch from Ottumwa. Ia., says that the depopulation of the mining town of Mystic is feared, the result of the rate ruling of the Iowa Central. "That road, a month ago, made rates to St. Paul, Minneapolis and other towns which shut out Mystic and gave the coal trade to Centreville and Forbush. As a result 18 mines are closed and 600 miners' families are beginning to feel the pangs of hunger."

MARYLAND.

Governor Brown has transmitted to the Senate the report of Richard T. Browning, Inspector of Mines for the counties of Allegany and Garrett. The output of coal for 1891 was 3,470,749 tons, an increase over 1890 of 189,570 tons, the largest ever mined in the history of George's Creek coal.

MICHIGAN.

COPPER.

CENTENNIAL MINING COMPANY.—Work has been ordered stopped in all departments of this mine, barring the operations of the pumps, reports to the contrary notwithstanding.

In discussing the situation the Calumet *News* says: "As soon as the Eastern and mine officials pull together work will be resumed. It seems improbable that the rich body of copper that was met with in No. 6 shaft and its neighborhood was the only one there. When the mine stopped in 1881 the Osceola amygdaloid was being worked (the present workings are on the conglomerate), and it was always understood that it then made a good showing. It is rumored that many of the insiders have never paid up the amount they were called upon to do when the mine started up the last time."

OSCEOLA CONSOLIDATED MINING COMPANY.—The report of this company for the year ending the 31st of December, makes the following showing:

The produet of mineral was 7,590,903 lbs., whieh at 86·2⅝ gave 6,543,358 lbs. of refined eopper, for which has been realized the gross sum of		$818,281.35
From interest receipts		143.43
From sale of building lots at Haneock		77.50
From sales of silver		1,249.10
		$819,751.38
The costs have been:		
Running expenses at mine	$499,160.65	
Smelting, transportation and all other expenses of selling copper.	107,477.50	
Expended in mine plant during year	55,226.77	
		$661,864.92
Total net income for year		$157,886.46
Deduet dividends No. 30, 31 and 32		150,000.00
Surplus for the year		$7,886.46
The balanee of assets Jan. 1, 1891, was		218,620.51
Making the balance of assets Jan. 1, 1892		$226,506.97

The directors say: Considering the low priee for copper, which prevailed during the last quarter of the year, your directors feel well satisfied with the results. This is owing in a large degree to the carefulness with which the work has been done. It will be noticed that the cost per ton of rock hoisted and stamped compares very favorably with that of last year, as also the cost per pound of refined copper at the mine. The amount needed for construction was less than in 1890, and it is expected that this present year will also see a still further reduction in that quarter. The product for the last year is larger than that of any year heretofore, and the appearance of the mine is better than at any time in the past.

The assets and liahilities as of Dec. 31, 1891, were as follows:

ASSETS.

Cash in bank at Boston and eopper on hand, since sold		$151,299.50
Cash on hand at mine		698.43
Supplies on hand at mine		40,444.42
Fuel on hand at mine and stamp mill		34,083.33
Aecounts receivable at mine		18,281.76
Aecounts receivable at Boston		57,023.54
250 shares Haneock & Calumet R. R. stock		25,000.00
Total assets		$326,775.98

LIABILITIES.

Drafts outstanding	$27,318.22	
Aecounts payable at mine	57,212.07	
Aecounts payable at Boston	22,695.72	
Dividends unealled for	43.00	
Total liabilities		100,269.01
Balanee of assets Jan. 1, 1892		$226,506 97

MINING RESULTS.

	1891.	1890.	1889.
Mineral produet, pounds.	7,590,903	6,169,686	5,262,997
Fine eopper, pounds	6,543,358	5,294,792	4,534,127
Per eent. copper in mineral	86·2	85·82	86·15
Yield fine copper per ton, pounds	27·92	28·08	25·82
Mineral in stamp rock, per eent	1·62	1·68	1·50
Refined eopper in stamp rock, per cent	1·40	1·44	1·29
Cost per ton, rock stamped	$2.13	$2.39	$2.21
Total cost per pound, cents	10·11	11·24	10·05

QUINCY MINING COMPANY.—This company's stamp-mill equipment is soon to be increased by the addition of two head of ball stamps. The machinery is on the ground and will be set up immediately,

IRON—MARQUETTE RANGE.

The *Iron Ore* says that the Chicago Lumber Company and the Western Lumber Company will

build a railroad from Negaunee to Manistique in the spring. These companies which are practically one, own and operate the Manistique blast furnace.

IRON - MENOMINEE RANGE.

LUMBERMAN'S MINING COMPANY.—This company's Ludington mine has been partiatly closed for a varlety of causes. The "old mine" so called, will operate about 40 men on ore. At a recent meeting of the stock holders it was shown that the task of unwatering the mine with the present equipment was almost hopeless, and it was decided to suspend operations until a more extensive plant could be put in. This, it is said, will be effected in about a year. The mine is connected with the Hamilton at the 11th level. Consequently in order to unwater this last named mine the water must he taken out of the Ludington down to the connecting point. Supt. Bankes has resigned and F. A. Brown secretary and treasurer of the company, is in charge. One hundred and fifty men have been discharged.

MINNESOTA.

IRON—MESABA RANGE.

Deposits of bituminous coal are said to have been found in the Mesaba Range.

BIWABIK.—This property has been explored by test pitting a distance of 1,400 ft. one way and 900 ft. the other, and ore has heen found in every pit. The drift is only from 15 ft. to 25 ft. thick. Striping operations will be commenced at once.

CINCINNATI.—A series of pits have been sunk on this property at intervals of about 300 ft. across the vein from north to south, covering a distance of 1,100 ft. The first seven pits are all bottomed in good ore. East of this, 300 ft. away, is another series of pits, one of which has struck ore, while the others are not down far enough. hut indications are good. West of the first is another series not down far enough, but all with good indications. All pits now in ore show a depth of from 22 ft. to 51 ft., and not one penetrates through the vein.

MISSOURI.

JASPER COUNTY.

(From our Special Correspondent.)

JOPLIN, Feh. 15.

The mines of the lead and zinc helt were favored last week with very fine weather and made a large output, but the price of zinc ore was on the decline and the sales were helow the average, so that there is a considerahle surplus stock on hand; lead ore ruled at $23 per thousand. Following are the sales of ore from the different camps for the past three weeks.

Feh. 1.

Joplin mines, 1,750,960 lhs. zinc ore and 360,540 lbs. lead; value, $28,497.50.

Webb City mines, 1,347,360 lbs. zinc ore and 126,710 lbs. lead; value, $17,735.30.

Carterville mines, 1,211,080 lbs. zinc ore and 109,300 lbs. lead; value, $16,288.55.

Zincite mines, 5,550 lbs. zinc ore and 4,080 lbs. lead; value, $157.65.

Lehigh mines, 173,600 lbs. zinc ore; value, $2,039.80.

Oronogo Mines, 13,530 lbs. of lead; value, $357.60.

Carthage Mines, 80,000 lbs. zinc ore; value, $690.

Galena, Kans., Mines, 433,000 lhs. zinc ore and 295,880 lbs. lead; value, $11,651.

Districts, total value, $77,417.40.

Feb. 8.

Joplin Mines, 1,135,040 lbs. zinc ore and 219,620 lbs. lead; value, $17,536.70.

Webb City Mines, 358,830 lhs. zinc ore and 26,760 lbs lead; value, $4,562.60.

Carterville Mines, 2,738,340 lbs. zinc ore and 75,880 lbs. lead; value, 31,867.

Zincite Mines, 223,610 lbs. zinc ore and 1,830 lbs lead; value, $2,992.40.

Lehigh Mines, 130,870 lbs. zinc ore; value, $1,505.

Oronogo Mines, 55,410 lbs. zinc ore and 3,550 lbs, lead; value, $640.

Carthage Mines, 212,138 lbs., zinc ore and 18,750 lhs. lead; value, $2,933.85.

Galena, Kan., Mines, 703,460 lhs. zinc ore and 300,000 lbs. lead; value, $14,178.

Districts, total value, $76,215.55.

Feb. 15.

Joplin Mines, 1,208,140 lbs. zinc ore, and 288,410 lbs, lead; value, $19,620 95.

Webb City Mines, 524,950 lbs. zinc ore and 56,920 lhs. lead; value, $6,952.85.

Carterville Mines, 1,799,700 lbs. zinc ore and 148,820 lbs. lead; value, $22,769.60.

Zincite Mines, 271,990 lhs. zinc ore and 7,340 lbs. lead; value, $2,621.30.

Lehigh Mines, 197,440 lbs. zinc ore; value, $2,270.55.

Oronogo Mines, 119,040 lhs. zinc ore and 13,730 lbs. lead; value, $1,446.65.

Carthage Mines, 167,360 lhs. zinc ore; value, $2,013.

Galena, Kans., Mines, 722,810 lbs. zinc ore and 111,590 lbs. lead; value, $9,930.

Districts, total value, $67,624.90.

As will be noted, the above figures give the output of the lead and zinc mines for three weeks or eighteen working days, and this makes a grand total of $221,257.85; it must be further noted that these are actual cash transactions. They show the magnitude of the lead and zinc mines of this district. The new year has opened up under the most favorable circumstances. Several new companies have been organized, and are already pushing development. Many new plants of machinery are in course of construction. One of the largest is that being built by Cooley & Elmore for the Cherokee Company operating on the common land south of Carterville. This is a 100 ton plant and will be fitted up with the latest improvements for dressing the zinc ore. One of the new improvements that will he placed in this plant is the Lurhig vanner for handling the fine slimes. Messrs. Cooley and Elmore recently visited St. Louis and made a thorough examination of this machine and then secured the right to use it in this district.

MONTANA.

ROCK OF AGES.—A streak of high grade ore is reported to have heen found in this mine in the Cataract district, owned hy Hark Estes, and is now being operated under lease to the Prince Bros. It was made at the depth of 140 ft. and the ore is said to run nearly $200 a ton.

DEER LODGE COUNTY.

GRANITE MINING COMPANY.—It is reported that 3-ft. of ore has heen recently struck in the cross-cut at the 1,700-ft. level in this mine.

LEWIS & CLARK COUNTY.

MONTANA COMPANY, LIMITED.—The output of this company in January was valued at $55,300; working expenses for the month were $44,500. There were crushed in the mills during the month 7,190 tons of ore, while 1,250 tons of tailings were treated which yielded $7,000 at a cost of $3,000. The report of Mr. Thomas Richards, M. E., on the "Drum Lummon Group of Mines, Blue Bird aud Hickey Mines" has heen issued. Mr. Richards states it as his opinion tbat the ore hodies in the Drum Lummon veins dip southward, and that the main lode going northwards ceases to he ore producing in that direction as depth is attained. Based upon this opinion he recommends for the further development of the mine as follows:

"*First.*—That the 1,000-ft. level be extended with all possihle speed, and cross-cuts made from it at intervals along the drivage.

"*Second.*—The 1,200-ft. level should not only he driven south with a view to locating the ore body exposed at the 1,000 ft. level, but cross-cuts should be driven from it in hoth directions—east and west—about midway between Nos. 1 and 2 shafts, to ascertain whether any ore bodies exist in other portions of the lode at this depth.

"*Third.*—The 1,600-ft. level should also he extended until it has passed the lines of the No. 2 shaft.

"*Fourth.*—At the 800-ft. level north a cross-cut sbould be driven westward, from a point about 600 ft. north from No. 1 shaft, until the 'nucleus granite' is reached; as, in my opinion, there may still he a portion of the lode to be found in that direction.

"*Fifth.*—It will be well to extend the 700 ft. level northward, for the purpose of ascertaining whether the Pixley No. 4 chute reaches this depth. There is a very strong lode in the forehreast of this level, and as the ore body mentioned has been followed a few feet below the 600, it may possihly be wortb finding at the lower level.

"*Sixth.*—The Castletown lode should be intersected and explored hy a cross-cut east from No. 1 shaft, at the 1,600-ft. level.

"*Seventh.*—This Castletown lode is also worth exploring at the 1,000-ft. level, as in the present end north, it contains ore of assay value to an appreciable extent.

"*Eighth.*—As the company possesses some bundreds of feet of territory both north and south of the present limits of the 400-ft. level or main tunnel, I recommend also the extension of this tunnel in both directions, since it will he judicious to prove the Empire as well as the main lode going northwards."

Mr. Richards estimates that there are 124,560 tons of ore in reserve, which may he expected to be equal to the requirements of the mills for the next 18 months, and unless an unexpected depreciation should occur in the value of the ores, the revenue to be derived will probahly he sufficient to cover the extra expenditure incident to carrying out the exploratory work recommended, in addition to providing for the ordinary requirements of the company for some time to come. A longitudinal section of the workings of the Drumlummon mine was published in our issue of May 2, 1891.

NEVADA.

ELKO COUNTY.

Following are the latest official letters from tbe superintendents of the Tuscarora mines:

BELLE ISLE MINING COMPANY.—In the No. 1 winze below the 350-ft. level No. 3 vein is showing 8 in. of first class ore. The winze from the 250-ft. level also shows some good ore.

DEL MONTE MINING COMPANY.—The stopes are looking well and are connected with raise 1, exposing good ore all the way. Extracted 12 cars first-class ore, assays $275 per ton, and 26 cars second class, assays $45 per ton.

NAVAJO MINING COMPANY.—In the South intermediate below the 250-ft. level the vein is small but rich.

NEVADA QUEEN MINING COMPANY.—Superintendent Coffin telegraphed as follows to the San Francisco office on the 11th inst.: "No. 2 raise up 4 ft. shows 12 in. of $200 ore. Not yet through the vein. No. 1 raise has 6 ft. of $25 ore. Intermediate bas 8 in. of good ore.

NORTH BELLE ISLE MINING COMPANY.—The North intermediate above the 400-ft. level, No. 2 vein, shows some good ore. Soutb Intermediate ahove the 400, No. 1 vein, showing 10 in. of good ore. The first-class ore is left stored under ground, pending the starting of the sampling works, to save extra handling. Hoisted 22 cars of second-class ore, estimated assay value, $30 per ton.

NORTH COMMONWEALTH MINING COMPANY.—Stopes going east on second level from winze bave improved, showing more high-grade ore. Extracted 28 cars of ore, assay, car sample, $43 per ton. No. 1 raise encountered incline vein, 18 in., giving low assays.

LINCOLN COUNTY.

PIOCHE MINING AND REDUCTION COMPANY.—Furnace No. 2 has heen thoroughly repaired, says the Piocbe *Record*, and resumed operations. The present receipt of ore from the company's mines speaks well for the future yield. One furnace is kept going steadily and the hullion produced has an upward tendency in value.

STOREY COUNTY—COMSTOCK LODE.

CONSOLIDATED CALIFORNIA & VIRGINIA MINING COMPANY.—The bullion statement of this company for January shows that during the month the total number of tons worked at the Morgan mill was 4,400. The bullion produced aggregated $87,260.01. Tbe total yield in bullion per ton was $19.82, of which $10.62 was in gold and $9.20 in silver. The assay value of the ore per ton per hattery samples was $29.03, of which $14.65 was in gold and $14.30 in silver.

(From our Special Correspondent.)

The following is the weekly statement of ore extracted from the Comstock mines, and milled, with the hattery assay values:

Mine.	Tons extracted.	Tons milled.	Assay Values. Feb. 6.	Jan 30.
Con. Cal. & Va....	1,037	980	$32.95	32.48
Hale & Norcross...	*486	420	21.48	18.68
Ophir...	†27	....	22.10	.....
Overman.....	‡511	....	18.73	16.75
Savage.....	§783	683	21.64	20.35
Yellow Jacket.....	‖266	...	.....	.....

* Cars. † Hoisted and stored. ‡ Car sample assay, $19,79. § Cars. ‖ Being shipped to Vivian Mill; no assay returns.

BELCHER MINING COMPANY.—The ore discovery, already alluded to in these columns as having heen made on the 1,300 level, is proving to be of even more importance than was supposed. Some of the ore has assayed as high as $70 per ton.

HALE & NORCROSS MINING CONPANY.—The suit of M. W. Fox against the directors of the H. & W., Hohart & Hayward, and the Nevada Mill and Mining Company, increases in sensational developments as it advances. He would be a bold man who ventured to prophecy as to what further incriminating testimony would be evolved.

Upon the question of the admissibility of the evidence of Evan Williams, as against the new defendants, the Court declared that Superintendent Williams' testimony, as taken on tbe main trial, could not be admitted, as it was merely narrative of past occurrences. As to its admissibility against the Nevada Mill Company, he was in doubt and desired to hear further argument. Later the Court ruled that Williams having been brought into court an unwilling witness, and before issue was joined as against the new defendants, his evidence could not be used, hecause Williams was made a witness against his alleged co-conspirators. The Court, held, however, that his testimony could he used as against the Nevada Mill and Mining Company.

H. W. Tangerman, ex-superintendent of the Eureka and Sierra Nevada Mills, being recalled testified to the working of the "three pan annex" or "little joker." Repeatedly he had seen slimes dipped out of the banks and put in the sluice box, and in 1888-89-90 concentrates were taken from the sluices and worked in the pans.

"Do you know," inquired Attorney Baggett, "how much of the shines or concentrates were worked in the annex of the Nevada Mill per day during 1889?" Ans.: "About 18 tons of each. There was a ton and a half to the charge of six hours, making six tons for each of the three pans, or 18 tons per day."

Witness then stated that he had taken samples of the slimes and concentrates from the tanks in 1889, and was familiar with the amount of bullion retorted during the year. "There was in that year hullion of the value of about $22,000 monthly retorted. The millmen frequently talked of the output of the annex."

Alvinza Hayward being recalled stated that he did not know what the property of the Nevada Mining and Milling Company (of which he is the one-fifth owner) amounted to. It consisted of real estate, mill and supplies and mining stocks. The company owned Bullion, Chollar, Potosi, Savage, Hale & Norcross stocks. He could not tell who hought those stocks or who held them. Mr. Hayward had previously stated that he had no account with the mill company, but he now pleaded that he had not understood the questions. He admitted that there were charges of money paid to H. M. Levy, president of the Hale & Norcross, but of his own knowledge did not know for what purpose such payments were made. He had made them "Upon

the order of Superintendent Williams." "Do we then understand that if you or your bookkeeper, Mr. Sells, drew checks for large amounts in favor of Mr. Levy, he having no connection whatever with the Nevada mill, that you did not know for what purpose that money was paid?" "Of my own knowledge I did not know."

He finally admitted that he had some recollection—"but it is merely guess work," he remarked, "that some arrangement was made perhaps with Jones or Hamilton or Hobart by which Levy was to receive one-eighth of the profits of crushing Hale & Norcross ore." A very interesting admission. Q. Do you know of any reason why Levy should be paid that profit? A. If I remember rightly, the agreement occurred through the election of Hale & Norcross in 1888. Levy was a large stockholder in that company. Mr. Hobart and myself held a controlling interest of Chollar and were desirous of having a *satisfactory Board of Directors* elected in the Norcross, and Levy was promised *if he would retire from the contest he would be paid one-eighth of the profits of crushing Norcross ore.* Levy complied, but was allowed to run as a director. Later he said it would be humiliating to him if he were not re-elected president, and that also was conceded to him.

The term "retire from the contest" really meant handing over the destinies of the Hale & Norcross to the Philistines, otherwise the mill-ring—for a consideration.

Mr Hayward's books with the Nevada Mill being examined accounts amounting to $300,000 for the years 1888-9 were found. In the accounts were the following entries, being part of Levy's share of the spoil: "January. 28th. 1889.—Paid to H. M. Levy $9,821.45, being ⅛ of $77,778 14, profits of crushing Hale & Norcross ore at Nevada and Mexican mills for the months of March, April, June and July 1888." Four other embries were read and the checks offered as evidence as follows: "May 15th, 1889, No. 68, for $6,465.63; November 2d, 1889, for $2,938.34; December 12th, 1889, for $1,647.58; March 11th, 1890, for $946.70."

Two of these checks were drawn by Sells, Hayward's bookeeper, to his own order, indorsed on the back, and the other three by A. Hayward personally. The ledger entries proved that all checks were in reality in favor of Levy, and two of the checks bear his indorsement showing he had received the money. The others had been collected through indorsement to third parties.

Other evidence bearing on the matter having been adduced, Attorney Baggett declared the plaintiff's case closed. Mr. Wood, leading counsel for the defendants, moved for a non-suit.

The Court delivered itself as follows:

"I have followed the evidence with the greatest care, and to my mind it appears that the stockholders of the Hale & Norcross Company have been defrauded of their property. There is no doubt that the plaintiff has made out a strong case of conspiracy, at least *prima facie*, except, perhaps, as to Hayward & Hobart as individual defendants. But there are certain facts and suspicious circumstances connecting Hayward & Hobart with the case which connect them it seems with the conspiracy itself. I deny the motion for a nonsuit as to any and all the defendants."

On the 10th of February the defense commenced their side of the case by the introduction of expert testimony as to the value of tailings. No preliminary statements were made, and the charge of conspiracy has, so far, only been touched upon in a very indirect manner.

D. B. Lyman, superintendent of the Consolidated California & Virginia, Ophir, Mexican, Union Consolidated & Utah mines, who has had a practical experience on the Comstock for 30 years, stated that it had always been the custom for the mills to retain the tailings. With the improved methods in vogue he did not think they ought to be a greater difference than 10% between the ear samples and the pulp assay at the mill. Being asked to illustrate the expense of working the tailings profitably, Mr. Lyman, taking one ton as a hasis, said:

"To half a ton of slimes I would take half a ton of sand and if I got 70% of the assay I would do well. Assume, for instance, a ton of slimes has an assay value of $16, and a ton of sand $5, the total will be $21. The average will be $10.50 to the ton, and by saving 70% of this you have a net result of $7.35. I estimate the cost of milling at $3, discount on silver, $1 83, hauling 60 cents, making a total cost in round figures of $6 a ton and a profit of $1.35. In working concentrates you save 55% of the assay value and no more. If it were not for the quicksilver in them they could be washed and 8% saved, but in doing that the quicksilver would be lost."

Mr. Lyman then stated that there were slow motion pans in all the Comstock mills similar to those in the Nevada annex.

Plaintiff's attorney, Baggett, entangled Lyman in a network of contradictions that appeared to utterly befog his intelleet and cause defending counsel to blaspheme in audible whispers. He admitted that he had obtained Mr. Mackay's consent before coming to San Francisco. Prior to leaving Virginia City he had gone over the sampling of the ores and was familiar with all the assays.

Attorney Daggett intimated to the Court that he hoped to prove that all the mines on the Comstock were under the control of the mill owners. Mr. Lyman admitted that he received his instructions from Messrs. Flood & Mackay. The Consolidated California and Virginia ore is worked at the Eureka and Morgan mills, which are owned by the Comstock Mining and Milling Company, or in other words, by Mackay, Flood and Jones, The Nevada Mining & Milling Company, on the other hand, is owned by Jones, Hobart & Hayward, and others.

"I make no contracts with the mills," said Mr. Lyman; "they are made in San Francisco." Senator Jones has the contract to work the ores for our mine. We have no representative at the mills when the ore is worked. I know that we are not being cheated by comparing the daily assays taken at the mines and at the mills. That is the only check we have against the mills Our returns are from 73 to 94% of the battery assays.

"Now, Mr. Lyman," asked Attorney Baggett, "if you owned the Hale & Norcross mine and had 4,579 tons of ore, worth, by car sample assays, carefully taken, $221,303.07, and shipped it to the Nevada Mill, would you be satisfied at receiving in return of bullion $90,535.12?"

"No, I certainly would not." "Well, then if you had, under like circumstances 3,973 tons of ore worth by car sample $222,711.30 and received in return $78,097.77, would you be satisfied? "No, I would not; the difference is too great."

"What would you be satisfied with?" "Not less than 65% of the car sample assay."

In February, 1889, 3,973 tons of Hale & Norcross ore was sent to the Nevada mill, having a value by car sample assay of $222,711.30. The mill ring returned $78,097.77. According to the 65% of the car sample basis of Mr. Lyman, the mill ought to have returned $144,300, but instead showed a shortage of $66,300. In April, 1889, 4,579 tons ore, having a car sample assay value of $221,303.07, were shipped to the Nevada mill, and a return made of $90,535.12. Aecording to Mr. Lyman's 65% basis a return of $143,650 ought to have been made. The shortage in that instanee, therefore, was $53,650.

Q. How do the battery sample assays compare with the car sample assays?

A. One that samples $100 in the car ought to assay $90 in the battery; $15 rock by car sample assay should give about $12½ per ton in the pulp assay.

Judge Hubbard, "You divide 12½ by 15, which gives 83⅓%." "Then I put it too high—too high altogether," responded witness. Mr. Lyman being questioned why it was that the Overman car samples are frequently lower than the battery assays, confessed he did not know.

Q. Didn't you have the continuous or Boss system introduced into the California pan mill at one time? A. Yes. Q. By that process you worked the slimes and ore together, keeping it all in the mill, did you not? A. Yes. Q. Did not the returns then range from 92 to 94 per cent? A. Yes, it went as high as that in the clean ups. Q. Were your tailings worth saving to work over for the mill company? A. Hardly worth while saving. Q. How is it then that you only get 63 per cent. of the battery assays to-day by the later system? A. I cannot tell.

Witness stated also that 18 months ago he sold 5,000 tons concentrates to T. Hulley, of Virginia City for $25,000, the money being paid over to the Comstock Mill and Mining Co. (The accumulated slimes at the Consolidated California & Virginia Mine at present are placed at $5,000,000.)

Mr. Lyman repeated his assertion made in his direct examination that it was the custom of all mills to retain the slimes and tailings as their perquisites. He was compelled to modify this, however, when asked if the custom prevailed at Silver City, only three miles from Virginia. He then allowed the custom was confined to the Comstock. He was then asked if he took, himself, the slime samples assayed by Price. "Yes," was the reply, "in company with Benham, the foreman of the Nevada mill."

The following are the 10 slime samples taken by these mill-ring employés: Sample 1, $14.61; Sample 2, $16.55; Sample 3, $17.45; Sample 4, $14.54; Sample 5, $21.28; Sample 6, $21.32; Sample 7, $15.76; Sample 8, $15.64; Sample 6, $9.95; Sample 10, $20.36.

"Did you get any dirt mixed with the samples?" next inquired counsel. "Well, we were not looking for dirt." "But it was possible, was it not, as you say you broke through the frozen crust and got your samples from near the bottom of the ponds?" "Yes, it was possible." "And in that case a very little dirt would make a vast difference in the assay, would it not?" "Yes."

As a matter of fact, these slimes ran over $100 per ton on the authority of the amalgamator in the mill at the time.

The cross-examination of Mr. Lyman being completed, the case was adjourned until Monday next.

**

NEW JERSEY.

OXFORD IRON AND NAIL COMPANY.—Both Houses of the Legislature on the 15th inst. concurred in the report of a special committee appointed to investigate the grievances of the employés of this company. The committee found that the puddlers had refused to do 13 hours' work a day; that the company did not take proper precautions to protect the lives of its miners, and that there were abuses in connection with the company store system. The report recommended the appointment of an inspector of mines and the passage of a hill providing for payment of wages in cash by mine and manufacturing companies.

NEW MEXICO.

GRANT COUNTY.

According to the Silver City *Sentinel*, the shipments of gold and silver bullion through Wells. Fargo & Co.'s office at Silver City during the month of January amounted to $17,930, of which $5,905 was in gold bullion and $12,025 in silver bullion.

NEW YORK.

CLINTON COUNTY.

ARNOLD.—A fall of roof in this mine, at Ferona, gave way on the 17th inst., killing four men outright and severely injuring several others.

PENNSYLVANIA.

COAL.

The Pennsylvania coal operators, it is said, want to construct a building entirely of anthracite coal at the Columbian Exposition, and to have 50,000 tons of best anthracite on exhibition.

Three hundred of the employés of the Lawrence & Brown colliery, at Mahanoy Plane, who recently resumed operations, struck on the 15th inst. for back wages.

Advices from Pine Grove, Pa., say that all the collieries in the west end of Schuylkill County were put on 10 hours time on the 16th inst. Heretofore they have been working only nine hours.

BLACKWOOD.—The strike at this colliery at Tamaqua, involving about 200 men, was settled on the 16th inst.

LEHIGH COAL & NAVIGATION COMPANY.—This company's report for the year ending December 31st, 1891, shows: Total revenue for the year 1891 was $2,129,560; general expenses, rentals, taxes and interest, $1,147,224, leaving surplus earnings of $982,336. Out of this sum $96,789 (10 cents per ton) was appropriated to the coal sinking fund, $100,679 for the depreciation of coal improvements and $715,150 to the payment of two dividends upon the capital stock, amounting together to 5%. The earnings of the Lehigh & Susquehanna Railroad system are the greatest in the history of the road, and are $191,412 above those of the preceding year. The earnings from passengers and mails are larger than for any year since 1883; the freight earnings are the largest in the history of the road, but the coal earnings were exceeded by those of 1888 and 1889.

President Harris says: "The total revenue of the road has doubled in the last twelve years, and the freight earnings have doubled in the last ten years. Our coal property produced in the last year 1,262,838 tons, which is a little less than the product of 1890. Within the past few days an agreement has been made by the Port Reading Railroad Company for the lease of the Central Railroad Company of New Jersey, which will probably result in great advantage to this company, as, in addition to the better returns of our coal business which should result from harmonious action among producers, the stipulated earnings of our railroad system will insure to this company minimum annual railroad rentals for the first four years of $1,800,000, and thereafter minimum annual rentals of $1,916,667, being an increase in the first four years of about $400,000, and thereafter of about $500,000 over our present rental."

MCCLURE COKE COMPANY.—Judge Lucien Doty, of Greensburg, has handed down his decision in the re-appeal of Superintendent Brennen, of the McClure Coke Company, from the decision of William Jenkins, Inspector of Mines. Inspector Jenkins, on the 30th of April, 1890, gave notice to Superintendent Brennen that but one mine boss was employed for two mines, known as Bessemer and Rising Sun, contrary to law, and ordered that an additional mine boss be employed. An appeal was taken to court. Some time afterward the inspector notified the company that it was violating the law in having only one mine boss for Donnelly No. 1, Donnelly No. 2 and Mayfield mines. The judge ordered that one certificated mining boss be employed for each of the foling mines: Hazlett shaft, Hazlett slope, East Donnelly, West Donnelly, Rising Sun, Mayfield and Bessemer, and that the appellant pay the costs in the case.

NEW YORK AND MIDDLE COAL FIELD RAILROAD COMPANY.—This company, of Philadelphia, was rechartered on the 17th inst.

READING COAL AND IRON COMPANY.—This company's Lykens and Lorberry district collieries have been put on 10 hours' time.

SOUTH CAROLINA.

The phosphate companies won in the lawsuits for mandamus argued before Judge Kershaw in the Berkley court. Assistant Attorney-General Townsend represented the State, and made no defense in view of the recent decision of the Supreme Court in the bank cases. The mandamus was issued and the County Auditor was ordered to reduce assessed value of land phosphate rock from $6 to $3 a ton.

SOUTH DAKOTA.

HOMESTAKE MINING COMPANY.—This company recently bonded a one-half interest in the Barrdall coal fields, situated on the Cheyenne River 12 miles southwest of Cascada for $15,000 on a 30-day option. The property consists of 16 quarter sections, upon which considerable development work has been done. One tunnel 60 ft. long is said to show some very fine coal.

TENNESSEE.

ANDERSON COUNTY.

TENNESSEE COAL MINING COMPANY.—The mines of this company in Briceville will be worked upon the co-operative plan. The details have been agreed upon and incorporated in an amended charter, which has been filed. The miners are allowed to take stock and have taken $10,000. Each subscriber will have 20 months in which to pay for $100. The company will erect dwelling houses and allow the miners to buy on liberal terms.

UTAH.

JUAB COUNTY.

BRITISH TINTIC MINING COMPANY, LIMITED.—A special meeting of this company was held in London on the 25th ult. The chairman stated that the necessity for this company going into liquidation was brought about by certain persons getting into the mine, and after four or five years of litigation, which was abortive, the late Mr. Elliott came to the conclusion that the only way to settle the matter was to come to terms with them. "We have made arrangements with the people in America by which we should form a new company, giving them an interest in that company, and so we have assembled to carry out that plan by going into liquidation to-day. We were in a difficulty that we did not see our way out of, and, therefore, Mr. Elliott advised that this was the best he could do. Our hopes are that this will be a turning point in our mine. We have arranged with the auditor to wind up the company for a small fee."

A resolution was passed appointing Mr. Edward Hohbs, C. A., liquidator of the company, for the purpose of voluntarily winding up the company. This company was registered November 17th, 1887, for the purpose of carrying into effect an agreement with the Mammoth Copperopolis of Utah, Limited, for acquiring and working certain property in the Tintic district. The authorized capital of the company is £75,000, in shares of £5 each, of which 10,573 were allotted and issued as fully paid. There were also issued 15% debentures to the amount of £60,000.

SALT LAKE COUNTY.

AMERICAN NATURAL GAS COMPANY.—This company is reported to have found gas at a depth of about 600 ft.

SUMMIT COUNTY.

MEEARS GOLD AND SILVER MINING COMPANY.—This company has made arrangements for developing its property at Park City. A station has been cut near its 500-ft. level with a view of crosscutting to the Daly vein. This station and crosscut will be on a level with the 200-ft. level of the Daly mine. On the 400-ft. level of the Meears the Daly vein has been cut and found to be 60 ft. wide.

WASHINGTON.

OKANOGAN COUNTY.

(From our Special Correspondent.)

BLACK BEAR AND WAR EAGLE.—The Black Bear mill started on the 2d inst. Drifts are now being run both ways from the 100 ft. level west, and a second ledge, assaying well in gold has been struck. The shaft on the main ledge is down some 50 ft. below the 100-ft. level, and when a depth of 200 ft. is reached they will cross-cut for all five ledges. On the War Eagle work on the shaft has been started, and a tunnel begun on the west extension. This will be from 700 ft. to 1,000 ft. long, and as soon as the ledge has been topped cross-cutting will commence to tap on the other ledges.

RAINBOW AND COYOTE.—A 6-ft. ledge of good ore has been struck. The ore taken out is being stacked on the dump, waiting for the spring opening. † †

STEVENS COUNTY.

(From our Special Correspondent.)

WELLINGTON.—For several months work has been done on this mine, and at a depth of about 120 ft. a 4-ft. ledge was struck, assaying from 50 to 80 ounces of silver and 20% lead. The ore is a carbonate. The mine is located in the Summit mining district. † †

WISCONSIN.

IRON—GOGEBIC RANGE.

SUPERIOR.—This mine is again in full operation and the force is being gradually increased, numbering about 100 at present. The property is said to be in an excellent state of development.

WYOMING.

ALBANY COUNTY.

(From our Special Correspondent.)

Bramel district, which was once the scene of considerable activity, shows signs of reviving, work having been resumed in the old Betsy Jane mine.

Thirty-five men are wintering in La Plata camp. Some of the mines there are showing up very well. The Red Bird has shown a better grade of ore as work has progressed. The ore from this camp is galena, high in lead with considerable gold. The ore near the surface carries the highest percentage of gold. As depth is gained the percentage falls.

LUCKY SIX MINING COMPANY.—The Brooklyn shaft has struck a water course which has driven out the miners. The water now stands 15 ft. in the shaft. Some ore has been taken out of this shaft, assaying $100 a ton.

FOREIGN MINING NEWS.

CANADA.

The Canadian Mining and Mechanical Review gives the following statistics relating to the mining industry in Canada in 1891:

Silver.—From returns furnished officially, the exports of silver ore from the Port Arthur mines (Ontario) during the past year were: January, $15,000; March, $39,000; May, 13,000; July, $44,113; August, $37,050; September, $27,050; October, $35,370; November, $9,800; total, $220,383. Of this, ore to the value of $220,200, went to the United States. Bullion valued at $10 was shipped in March.

Phosphate Rock.—The value of the phosphate exported to the United States during the past year, as per Consular returns, was: Ottawa Valley, $12,600; Kingston District (351 tons), $1,346; total, $14,446.

Mica.—The exports of mica to the United States so far reported were:

Kingston District	27,692 lbs., or	$6,970.00
Ottawa Valley	.....	23,817.17
Brockville	77,775	4,925.83
Belleville	272½	.....

Nickel.—Exports of nickel matte to the United States were: Via Prescott, of a value of $363,000; via Carleton Place, of a value of $569.17, or a total value of $363,569.17.

Iron Ore.—Exports of iron ores from Bristol mines, Pontiac County, Que., as reported by Consul General Lay: March quarter, $2,930.14; December quarter, $660; Total, $3,590.14.

Miscellaneous.—The exports of mineral from Beleville, other than reported above, were: Actinolite, (hags) 320; gold quartz, (lbs.), 28,800.

INDIA.

The four principal Indian gold mining companies have made the following reports for January: Balaghat-Mysore, 90 tons of ore milled, yielding 109 oz. gold, against 320 tons, yielding 635 oz. gold, in December; Mysore, 3,511 tons of ore milled, yielding 5,033 oz. gold, and tailings yielding 545 oz. gold, against 3,575 tons of ore milled, yielding 5,122 oz. gold, in December; Nundydroog, 1,150 tons of ore milled, yielding 2,440 oz. gold, and tailings yielding 113 oz. gold, against 111 tons of ore milled, yielding 2,500 oz. gold, and tailings yielding 101 oz. gold, in December; Ooregum, 1,402 tons of ore milled, yielding 3,225 ounces gold, and tailings yielding 200 oz. gold, against 1,439 tons of ore milled, yielding 3,098 oz. gold, and tailings yielding 135 oz. gold, in December. The falling off in the output of the Balaghat-Mysore Company was was due to an accident in one of the shafts early in the month. The repairs have now been completed and it is expected that the output will go on at the regular rate.

MEXICO.

CHIHUAHUA.

According to the Chihuahua papers, says *El Minero Mexicano*, the mining industry in that State is not in a very flourishing condition, but according to the latest statistics the production for the year 1891 was about the eighth part of the total product of the Republic, as far as can be learned from the imperfect data to be had. The silver coined in and exported through the Chihuahua mint amounted to $3,500,000; the direct exportation of ores produced in the State was about half a million more, and the exportation through the States of Sonora and Sinaloa of ores produced on the western slope of the Sierra Madre was also over $1,000,000. The total production of the State of Chihuahua has then been over $5,000,000 during 1891.

GUERRERO.

From a well-known engineer who has just arrived from Mexico we learn that the Huitzuco quicksilver mines are now producing about 700 flasks monthly. The ore at this property is a mixture of sulphide of antimony and cinnibar. The Guadalcazar Quicksilver Mining Company has lately started two new furnaces designed by Mr. J. MacTear, and it is anticipated that the production at this property will reach 300 flasks per month.

SONORA.

A synopsis of the report made by the Governor Don Jonquin Baltran to the secretary of the treasury in Mexico, giving the results of recent explorations of the coal deposits in this State, has been issued. It appears that the deposits of anthracite coal in that department are immense, the area in which it is found extending over a region of 570 square leagues. In making the borings it was found that the veins varied greatly, some of them being merely from 2 ft. to 4 ft. thick, while other ranged from 8 ft. to 25 ft.

CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, Feb. 19.

Heavy Chemicals.—Despite the numerous rumors of a probable advance in prices in the near future, the main features which have characterized the heavy chemical market for some weeks past, remain practically unchanged. Consumers are skeptical concerning the truth of the intimation to the effect that important changes may occur shortly in the position of the various chemicals, and do not display very much anxiety about their ability to purchase supplies later on at satisfactory prices.

Caustic Soda.—The spot demand has been light. We quote this week: 60%, 3·10@3·20c.: 70%, 74%, 2·85@2·90c.; 76%, 3·15@3·20c.; 77%, 2·02½@3c.

Carbonated Soda Ash.—There has been rather more inquiry for carbonated ash during the week, both for spot goods and for future shipments. Quotations have ruled: 48%, B. M. & Co., 1·55@1·60c.: 58%, 1·50@1·55c.

Alkali.—Arrivals during the week were light. Sales of spot goods were correspondingly small, but there was more demand for future delivery. Quotations show a slight advance, and now rule as follows: 48%, B. M. & Co., 1·55@1·60c.; 58%, 1·47½@1·52½c.

Bleaching Powder.—This market is quiet. Some spot sales are reported at 2·15@2.20c.

Sal Soda.—The domestic article is said to be demoralized, owing principally to over-production. It is offered at 90c., f. o. b. less 5%. A good many sales are reported. English sal soda is quiet at 1·10@1·15c.

Acids.—Manufacturers still continue to report a good business, although the great demand of a month ago has eased off. Prices have undergone no change. We quote this week for 100 lbs. of acid in New York in lots of 50 carboys or more; Acetic, $1.60@$2, according to quality; alum, lump, $1.50@$1.75; muriatic, 18°, $1; 20°, $1.12½; 22°, $1.25; nitric, 40°, $4; 42°, $4.50@$4.75; sulphuric, 90c @ $1.12½; oxalic, $7.25@$7.75. Blue vitroil is quoted all the way from $3.25@$4.

Brimstone.—Cables received to-day from Sicily report a fluctuating market; so much so, that no quotations could be given. In this market quotations are: $27.50 for best unmixed seconds on the spot; there are no thirds here. Brimstone to arrive is held at: $27.25 for best unmixed seconds, and $26.25 for best unmixed thirds. Previous to this advance in price a fair amount of business was done, but just now buyers are holding off in anticipation of changes which may prove to their advantage.

Fertilizers.—The demand for the various fertilizers continues very light and the market is as dull as ever. Only a few small sales are reported. Nothing of especial interest has occured during the week. We quote as follows: Sulphate of ammonia, 3c. for spot and 3.05c, for shipments. Dried blood, $1.95 per unit for high grade and $1.85 for low grade. Acidulated fish scrap, $13.50 f. o. b. factory. Dried scrap, $23.50@$24. Azotine, $1.95. Tankage, $19@$21. Bone meal, $22@$23.

Double Manure Salts.—Quotations are about as follows for winter shipments, ex-vessel New York, in lots of 10 to 50 tons: 48%-53%, 1·18½@1·23½c.; 90-95%, 2·18@2·23½c.; 96-99%, 2·21@2·23½c.

Kainit.—There is no business doing in this article. Quotations remain $8.75@$9.50, according to quantity, time of delivery, etc.

Muriate of Potash.—During the week 100 tons arrived at Baltimore per steamer "Hohenzollern," all of which went into consumption. Stocks here are light and not much is doing. Only a small jobbing demand is reported. Prices remain as fixed by the syndicate.

Phosphates.—Nothing of interest can be reported so far as the local market is concerned. Prices continue at $6 for dried and $5 for undried, with freights at $1.75@$2.

Nitrate of Soda.—The market for nitrate just now is weak. Quotations are: Spot, $1.87½@$1.90 ex stmr.; to arrive, $1.86; future shipments, $1.75

NOTES OF THE WEEK.

Alonzo C. Lamar, a prominent window glass manufacturer of Woodbury, N. J., and of Philadelphia, failed on the 15th inst. Executions against him to the extent of $20,000 have been filed. His factory at Woodbury and large warehouses at Philadelphia have been seized by the sheriff. Mr. Lamar says that his assets will amount to $30,000, and that he can pay all his debts if allowed to continue his business. George Green, the millionaire patent medicine man, has offered to be Mr. Lamar's security. The heaviest creditor is the National State Bank of Philadelphia, which holds notes amounting to over $18,000. This is the largest amount due any one creditor, and the only one of any amount. It is believed that Mr. Lamar will be allowed to continue his business.

MINING STOCKS.

[For complete quotations of shares listed in New York, Boston, San Francisco, Baltimore, Denver, Kansas City, Deadwood, Dak., Pittsburg, St. Louis, London and Paris. see pages 244 and 246.]

NEW YORK, Friday Evening, Feb. 19.

The week under review at the Consolidated Stock and Petroleum Exchange has developed nothing new in so far as the mining market is concerned. It has been quiet, but fairly steady. During the week the total number of shares sold was 51,284, against 57,855 last week.

A full report of the Hale & Norcross trial will be found in our mining news columns. Comstock stocks show but little change over last week. We note a sale of 100 shares of Belcher at $160; 724 shares of Crown Point at $1.30@$1.40; Gould & Curry declined from $1.80@$1.55, with sales of 624 shares. Hale & Norcross shows sales of 300 shares at $2@$2.45. There was a sale of Comstock Tun-

nel bonds, $1,000, on the basis of 29%. Ophir declined from $3.10@$2.90.

Savage was quiet at $1.40@$1.45, as was also Alpha at 60c. Yellow Jacket shows a single sale of 200 shares at $1.15. Alta was quiet at $1.05@$1.10. Andes, which had not been traded in for some time past, shows sales of 300 shares at 94c. Of Best & Belcher 550 shares changed hands at $2.80 to $3. Comstock Tunnel stock shows sales of 1,500 shares at 18c. Exchequer was neglected at 67c.

Among other sales we note: 300 shares of Julia at 19@20c.; 100 shares of Justice at 60c.; 500 shares of Mexican at $1.85@$2.10; 200 shares of Overman at $1.60; 550 shares of Potosi at $1.75@$1.90; 200 shares of Scorpion at 31c.; 350 shares of Segrated Belcher at 80@90c.; 700 shares of Union Consolidated at $1.50@$1.80. Comparatively large transactions in Utah are reported. According to the official lists of the Exchange 1,300 shares were sold at 45@55c.

Among the Tuscaroras we note a sale of 200 sharet of Del Monte at 70c. Among other Nevada stocks there was a sale of 100 shares of Mount Diahle at $1.45.

Among the California stocks Brunswick was the feature of the week, with reported sales aggregating 24,500 shares. It is understood, however, that Mr. H. R. Lounsbery has bought during the week more than twice this number. The last letter received from the superintendent, dated Grass Valley, February 9th, says: "Since my last report there has been a great improvement in the mine. The bottom of the shaft is in good ore, showing free gold and sulphurets. It has all the indications of the best class of gold-bearing rock; the sledge is not any wider than last reported but as we sink upon it it keeps its good grade. I think it is the best showing made in this mine since the present company worked it. The ore is of a paying grade and if continuous will give us a milling proposition in a short time. This prospect is all in the shaft, which is so much better, for when drifts are run upon it it may disclose better ore. The shaft has been sunk 7 ft. during the past week, making the total depth 522 ft. There is no change in the number of employés. Everything in and about the mine is in perfect order and working well." To this letter is due the activity of the stock.

Somebody or other has seen fit to report a sale of 1,000 shares of Astoria at 2c. Belmont was quiet, only 500 shares being sold at 65c.@66c. Sales of Standard aggregated 300 shares at $1.25@$1 30.

Among the Colorado stocks Leadville Consolidated continues the favorite; due to the rumors of a dividend, the stock advanced to 24c. with sales of 4,200 shares. Adams shows a sale of 100 shares at $1.50. Chrysolite was dealt in to the extent of 1,000 shares at 20c. Robinson Consolidated shows a solitary transaction at 46c. Sales of Silver Cord this week aggregate 2,000 at 25c.@35c. American Flag is reported to have undergone a sale of 200 shares at 2c. La Crosse stock, about which there are many doubts, is reported to have been dealt in to the extent of 2,700 shares at 5c.@6c.

Among the Black Hills' stocks there were sales of 500 shares of Caledonia at 83@85c. Deadwood Terra appeared in better demand, 960 shares being sold at $2@$2.05.

Alice declined during the week from $1.35 to $1, which is the lowest price at which it has been quoted for a very long time. It is reported that the mine has shut down. The reason for this step, however, was not stated; neither was the report confirmed.

Horn Silver was quiet this week, sales amounting to 200 shares at $3.85@3.90

It will be gratifying to the stockholders and friends of the Phœnix Mining Company of Arizona to learn that the Hon. Wilhur F. Lunt has been elected a trustee of the company. Mr. Lunt was for some time a resident of Arizona previous to becoming one of the Board of the United States Appraisers, and has a personal knowledge of the Phœnix mine, besides being conversant with mining interests in Arizona generally. We learn that the management of the company is making steady progress in putting in the water power and in increasing the stamp capacity of the mill.

Boston.

Feb. 18.

(From our Special Correspondent.)

There is not much to encourage trading in the copper stocks, and the market has lapsed into a condition of dullness and inactivity. There is more disposition to sell stocks than usual, but orders to buy are very limited and under the circumstances prices hold quite steady. Calumet and Hecla sold at $259 for small lots. The demand for it is now very limited and lower prices are looked for. The company has suspended the weekly publication of its output and the percentage of copper in the mineral sent to the smelters is reduced to 61, which is considered rather an unfavorable factor in the market.

Tamarack declined to $147, but recovered to $148. There is a fair demand for investment, which is quite fully met.

The Montana stocks have been fairly steady, although dealings in them have been light. Boston & Montana advanced at one time during the week to $33¼, but in the later dealings declined to $32¾. Butte & Boston advanced to $14⅛ and the advance was fairly maintained.

There was considerable trading in Centennial, which declined to $6⅛, the lowest point touched. In the reaction it advanced to $8 for small lots, owing to the covering of shorts. The mine is closed and it is douhtful if operations will be resumed until there is a better outlook for copper. Kearsage sold at $10, but recovered to $10⅛ and holds fairly well.

Osceola has been quiet with a slight improvement in price over last week. It sold up to $25¼ for a small lot and declined later to $24½.

Franklin sold at $12½ and $12 with very little doing in it.

Atlantic sold at $9, same as last week.

Allouez sold at $1@$1⅛, and Santa Fé declined to 2½c. We have not heard of any sales of Quincy the past week, but the stock is quoted at $103 bid, $105 asked.

The silver stocks continue quiet. Sales of Crescent are reported at 12c. and a small lot of Catalpa at 15c.

3 P. M.—Boston & Montana sold at $33, a gain of ¼, while Butte & Boston declined to $14⅛, a loss of ⅝. The balance of the list was unchanged.

BOSTON, Feb. 19, 1 P. M.—*By Telegraph*—Quotations to day were as follows: Calumet & Hecla, $260; Tamarack, $148½, hid; Franklin, $12; Osceola, $24 hid; Boston & Montana, $33 bid; Butte & Boston, $14¼, Centennial, $7½.

Denver.

Prices and sales for the week ending Fehuary 13th, 1892:

Company.	Opening.	H.	L.	Closing.	Sales.
Mines.					
Alleghany	....	....	....	....	.....
Amity	02½	02¼	02	02	3,600
Bangkok-C.-B	05½	06	05¾	05¾	300
Bates-Hunter	60a	....	....	....	.....
Brownlow	04	04½	04½	....	100
Calliope	15	....	....	....	.....
Claudia J	03	*03¾	02½	03¼	51,100
Cash	....	....	....	12	.....
Clay County	38	28	28	....	100
Emmons	48½a	*48	45½	....	9,000
Gettysburg	32a	....	....	....	.....
Gold Rock	48	50	48	....	1,100
Leavenworth	....	....	....	....	.....
Little Rule	110a	....	....	....	.....
Lexington	39½	43	40¼	41	1,200
May-Mazeppa	110a	....	....	50	.....
Matchless	....	....	....	....	.....
Oro	400a	....	....	....	.....
Pay Rock	01¼	02	01½	01¾	4,200
Puzzler	....	....	....	....	.....
Paul Gold	12	12	12	....	100
Reed-National	....	....	....	....	.....
Rialto	....	111	111	....	100
Running Lode	25	†30	26	†30	800
Whale	....	....	....	....	.....
Bal. Smuggler	15½	....	....	15	.....
Sutton	21	24	24	24	100
Prospects.					
Argonaut	15	....	....	....	.....
Big Indian	10a	....	....	....	.....
Big Six	05	05¼	05¼	05	100
Century	07	*07½	05	05	15,000
Diamond B	03½	04½	03¾	04½	9,400
Nat. G. & Oil Co	†06	†07	05¾	05½	5,400
Golden Treasure	85a	....	....	....	.....
Ironclad	*12	11¼	11	11	500
John Jay	½	....	....	....	.....
Justice	†17	†18½	15½	16½	18,900
Morning Glm	49a	....	....	....	.....
Park Consolidated	....	05	05	05	200
Potosi	01½	01½	01¼	01¼	2,100
Total					123,400

* Buyer 30. † Buyer 60. ‡ Seller 60. § Seller 30. a Asked.

San Francisco.

SAN FRANCISCO, Friday, February 19th. (*By telegraph.*)—A slight decline is to he reported in to-day's opening prices compared with those previously announced. The ruling quotations are as follows: Best & Belcher, $2.50; Bodie, 60c.; Belle Isle, 25c.; Bulwer, 45c.; Chollar, $1.65; Consolidated California & Virginia, $4.80; Eureka Consolidated, $1.75; Gould & Curry, $1.45; Hale & Norcross, $2.10; Mexican, $1.80; Mono, $1; North Belle Isle, 20c.; Navajo, 5c.; Ophir, $2.90; Savage, $1.25; Sierra Nevada, $1.50; Union Consolidated, $1.55; Yellow Jacket, 80c.

MEETINGS.

Bangkok-Cora Belle Mining Company, at th office of the company, Room 40 Railroad Building Denver, Colo., February 25th, at 3 P. M.

Pacific Mining and Milling Company, at the office of the company, Room 4 Commercial Building, Salt Lake City, Utah, March 8th, at 8 P. M.

Ridge Mining Company, at the office of the company, No. 53 State street, Boston, Mass., March 3d, at 12 o'clock noon.

DIVIDENDS.

Calumet & Hecla Mining Company, dividend of $5 per share, $500,000, payahle March 16th, at the office af the company in Boston, Mass. Transfer-books close February 20th.

Daly Mining Company, dividend No. 60, of twenty-five cents per share, $37,500, payable February 29, at the office of Messrs. Lounsbery & Co., Mills Building, No. 15 Broad street, New York. Transfer books close February 24 and reopen March 1.

Homestake Mining Company, dividend No. 163, of ten cents per share, $12,500, payable February 25th, at the office of Messrs. Lounsbery & Co., Mills Building, No, 15 Broad street, New York.

Ontario Silver Mining Company, dividend No. 189, of fifty cents per share, $75,000, payable February 29, at the office of Messrs. Lounsbery & Co., Mills Building, New York. Transfer books close February 24 and reopen March 1.

ASSESSMENTS.

Company.	No.	When levied.	D'lnq't in office.	Day of sale.	Am't. per share.
Alki Cons., Cal	2	Jan. 16	Feb. 20	Mar. 9	.02
Alta, Nev	41	Jan. 5	Feb. 9	Feb. 29	.10
Blue Jay, Utah	1	Jan. 18	Feb. 15	Mar. 7	.00½
Bullion, S. Dak	8	Jan. 20	Feb. 20	Mar. 8	.03
Butte Queen, Cal	2	Jan. 26	Feb. 27	Mar. 18	.04
Challenge Con, Nev	10	Jan. 14	Feb. 17	Mar. 9	.25
Chollar, Nev	32	Jan. 8	Feb. 11	Mar. 3	.50
Con. Imperial, Nev.	32	Jan. 22	Feb. 25	Mar. 15	.25
Cons. St. Gothard G. Cal	4	Dec. 29	Feb. 6	Feb. 23	.05
Convention G., S. Dak	1	Jan. 16	Feb. 20	.....	.001
Evening Star Cal	3	Jan. 20	Feb. 22	Mar. 12	.06½
Exchequer, Nev.	32	Jan. 22	Feb. 25	Mar. 17	.25
Found Treasure, Nev	7	Jan. 19	Feb. 24	Mar. 17	.50
Gen. Merritt, S. Dak	4	Jan. 2	Feb. 8	Feb. 29	.00½
Golden Fleece Gravel, Cal	16	Jan. 30	Mar. 24	May 7	5.00
Gold Mountain, Cal.	1	Jan. 4	Feb. 8	Feb. 27	6.00
Gould & Curry, Nev	68	Jan. 5	Feb. 8	Mar. 1	.30
Gray Eagle, Cal	1	Jan. 11	Feb. 15	Mar. 7	.02
Guasucaran & California. B. C	6	Feb. 9	Mar. 15	Apr. 5	3.00
Hiawatha, Mont	4	Jan. 6	Feb. 10	Feb. 27	.02
Imperial, Nev	33	Jan. 23	Feb. 25	Mar. 15	.03
Keystone, S. Dak	1	Jan. 16	Feb. 16	Mar. 2	10.00
Martin White, Nev	27	Jan. 8	Feb. 11	Mar. 12	.25
Mexican, Nev	44	Jan. 14	Feb. 17	Mar. 10	.25
Middle Creek Gold, B. Col	2	Jan. 16	Feb. 0	Mar. 22	.05
Modoc Chief, Idaho	1	Jan. 28	Mar. 21	Apr. 11	.02½
Northwestern G. & S. B. Col	4	Jan. 15	Feb. 24	Mar. 16	.25
Norway, Utah	....	Dec. 24	Feb. 1	July 21	.02
Occidental Con., Nev	9	Jan. 11	Feb. 16	Mar. 10	.25
Overman, Nev	63	Feb. 10	Mar. 16	Apr. 6	.50
Pasadena, Utah	1	Jan. 12	Feb. 15	Mar. 10	.00¼
San Francisco M. & M., Cal	1	Jan. 12	Feb. 16	Mar. 8	.02
Savage, Nev	78	Feb. 2	Mar. 8	Mar. 28	.50
Sierra Nev., S. Nev	101	Feb. 1	Mar. 4	Mar. 24	.30
Terikoff Gold, Cal	7	Jan. 2	Feb. 2	Feb. 29	.01
Union Con., Nev	45	Jan. 6	Feb. 11	Mar. 2	.25
Weldon, Ariz	5	Feb. 9	Mar. 15	Apr. 14	.05
Yellow Jacket, Nev		Feb. 2	Mar. 4	Apr. 2	.50

PIPE LINE CERTIFICATES.

The chief of the Bureau of Statistics reports that the exports of domestic mineral oils in January, 1892, were valued at $3,247,223, against $3,312,225 in January, 1891.

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales
Feb. 13	60⅛	60⅛	60	60	15,000
15	59¾	60	59¾	60	12,000
16	60	60	60	60	13,000
17	59⅞	60¼	59⅞	60¼	8,000
18	60⅛	60⅜	60⅛	60⅜	1,000
19	60⅜	60⅜	60	60	5,000
Total sales in barrels					63,000

NEW YORK STOCK EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Feb. 13	....	....	....	....	.....
15	....	....	....	..	.....
16	....	....	..	....	.....
17	....	....	....	....	.....
18	....	....	....	....	.....
19	59⅝	59⅝	59⅝	59⅝	3,000
Total sales in barrels					3,000

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Feb. 19.

PRODUCTION OF BITUMINOUS COAL for week ending February 13th, and year from January 1st.

EASTERN AND NORTHERN SHIPMENTS.

	1892. Week.	1892. Year.	1891. Year.
Phila. & Erie R. R	1,773	10,268	21,274
Cumberland, Md	55,568	381,603	450,952
Barclay, Pa	‡3,071	28,686	20,256
Broad Top, Pa	7,676	71,848	84,487
Clearfield, Pa	74,037	455,202	585,161
Allegheny, Pa	23,863	137,878	168,232
Beach Creek, Pa	42,107	275,688	312,238
Pocahontas Flat Top	46,061	303,024	264,251
Kanawha, W. Va	*52,638	269,269	223,431
Total	306,794	1,933,465	2,130,282

WESTERN SHIPMENTS.

	1892. Week.	1892. Year.	1891 Year.
Pittsburg, Pa	24,783	167,731	146,982
Westmoreland, Pa	34,131	213,556	261,015
Monongahela, Pa	8,986	58,328	74,584
Total	67,900	434,615	482,581
Grand total	374,694	2,368,080	2,612,863

*Week ending February 7th.
‡Estimated.

PRODUCTION OF COKE on line of Pennsylvania R. R. for the year ending February 13th, 1892, and year from January 1st, in tons of 2,000 lbs.: Week, 118,709 tons; year, 725,106 tons; to corresponding date in 1891, 576,434 tons.

Anthracite.

The anthracite coal market, which a week ago was in chaotic condition owing to the consolidation of extensive interests, as reported in our last, has made great strides toward regaining its equilibrium. The policy of the Reading and Delaware,

Lackawanna & Western, which now control 69% of the anthracite output, so far as announced, is a conservative one, and tends to restore the confidence of employés, middlemen and consumers in the belief that no radical changes are to be made. The announcement was made this week that both the Lehigh Valley and Jersey Central staffs of employés in this trade center are to be continued. The logical conclusion that the existence of the middleman is necessary for the promotion of the trade seems to have gained credence. As a point in favor of this view may be cited the attempt at various times of a number of the large companies to retail their coal. It was found that the entailed loss on bad debts, time orders, shortage, etc., more than absorbed the profits. The middleman occupies the same relation to the company in this connection, as did the retailer. Aside from doing business on a remarkably low percentage—less than 5%—he offers as an incentive to the companies to assume all responsibility of credits, loss or shrinkage, time orders, etc. As one middleman recently remarked: "I deal with a large number of retailers whom the companies would not think of carrying on their books."

The present agitation of officials of the States of New Jersey, New York and Pennsylvania relative to an investigation of the consolidation will, for a time at least, deter controlling interests from making any advance in prices. It will show the public on what basis the combination has been effected. It is fair to presume, however, that the framers of the various contracts involved thoroughly understood the law of trusts and combination, and that illegality was avoided.

The relation of the outside interests representing 31% of the trade is at this early stage problematical Aside from a few hull reports to the effect that efforts have been made to bring into the combination a portion of these interests nothing can be learned, and nothing has yet been done. It is believed that the independent operators are now more to be feared than the outside companies, and it is probable that the next move will be with the view of adopting an equitable basis on which their coal will be marketed at pool rates, although this is a movement which has been tried without success since the first days of the anthracite pool.

The only evidence of benefit to accrue to the wholesale trade, through the consolidation, is the strong tone of the market. Although the demand is light, there is in the main a marked stability in prices, a disinclination of the producer to contract for future delivery, and a belief that these tendencies possess permanence. The independent operators, as usual, have been slightly shading rates, but not to any great extent.

The Reading has made the following appointment of officers: J. Rogers Maxwell, president Jersey Central, to be first vice-president, headquarters at New York; Charles Hartshorne, vice-president Lehigh Valley, to be second vice-president and in charge of the finances of the company; Robert H. Sayre, vice-president Lehigh Valley, to be third vice-president and have charge of the construction and maintenance of way; John H. Taylor, now with the Lehigh Valley, to be general traffic manager; Henry S. Drinker, now with the Lehigh Valley, to be assistant to the president.

The coal stock market during the week under review suffered an unexpected reaction. It was not as great, however, as predicted, and though values in most of the stocks have fallen off several points they are greatly in advance of the average quotations which had ruled since the upward movement started. As was predicted in our last report the investment nature of the buying has all along given a tone of stability. This seems to have solidified the market, and the present high figures are regarded as a basis for future operations rather than fictitious values. The sales have fallen off materially in volume, and unlike the preceding week have been partially brought about by several sharp, though short lived, bear movements; then too, quite heavy realization sales were made. Taken all in all, the market is satisfactory to the bull movement, and responsible in a large measure for the general buoyancy of the better class of other listed securities. The greatest reaction of the week was on Saturday last, when various rumors were circulated that the Pennsylvania and New Jersey State officials intended to place legal obstructions in the way of the consummation of the coal deal. This was only spasmodic, however, lasting through the day. On Monday the bulls regained control of the market, and on quite heavy transactions have held it during a greater portion of the time since.

Delaware & Hudson, whose position in the anthracite coal world just at the present time seems ill-defined, was the least traded in. On last Saturday it sold at $133⅜@$134½; on Tuesday it touched the highest point, viz., $136, closing yesterday at $133⅞@$134¾. Lehigh Coal and Navigation ranged about $54½., at which figure it closed. Lehigh Valley did not advance beyond its opening of $59¼@$61¼; it closed strong at $59⅛@$59¼. Jersey Central went as low as $133 on Saturday; on Tuesday it touched $140, and closed on the ascending scale yesterday at $137@$138½. As usual Philadelphia & Reading led the list and was very active throughout the week. The entire speculative movement seemed to be concentrated thereon, and the 280,000 shares dealt in on the New York Stock Exchange, and the 96,000 on the Philadelphia Exchange were largely in margin transactions. Notwithstanding the onslaught of the bears values were fairly well maintained. From an opening of $57¼@$59 on Saturday it touched its highest point or $62 on Monday, and closed yesterday at $57¼@$58¾.

To-day prices had a decided upward tendency. There were noticeably large numbers of Philadelphia orders executed. New Jersey Central advanced $2¼; Reading passing $60, but subsequently fell off a fraction. All the stocks closed very strong.

Bituminous.

The features of this market at the present time are a lack of demand for a new business, a very limited tonnage moving on old contracts, full stocks in consumers hands and a heavy tonnage in trade centers and at shipping points. The cause which has brought about these effects, viz., the closing of the contract year, will doubtless remain operative through a greater portion of the month of March. Affairs of the Seaboard Steam Coal Association and the 1892-93 schedule of railroad freights are in *statu quo*. As yet there is scarcely any inquiry looking toward the making of new contracts.

This condition of affairs has brought about the slump in ocean freight rates. From 80@85c. is quoted from Philadelphia to Boston, 70@75c. to Sound ports; about the same rate from Baltimore and Newport. Vessels are very scarce owing to the inclination of owners to tie up; the tonnage, however, is adequate to meet all demands.

DETAILS OF PRODUCTION OF THE CUMBERLAND COAL TRADE DURING 1891, IN TONS OF 2,240 LBS.

COMPANY.	Total. Tons.	Increase. Tons.
Consolidation Coal Co.	910,977	*45,054
American Coal Co.	449,631	62,900
Maryland Coal Co	406,464	39,625
George's Creek Coal & Iron Co.	356,927	5,617
Borden Mining Co.	300,268	10,213
New Central Coal Co.	206,813	*11,356
Barton & George's Creek Valley Coal Co.	201,124	25,286
Potomac Coal Co.	184,706	*32,526
Union Mine	179,232	161,299
Franklin Consolidated Coal Co.	76,593	9,949
Big Vein Coal Co. (Md.)	62,832	9,915
Piedmont-Cumberland Coal Co.	42,439	13,436
Swanton Mining Co.	33,029	*8,372
Anthony Mining Co.	9,725	9,610
National Coal Co.	.....	*60,206
Atlantic and George's Creek C. C. Co. (Md.)	.....	*752
Enterprise Mine	.....	11
North Potomac Basin.		
W. Va. C. Ry. Co.'s Elk Garden mines	422,790	13,372
Davis Coal and Coke Co.	235,175	58,952
Davis & Elkins Coal Co.	101,205	25,291
Atlantic and George's Creek C. C. Co. (W. Va.)	92,957	28,767
Thomas Mine	81,745	38,619
Cumberland Coal Co. (Douglas mine)	15,332	15,332
Elk Garden Big Vein Mining Co.	6,098	6,098
Hampshire Mine	2,428	2,428
Merrills Mine	597	597
Big Vein Coal Co., W. Va.	569	569
Levering Coal and Coke Co.	544	544
Virginia Coal and Coke Co.	193	*5,716
Spring Garden Coal Co.	.....	*84
	4,380,433	Inc. 374,342

SHIPMENTS BY RAILROADS.

From:	To B. & O. R. R.	To C. & O. Canal.	To Penn. R. R.	Local.	Total.
Cum. & Penn.	1,520,721	9,070	289,232	†107,853	1,926,876
Cum. Branch	423,226	39,294	36	38,217	500,773
George's Creek.	199,352	.....	763,845	29,904	993,111
W. Va. & Pitts.	395,713	2,757	420,974	‡140,229	959,673
	2,539,012	51,121	1,474,087	316,213	4,380,433

* Decrease.

† 33,852 tons of this amount was delivered at Westernport Junction and afterward hauled by the W. Va. C. & P. Ry. Co. to State Line, etc.

‡ 113,716 tons of this amount was used in making coke, and of the coke 74,083 tons was shipped over B. O. R. R., and 6,767 tons over P. R. R.

NOTES OF THE WEEK.

The output of Tracy City Division of Tennessee Coal, Iron and Railroad Company for January was 32,683 tons coal. Shipments for the same month were: Coal, 11,489 tons; coke, 12,635 tons; total, 24,124 tons.

Up to the hour of going to press no reply had been received by the Attorney-General of New Jersey to his request, on the part of the State, for a copy of the contract in the matter of the Reading Railroad combine.

On the 15th inst. the lower house of the New Jersey Legislature adopted a resolution instructing the Committee on Railroads and Canals to report on or before the 22d inst. whether there was any concerted movement to advance or control the price of coal. Also that a committee of three be appointed to draft a bill or bills to prevent the consummation of any such trust or agreement which might be found to exist.

The Philadelphia *Ledger* of the 19th inst. prints editorially the following: "Having carefully reviewed the arrangement, the Governor and the Attorney General can at present perceive no good cause, either in respect of law or public interests, to interfere with a business undertaking which is apparently fruitful of promises of common advantages to be achieved by it. Nor have they been asked by any person or persons to take official action against the arrangement. The Attorney General, however, states that, in case it should be made to appear that the welfare of the community is likely to be adversely affected by the agreement of the railroad companies, he will then take such action as in law and duty he shall consider right and necessary, but thus far no one has represented to him that the law has been violated or the public interest jeopardized by the arrangement of the companies. Mr. Hensel further says that it has not been considered "a fair and reasonable exercise of the State's power to vex and assail any interest in the Commonwealth without due inquiry and fair hearing. It is the usual practice to entertain any respectable complaint of the abuse, misuse or non-use of corporate franchises, and, upon due notice, to give full hearing to complainant and complained against. Their understanding of the arrangement of the companies with reference to its influence upon the welfare of the community is evidently in full accord with that of the people of the State and city generally, and especially with the representatives of the great business interests of both, who have spoken with absolute unanimity through their most respectable and powerful trade organizations in the clearest, heartiest and most emphatic condemnation of it as an arrangement which will redound in superior advantage to Pennsylvania and Philadelphia."

Boston. Feb. 18.

(From our Special Correspondent.)

The Boston coal trade is still at sea in regard to the anthracite coal situation. It accepts the fact that the market is or is very likely to be in the hands of the new coal combination, but what does the latter intend to do is the question. What coal dealers here want to know at present is, "What changes will be made in the selling trade?"

Of the numerous articles that appeared last week on the coal combination, none was thought so comprehensive and complete by the Boston coal trade as the review published in last week's ENGINEERING AND MINING JOURNAL.

Under the circumstances business in the coal line has been extremely limited. None of the retail dealers is disposed to buy any more than is necessary for his immediate wants. Prices are steady and unchanged.

We quote f. o. b. prices net at New York: Stove, $3.75; egg, $3.55@3.60; free broken, $3.45@$3.50; chestnut, $3.25; Lykens Valley, broken, $4.90; egg, $5; stove, $5.40; chestnut, $4.50.

Soft coal is very quiet and without any new developments. On cars it is worth $3.75 per ton.

Freight rates are steady. We quote: From New York to Boston, 55@60c.; from Philadelphia to Boston, 75c.; from Philadelphia to Portland, 80c.; to Bath, 95c.; to Providence, 70c.; from Baltimore to Boston, 80@85c.; Newport News to Boston, 70c.; Sound points, 65c.

Retailers are having a very good trade. The weather is cold and seasonable. Prices under the circumstances are firm. We quote: Stove, $5.50; nut, $5.50; egg, $5.25; furnace, $5.25: Franklin, $6.75@$7, all sizes; Lehigh egg, $5.51; Lehigh furnace, $5.50. Wharf prices are 50 cents less than the foregoing.

The receipts of coal at this port for the week ending February 13th were 3,807 tons of anthracite and 10,878 tons of bituminous against 19,053 tons of anthracits and 24,215 tons of bituminous for the corresponding week last year. The total receipts thus far this year have been 177,297 tons of anthracite and 63,799 tons of bituminous against 135,317 tons of anthracite and 138,058 tons of bituminous for the same time last year.

Buffalo. Feb. 18.

(From our Special Correspondent.)

Slight flurries of snow, a day's heavy rain, a few hour's thaw, and the balance biting cold weather, with bright sky alternating with a steady frosty atmosphere—such has been the experience of Buffalonians since my last letter, written one week ago.

Prices of anthracite are unchanged. The local demand good and for nearby places fair. Orders from a distance are few and far between as dealers seem to be well stocked at present, but if the weather continues as cold as now coal bins must be depleted soon to the advantage of our mer chants.

Bituminous coal is quiet and unchanged; the side tracks of our city railroads are well stocked up with cars laden with fuel. Bituminous miners and shippers are said to be well pleased with this year's business so far, and hope for a continuance of good times,

"Coal freights hence to Michigan ports will open high," says a vesselman, and "Lake Superior rates will not be cheap." The ice is very thick on Lake Erie.

Messrs. Brinker, Jones & Co. gained their case against the Acme Coal Company of Pennsylvania. They claimed $800 on a coal deal. The company acknowledged the indebtedness, but tried to show that a $450 offset should be allowed off for a previous deal,

It is expected that the Board of Public Works of this city will be successful in its endeavor to obtain a low priced contract for three or five years for coal, gas, and electric lights from the companies.

Chicago. Feb. 18.

(From our Special Correspondent.)

The market is "in statu quo," and the trade is waiting with what patience it can for the promulgation of the policy of the new combination or consolidation of anthracite coal interests which has taken place East. Whatever may be the effect by and by, at present it has not added a grain of strength to the market in Chicago. On the contrary, there is a rumor abroad that one of the companies, not included in the deal, has dropped the circular price to $4.75. This report bears every evidence of correctness, which, however, could not be verified at this writing.

During the recent cold weather trade was rather more active, wholesale and retail, but it still continues a weather trade, and will remain so until the end of the season. The chances are now very much in favor of the working off of a considerable portion of the stock on dock, especially if the weather during March should be like that which we have had through the present month.

Bituminous coal is a drug, the market is glutted with soft coal, largely the production of Indiana mines. Trade is dull, and prices are cut right and left. The fact is that some mine owners entertain the idea that the absorbing capacity of Chicago is inexhaustible, and rush coal in regardless of the stock on track and in yards. The consequences of which are fatal to the maintenance of anything like decent prices, leaving the remunerative out of the question entirely. Indiana block is quoted at $2.35 on track and on round lots these figures would be materially shaded.

Coke is in moderate demand. Some dealers say it is quiet, and there is some surplus of best grades, as well as large stocks of inferior quality. Consumption increases each week, but supply just now is in excess of demand. This will become more evenly balanced, as foundries take in more work and a more general activity in the iron market.

Circular prices are unchanged at the following rates: Lehigh lump, $6.25; large egg, $5; small egg, range and chestnut, $5. Retail prices per ton are: Large egg, $5.75; small egg, range and chestnut, $5.75.

Prices of bituminous per ton of 2,000 lbs., f. o. b. Chicago, are: Pittsburg, $3.15; Hocking Valley, $3; Youghiogheny, $3.25; Illinois block, $1.90@$2; Brazil block, $2.50.

Pittsburg. Feb. 18.

(From our Special Correspondent.)

Coal.—There is nothing special to note in regard to the coal market. The local demand continues active. The supply of natural gas is daily diminishing, which increases the demand for coal. There have been no shipments to the lower markets since our last report, on account of the heavy ice in both rivers.

The amount of coal loaded in the pools and Pittsburg harbor ranges from 2,500,000 to 3,000,000 bushels. The miners are making ready for a strike; a river miner says: "Since last September the miners have had steady work at 3½c. for mining, and are well prepared financially; now that contracts for the spring are being made, the operators have started the report that a reduction to 3c. will be made. The miners are of the opinion that this will be done."

Coke.—The week's shipments show an increase of 247 cars. The unsettled condition of the iron market and the low price prevailing is causing considerable anxiety among coke producers. There are constant changes going on in the running order of the works of the region, which produces a fluctuation in shipments. The active ovens in the region averaged 5½ days during past week.

The McClure Works, 1,545 ovens, ran six days; the Rainey Works, 1,091 active ovens, six days as usual; Cochran and others, 751 ovens, six days; the Whitney plant of the Hostetter Company made five days; only one of the plants of the Frick Company made six days, the balance five days. The shipments for the week aggregated 130,770 tons, distributed as follows: To Pittsburg, 1,730 cars; points east of Pittsburg, 1,670; points west of Pittsburg, 3,865. Prices show no changes.

METAL MARKET.

NEW YORK, Friday Evening, Feb. 19, 1892.

Prices of Silver Per Ounce Troy.

Feb.	Sterling Exch'ge.	London. Pence.	N. Y. Cents.	Value of sil. in $1.	Feb.	Sterling Exch'ge.	London. Pence.	N. Y. Cents.	Value of sil. in $1.
13	4.87½	41⅛	89⅞	.695	17	4.87½	41 1/16	91⅛	.705
15	4.87½	41¼	90⅛	.697	18	4.87¾	41 1/16	91⅛	.705
16	4.87½	41⅛	90½	.700	19	4.88	41 5/16	90¼	.698

Silver advanced suddenly owing to rumors that an Indian loan maturing this year would be paid off, but as nothing definite has been done the price relapsed, and the market is dull at current figures.

The United States Assay Office at New York reports the total receipts of silver for the week to be 123,000 ounces.

This afternoon Heidelbach, Ickelheimer & Co. engaged $500,000 in gold for export to Europe. The *Wall Street Journal* says: "The strongest point against large gold exports is the condition of the Bank of England, its proportion of reserve to liability being 45·16% against 39·08% last year.

Silver Bullion Certificates.

	Price. H.	Price. L.	Sales.
Feb. 13	90	....	5,000
Feb. 15	...	....	.....
Feb. 16	91	90¾	89,000
Feb. 17	91¾	91⅜	137,000
Feb. 18	...	....	.....
Feb. 19	91⅛	....	2,000
Total sales in barrels			333,000

Domestic and Foreign Coin.

The following are the latest market quotations for American and other coin:

	Bid.	Asked.
Trade dollars	$ .72	$ .75
Mexican dollars	.70½	.71½
Peruvian sols and Chilian pesos	.68	.70
English silver	4.83	.....
Five francs	.93	.95
Victoria sovereigns	4.86	4.90
Twenty francs	3.86	3.90
Twenty marks	4.74	4.76
Spanish doubloons	15.55	15.70
Spanish 25 pesetas	4.78	4.83
Mexican doubloons	15.50	15.70
Mexican 20 pesos	19.50	19.60
Ten guilders	3.96	4.00
Fine silver bars	.90½	.91½

Copper continues to be rather flat and prices for Lake have given way a fraction. Sales have been made from second hands, and we understand also for account of smaller companies, at 10·65c. and 10·70c., but since then one lot was sold at the Metal Exchange at 10·50c. At this price nothing further is available.

Consumption of copper appears to be very good and manufacturers are well stocked with orders, but they all complain that prices for manufactured articles are very low and that business is not remunerative. This is the more to be pitied, as with the present very low prices for refined copper, the trade ought to have fair benefits.

For casting copper the demand has also somewhat fallen off, and in consequence prices were somewhat reduced, and good brands are now to be had at 10¼c. delivered, and in larger lots at somewhat less. At the close there is very little doing, and there is a certain apathy on both buyers' and sellers' sides.

The foreign market has also been rather weak, and prices for G. M. B. copper have declined during the week to £43 10s. for spot, and £44 2s. 6d. for 3 months prompt. We quote: Tough copper, £47@£47 10s.; best selected, £48@48 10s.; strong sheets, £57 10s.@£58; India sheets, £55@£55 10s.; yellow metal, 5¼d.@5⅝d.

According to our cables, statistics do not show any change for the first fortnight of February.

The exports of copper from the port of New York during the past week were as follows:

To Liverpool—	Copper Matte.	Lbs.	
S. S. Runic	3,033 bags.	401,000	$23,000
" The Queen	3,337 bags.	441,100	25,000
" Buffon	3,621 bags.	441,100	25,000
" Olbers	2,218 bags.	240,600	15,000
To Liverpool—	Copper.	Lbs.	
S. S. Arizona	775 pigs.	282,010	$22,300
To Hamburg—	Copper.	Lbs.	
S. S. The Queen	142 pigs.	22,014	$2,200
To Bristol—	Copper Matte.	Lbs.	
S. S. Exeter City	590 bags.	60,000	$9,000
To Havre—	Copper.	Lbs.	
S. S. La Normandie	76 casks.	95,000	$10,000
To Rotterdam—	Copper.	Lbs.	
S. S. Veendam	18 casks.	22,500	$2,500

Tin.—Tin grew rather firm this week and prices gradually advanced to 19·80c., but since then the London market has given way, and this at once reacted over here. Consumptive demand has been decidedly better during the last fortnight, but then arrivals were rather heavy, and with the declining tendency in London, prices could not be upheld here.

In London the market opened on Monday last at £89 15s., but since declined to £89 2s. 6d. for spot, and £89 5s. for three months prompt.

Lead has experienced quite a sharp advance and the curtailed output of the Idaho district now makes itself felt. All smelters are unwilling to part with refined lead except at higher prices, and after some business had been done at 4·15c. the market advanced to 4·20c. with rather light offers.

The English market also hardened, and Spanish lead is now quoted at £12 12s. 6d.@£12 15s., and English lead 2s. 6d. higher.

According to the monthly statistics of James Shakespeare, of Liverpool, the stocks of Australian and Straits tin in London on January 31st were 2,894 tons, against 3,392 tons on December 31st. In Holland there were 1,038 tons of Banca tin and 651 tons of Billiton, against 498 tons and 370 tons respectively on December 31st. The approximate quantity of tin afloat to England and Holland was as follows: 600 tons of Australian, 3,200 tons of Straits and 1,100 tons of Billiton, making the total visible European supply 9,483 tons, against 9,360 tons on December 31st. The stock in and afloat to America was 3,150 tons, against 3,200 tons on December 31st.

Spelter is rather flat. The majority of producers are not willing, for the present, to meet current prices, but others are selling, and consumers have no trouble in securing their wants. Unless consumption increases, there is some fear that production will be in excess of consumption. We have to lower prices to 4·57½@4·60c. delivered New York.

In London good ordinary brands are quoted £21 10s. and specials £21 15s.

Antimony—In antimony a fair trade is doing, and we quote Cookson's at 15¼c. L. X. 12@12½c.; and Hallet's 11c.

Quicksilver.—This market continues featureless. Quotations are: $41@$41.50 for New York and £7 for London.

According to the San Francisco *Bulletin* the receipts of quicksilver at San Francisco from the various mines of California for the month of January were 1,704 flasks, against 1,565 and 828 flasks respectively for the same month in the previous two years. The exports from San Francisco by water for the month of January were as follows:

	Flasks.	Value.
Australia	381	$14,672
British Columbia	200	7,800
Mexico	50	1,965
Total	631	$24,437

There was also 200 flasks Spanish quicksilver shipped in transit to Mexico. The quantity sent overland last month has not been made public.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Feb. 19.

The iron market shows no sign of improvement. From all centers come reports of continued, indeed, of a greater dullness. Inactivity seems to reign supreme in iron circles and producers apparently have a less hopeful feeling. The demand is light in every branch of the iron market, but the production keeps up as though a normal good business were doing.

American Pig Iron.—Nothing of interest has occurred in this market during the week under review, unless it be the greater dullness which has prevailed everywhere. Consumers seem to be unwilling to buy iron on any conditions just now; in some cases probably because of a sufficiency of stocks on hand; in others due to the belief that lower prices will obtain ere long. And yet a prominent iron dealer of this city expressed his opinion that the average consumer would not buy iron just now even if it were offered at $1 or $2 below the ruling market price. There was offered during the week a lot of 2,000 tons of No. 2 iron from a Lehigh furnace at $14.50 at Perth Amboy, but it has had no effect on the market at large. Not much Southern iron is pressing on the market, for the simple reason that it would not be of much avail. Whatever trading there has been during the week has been of the same hand-to-mouth character as for the past two months. All anticipations of a livelier trade this month have been dispelled, and the latter part of February sees great inactivity in the iron market. We continue to quote Northern, No. 1X, $17@$17.50; No. 2X, $15.50@$16; Southern, No. 1X, $16@$17; No. 2X, $15@$16.

Spiegeleisen and Ferro-Manganese.—We hear of no transactions in either spiegeleisen or ferro-manganese. Quotations must be regarded as merely nominal as follows: 20% spiegeleisen, $27, and 80% ferro-manganese, $62@$63.

Steel Rails.—We hear of no sales of steel rails by Eastern mills during the week. Everybody appears to be satisfied that the future will bring better business, but the stereotyped remarks about the railroads demanding impossible conditions as to time, etc., are circulated. We continue to quote $30 f. o. b. mill and $20.70 at tide water.

Rail Fastenings.—Not a sale has occurred during the week. The market, in sympathy with steel rails is entirely featureless. We quote this week, fish and angle plates, 1·75@1·80c.; spikes, 2·10@2·15c.; bolts and square nuts, 2·70@2·80c.; hexagonal nuts, 2·80@2·85c.

Merchant Steel.—A good volume of business is doing in this market and the demand continues good. Prices are firm as follows: Mushet's special, 48c.; English tool, 15c. net; American tool steel, 7@8c.; special grades, 13@18c.; crucible machinery steel, 4·75c.; crucible spring, 3·75c.; open hearth machinery, 2·25c.; open hearth spring, 2·50c; tire steel, 2·25c.; toe calks, 2·25@2·50c.; first quality sheet, 10c.; second quality sheet, 8c.

Tubes and Pipe.—Considering the season of the year, the business now doing is all that could be expected. The association held a meeting in Pittsburg last week and reaffirmed the old prices. We therefore quote ruling discounts as follows: Butt, black, 57½%; butt, galvanized, 47%; lap, black, 67%; lap, galvanized, 55%; boiler tubes, under 3 in. and over 6 in., 55%; 3 in. to 6 in., 60%.

Structural Material.—Nothing of special interest is being done in this market, and we hear of no sales of any magnitude. Our quotations are as follows: Beams, 2·50@2·75c., angles, 1·90@2·10c.; sheared plates, 1·85c. @2·25c.; tees, 2·40@2·60c.;

beams, 2·40@2·80 channels, 2·40@2·50c. Universal plates, 2·10c.; bridge plates, 2·10c., on dock.

Old Rails.—We hear of no sales this week. The market continues dull. Nominal quotations are: Old tees, $20@$21; doubles, $22@$23. Wrought iron scrap is quoted at $19@$20.

NOTES OF THE WEEK.

The Richard Tompson Company, of New York, dealer in iron, steel and shafting, and commission merchant for iron and steel mills, assigned on the 16th inst. to Thomas H. Brady, without preferences. Liabilities, $12,000 to $13,000; assets, unknown.

Chicago. Feb. 17.

(From our Special Correspondent.)

The iron and steel market generally has been quiet during the past week during the first half of the present week, there has been no noticeable improvement. With very few exceptions, and those from unexpected quarters, the demand for crude iron has been light and largely from foundry men with limited capacity. The probabilities now are that the quietude will continue for several weeks. In finished iron circles much the same degree of dullness is noted—bars, sheets, plates, merchant steel, etc. Structural material is in good inquiry and heavy contractors are feeling the market fearing higher prices. Beam makers here say there is very little hope for an early reorganization of the combine. Steel rails continue in moderate demand and larger orders are expected soon. The movement of old material is very sluggish and heavy dealers are marketing some of their stock at outside points.

Pig Iron.—As a rule orders for Northern coke irons have been fairly numerous, but the tonnage has been light, from carloads to 50 tons and from that up to 200 tons, with several contracts for 500 and 1,000 tons, so that the general movement compares very unfavorably with the activity in January, and shows a large falling off. With regard to prices they are as low as they have been at any time, and in several instances lower. On the other hand Lake Superior charcoal iron shows up stronger, although business continues meagre. Large orders are looked forward to from wheel makers, who, for some reason, are very slow. Some contracts for small quantities of several hundred tons were placed last week at $17.25@$17.50, and $17 is now an exceptional and inside quotation on round lots. Southern soft iron is in moderate demand, but foundry grade is practically out of this market.

Quotations per gross ton f. o. b. Chicago are: Lake Superior charcoal, $17@$17.50; Lake Superior coke, No. 1, $15.50@16; No. 2, $15@$15.50; No. 3, $14@14.50; Lake Superior Bessemer, $17; Lake Superior Scotch, $17@$17.50; American Scotch, $17.75@$18.25; Southern coke, foundry No. 1, $15.50; No. 2, $15; No. 3, $14.50: Southern coke, soft, No. 1, $15.50; No. 2, $14.50; Ohio silveries, No. 1, 18; No. 2, $17; Ohio strong softeners, No. 1, $18; No. 2, $17; Tennessee charcoal, No. 1, $18; No. 2, $17.50; Southern standard car wheel, $20@$21.

Structural Iron and Steel.—There is a very large inquiry, and many contractors are anxious to get in at present low figures. Local mills are not pushing business at current prices. Some beams are quoted at 2¼c., Chicago. Generally quotations are: Car lots f. o. b. Chicago are as follows: Angles, $2@$2.15; tees, $2.30@$2.40; universal plates, $2.05½@$2.15; sheared plates, $2.10@$2.20; beams and channels, $2.40@$2.50.

Merchant Steel.—Low prices have been made on mill lots of tank steel. Business from warehouse is in better shape, but prices are unsatisfactory. Steel, sheets, 10 to 14, $2.40@$2.50; iron sheets, 10 to 14, $2.20@$2.30; tank iron or steel, $2.10@$2.15; shell iron or steel, $3@$3.25; firebox steel, $4.25@$5.50; flange steel, $2.75@$3.25; boiler rivets, $4.25; boiler tubes, 2¾ in. and smaller, 55%; 7 in. and upward, 65%.

Merchant Steel.—Demand for merchant steel is usually light at this time of year, still additional orders are frequent. Mills are very busy with contracts already placed. We quote $6.75@$7 and upward; tire steel, $2.30@ $2.50; toe calk, $2.50@ $2.65; Bessemer machinery, $2.10@$2.20; Bessemer bars, $1.75@$1.90; open hearth machinery, $2.60@ $2.75; open hearth carriage spring, $2.30@$2.40; crucible spring, $3.75@$4.

Steel Rails.—A number of round lots are wanted in the northwest the week bringing forth renewed inquiries from that quarter. This is a marked improvement on the past month. Small orders for 500 tons and upward are frequent, quotations on which are $31.50@$32. Spice bars, etc., continue in good demand. Regular quotations are: 1·80@1·85c. for steel or iron; spikes at $2.15 @$2.25 per 100 lbs.; track bolts, hexagonal nuts, $2.70.

Galvanized Sheet Iron.—Inquiries are in this market from British Columbia for car lots of "Juniata." Demand is light in a general way, but isolated orders for round lots of 100 to 150 bundles are frequent. Aecounts remain unchanged at 67% off on Juniata and 67½% and 5% off on charcoal in large lots. Small quantities are quoted at 65% and 10% from list.

Black Sheet Iron.—Mill orders are light and mostly for sorting up stock; on such quotations are steady at 2.85@2.90c. Chicago for No. 27 common. Jobbing price is 3.10c., same range from stock.

Bar Iron.—Several agents of Ohio mills report they have all they can do on their smaller mills and behind with deliveries. On large sizes they would like to see business more active. Demand is rather higher and 1·67½@1·70c. are very close prices and an order would have to carry large extras for inside quotation to be shaded. Jobbing trade is fair at 1·80@1·90c. rates, as to quality.

Nails.—Steel cut are in fair demand from the West, but prices are easier at $1.62½ on fair average specifications; jobbers quote $1.75 from stock. Wire nails are in better demand and mill agents are booking good business at $1.82½@$1.85, according to quantity. Jobbing prices is $1.90@$1.95 from stock.

Scrap.—Some small improvement is noted, though most of the movement is to points outside Chicago. Quotations are still nominal. No. 1 railroad, $18.50; No. 1 forge, $18.00; No. 1 mill, $13.00; fish plates, $20.50; axles, $22.00; horseshoes, $18.50; pipes and flues, $11.00; cast borings, $7.50; wrought turnings, $9.50; axle turnings, $12.50; machinery castings, $12; stove plates, $8.50; mixed steel, $11.50; coil steel, $14.50; leaf steel, $15; tires, $15.50.

Old Material.—Iron rails are stagnant. Holders want $21.75@$22, and consumers' views are about 50 cents less. Old steel rails are dull at $13.50 for short and $15.50 for long selected. Old car wheels are moving in a small way at $16@$16.50, according to quantity.

Louisville. Feb. 13.

(Special Report by Hall Brothers & Co.)

There have been no developments of an encouraging nature in iron circles during the past week. Some extremely low prices are reported to have been accepted by two or three of the leading Southern furnaces for all kinds of deliveries, indicating a marked anxiety for orders. There is no immediate prospect for improvement. We quote:

Hot Blast Foundry Irons.—Southern coke No. 1, $14@$14.25; Southern coke No. 2. $13.25@ $13.75; Southern coke No. 3, $13@$13.25; Southern charcoal No. 1. $16@$17; Southern charcoal No. 2, $15.50@$16; Missouri charcoal No. 1, $17@$17.50; Missouri charcoal No. 2, $16.50@$17.

Forge Irons.—Neutral coke, $12.50@$12.75; cold short, $12.25@$12.50; mottled, $11.50@$12.00.

Car Wheel & Malleable Irons.—Southern (Standard brands), $18.00@$18.50: Southern (other brands), $17.00@$17.50: Lake Superior, $19.50@ $20.50.

Philadelphia. Feb. 18.

(From our Special Correspondent.)

Pig Iron.—The iron trade is in even a worse condition than it was last week. To-day not a single broker could be found who said he was doing much business. Without doubt a great deal of business could be done if offers recently made were acceptable. Buyers are now more anxious than sellers and are making offers quite freely, but very few have been taken. Most of the offers are for forge iron; several mills are nearly out. Founders are buying but little and are haggling over prices, declining to pay $17, even for fair makes. Some brands are bringing $17.50, but very little is selling. Forge ranges all the way from $13.75 to $15. Scotch irons range from $17 to $18.50; charcoal from $26 for cold blast.

Muck Bars.—A number of buyers are in the market to-day but have not bought. Selling prices range from $26 to $26.50 for good makes.

Billets.—Several large buyers are willing to purchase supplies for 90 days' delivery, but at figures which makers will not look at. The lowest quoted figures by makers to-day are $26 for nearby delivery. There is talk of a great deal of business being near at hand, but this is nothing new: the situation is disappointing.

Merchant Iron.—The bulk of the business is being done on a basis of $1.70 for best and $1.60 for ordinary; no mills have shut down or have reduced output, which does not corroborate the statements of extremely dull trade.

Nails.—The production of nails will probably be restricted for a month to come; large holders refuse to make any additional purchases; stocks in consumers hands are large.

Skelp Iron.—Grooved is quoted at $1.70; sheared, $1.85.

Wrought Iron Pipe.—It is difficult to say at what figure a large order for large pipe would be placed. Makers are very anxious for business, but buyers are utterly indifferent and some think that this demoralized condition of things will continue indefinitely; they will perhaps be surprised soon.

Sheet Iron.—This branch is rather exceptionally active, but in a retail way; distribution from store is good; card rates are pretty well adhered to.

Plate and Tank Iron.—Two or three manufacturers say there is more inquiry coming in, but it is hard to name prices. Y tank has sold at less than 1·85c. for both iron and steel; refined from 2c. to 2·20c., but these are not bottom prices; firebox 2½@4c., according to quality.

Structural Material.—It is known that within the past forty-eight hours large orders have been placed for structural material, but where, how much, and at what terms is just now a secret. Beams are quoted nominally at 2·3c., but business has been done at less, and it is rumored to-day that further competition is inevitable. Angles, 1·90c.; universal plates, 2c.; sheared plates, 1·85c.

Steel Rails.—A few orders have been taken at $30; it is impossible to gather any new information on rails.

Old Rails.—All that can be delivered at $20.50 will sell. Steel are in demand at $16.50.

Scrap.—Railroad scrap is wanted, and the average quotations delivered are $20@$21.

Pittsburg. Feb. 18.

(From Our Special Correspondent.)

There has been a decided change for the worse in the iron market during the past week. brought about by a combination of circumstances. Among them was the breaking of the agreement between the steel plants of Wheeling and Pittsburg, regarding prices of billets. It is now go-as-you-please between them; instead of steel billet selling at $25, prices are to-day lower than at any time during 1891. Next came the dissolution of the Beam Association, followed by a material decline, and now there is more or less demoralization throughout the trade. Moreover, pig iron is still being produced largely in excess of the demand, and the surplus is steadily accumulating in the hands of furnacemen. From these facts it is not evident that the outlook at the present time a favorable one and will account for the shrinkage in values. As usual, large dealers view the situation in an entirely different way, but one thing in which both sides agree is that prices of raw iron and steel are far below what they ought to be.

February prices of last year were as follows: Grey forge, $14.50; Bessemer, $16.50; steel billets, $26.75; steel slabs, $26.50; muck bar. $27.50. The prevailing condition throughout the trade is not so much a well-defined dullness as a feeling of uncertainty as to what is likely to happen next. A moderate business is being transacted, but at irregular and uncertain prices, and there is a disposition to adjust prices to the views of buyers. The capacity of furnaces in blast at the present time is at the rate of about 9,800,000 gross tons per annum, and unmistakably far in excess of the consumption, with due allowance for increase that may result from present low prices for many varieties of manufactured products, Steel rails are in fair demand on orders varying from small lots to contracts of 5,000 tons and upward. Eastern mills have sold 25,000 tons for delivery at far Western and Southern points, and the Louisville & Nashville is reported as having bought about 12,000 tons from Western mills for early delivery. Prices here remain firm at $30 at works, Valley furnace men were in town during the week, and succeeded in selling a block of 5,000 tons of Bessemer for March, April and May delivery, at figures netting $14.20 at the furnace; this is certainly a very low figure. Old iron and steel rails are very dull; prices are weak and uncertain. Scrap material seems to have no fixed value; sales much restricted. Steel wire rods have declined. Some few sales of iron ore were made; tonnage small and prices weak. The demand for skelp iron is moderate; last week's prices were maintained. The following sales are reported.

Coke Smelted Lake and Native Ores.

3,000 Tons Bessemer, next 3 months	$15.25 cash.
3,000 Tons Bessemer, March, April, May	15.00 cash.
2,000 Tons Bessemer, March, April	15.00 cash.
1,500 Tons Bessemer, next 3 months	15.00 cash.
1 000 Tons Grey Forge, April, May	13.25 cash.
500 Tons Grey Forge	13.25 cash.
500 Tons Southern White Iron	13.00 cash.
500 Tons Southern White	13.00 cash.
500 Tons Bessemer, February, March	14.85 cash.
500 Tons Grey Forge, March	13.20 cash.
400 Tons No. 2 Foundry	14.50 cash.
200 Tons No. 2 Foundry	14.50 cash.
200 Tons Grey Forge	13.25 cash.
200 Tons No. 1 Foundry	15.50 cash.
100 Tons No. 3 Foundry	14.00 cash.
Charcoal.	
100 Tons Cold Blast	25.50 cash.
100 Tons Warm Blast	19.00 cash.
100 Tons Warm Blast	18.50 cash.
50 Tons Cold Blast	26.50 cash.
50 Tons No. 2 Foundry	20.00 cash.
Steel Slabs and Billets.	
1,000 Tons Steel Billets, April, May	24.00 cash.
1,000 Tons Steel Billets, April, May	24.00 cash.
1,000 Tons Steel Billets, April, May	23.50 cash.
1,000 Tons Steel Billets and Slabs, March, Apr.	23.75 cash.
Muck Bar.	
500 Tons Neutral, April	25.50 cash.
500 Tons Neutral, March, April	25.50 cash.
Ferro-Manganese.	
125 Tons 80%, imported del	62.80 cash.
100 Tons 80%, imported del	62.80 cash.
100 Tons 80%, domestic	63.00 cash.
Skelp Iron.	
300 Tons Wide Grooved	1.60 4m.
300 Tons Narrow Grooved	1.57½ 4m.
100 Tons Sheared Iron	1.80 4m.
Steel Wire Rods.	
500 Tons American Fives, April, at Mill	32.75 cash
Blooms Beam, Rail and C. Ends.	
1,000 Tons Rail and Bloom Ends	17.50 cash.
500 Tons Beam Ends	17.50 cash.
Old Iron and Steel Rails.	
500 Tons Old Steel Rails, mixed	17.25 cash.
500 Tons Old Steel Rails, short	17.00 cash.
500 Tons Old Iron Rails	22.75 cash.
Scrap Material.	
300 Tons Cast Borings, gross	10.50 cash.
200 Tons No. 1 R. W. S., gross	19.50 cash.
200 Tons Cast, Wrought Pipe, gross	16.50 cash.
100 Tons R. R. Leaf Steel, gross	20.50 cash.
100 Tons Charcoal Scrap, gross	15.00 cash.
50 Tons Cast Scrap, gross	12.00 cash.

NEW YORK MINING STOCKS QUOTATIONS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Feb. 13.		Feb. 15.		Feb. 16.		Feb. 17.		Feb. 18.		Feb. 19.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Adams											1.50		100
Alice, Mont	1.35								1.00		1.00		400
Amador													
Atlantic, Mich							1.60						100
Belcher, Nev													
Belle Isle, Nev													
Bodie Cons., Cal													
Bos. & Mont., Mont													
Breece, Colo													
Bulwer, Cal													
Caledonia, S. Dak	.85	.83											500
Catalpa													
Chrysolite, Colo					.20						.20		1,000
Colorado Central, Colo													
Commonwealth, Nev													
Comstock T. bonds, Nev			.29										1,000
" scrip., Nev													
Cons. Cal. & Va., Nev													
Crown Point, Nev	1.40		1.40		1.40		1.40		1.30		1.30		724
Daly													
Deadwood, Dak	2.05		2.05						2.00		2.05		960
Father de Smet, S. Dak													
Franklin, Mich													
Freeland, Colo													
Gould & Curry, Nev	1.80		1.75		1.75		1.70				1.55		625
Grand Prize													
Hale & Norcross, Nev	2.15		2.00		2.10				2.45		2.25		700
Homestake, Dak													
Horn-Silver, Utah					3.85		3.90						200
Independence, Nev													
Iron Hill													
Iron Silver													
Leadville Cons., Colo	.23				.23		.24	.23	.24	.23	.24		4,200
Little Chief, Colo													
Martin White													
Mono													
Mt. Diablo, Nev					1.45								100
Navajo, Nev													
N. Belle Isle, Nev													
Ontario, Utah													
Ophir, Nev	3.10		3.10				3.00		3.00		2.90		550
Overman													
Plymouth, Cal													
Quicksilver, Pref., Cal													
" Com., Cal													
Quincy, Mich													
Robinson Cons., Colo									.46				100
Savage, Nev	1.40				1.40				1.45		1.40		510
Sierra Nevada, Nev	1.60				1.65				1.75		1.65		385
Silver Cord, Colo					.30	.25	.35						2,000
Silver King, Ariz													
Small Hopes													
Standard	1.25										1.30		300
Stormont													
Yellow Jacket, Nev	1.15												200

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Feb. 13.		Feb. 15.		Feb. 16.		Feb. 17.		Feb. 18.		Feb. 19.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alpha									.60				300
Alta	1.05		1.05				1.10		1.05		1.05		600
American Flag, Colo											.02		200
Andes, Cal									.94				300
Astoria, Cal	.02												1,000
Augusta, Ga													
" bonds													
Barcelona, Nev													
Belmont, Cal	.65		.65		.66	.65							500
Best & Belcher, Nev	2.95		2.80		2.85		2.85		2.80		3.00		550
Bonanza King, Cal													
Brunswick, Cal	.12	.11	.12	.11	.12		.14	.11	.11		.14	11	24,500
Bullion, Nev													
Butte & Bost., Mont													
Castle Creek, Idaho													
Challar													
Comstock T., Nev	.18		.18										1,500
Con. Imperial, Nev													
Con. Pacific, Cal													
Crescent, Colo													
Del Monte, Nev			.70										200
El Cristo, Rep. of Col													
Excelsior													
Exchequer, Nev	.67												300
Hollywood, Cal													
Julia	.20										.19		300
Justice													100
King & Pembroke													
Lacrosse, Colo			.05		.06	.05			.05				2,700
Lee Basin, Colo													
Mexican, Nev	1.90		1.85				2.10		2.10		1.90		500
Middle Bar, Cal													
Monitor, Colo													
Mutual S. & M. Co., Wash													
Nevada Queen, Nev													
N. Standard, Cal													
N. Commonwealth, Nev													
Occidental, Nev													
Overman									1.60				200
Phoenix Lead, Colo													
Phoenix of Ariz													
Potosi, Colo	1.90		1.90		1.85				1.75		1.75		530
Rappahannock, Va													
S. Sebastian, S. Sal													
Santa Fe, N. M													
Scorpion, Nev	.31												200
Seg. Belcher, Nev	1.95								.80	.90			350
Shoshone, Idaho													
Silver Queen													
Sullivan Con., Dak													
Sutro Tunnel, Nev													
Syndicate													
Tornado Con., Nev													
Union Cons., Nev	1.80		1.80		1.75		1.50		1.80		1.70		700
Utah, Nev	.50		.55		.50		.45		.45		.45		1,300

Ex-dividend. †Dealt at in the New York Stock Ex. Unlisted securities. ‡Assessment paid. §Assessment unpaid. Dividend shares sold, 14,654. Non-dividend shares sold, 36,630. Total shares sold, 51,284.

BOSTON MINING STOCK QUOTATIONS.

NAME OF COMPANY.	Feb. 12.		Feb. 13.		Feb. 15.		Feb. 16.		Feb. 17.		Feb. 18.		SALES.
Atlantic, Mich	9.00												65
Bodie, Cal													
Bonanza Development													
Bost. & Mont., Mont	32.00		32.75	32.50	33.50	32.75	33.50	33.00	33.00		33.00	32.75	1,251
Breece, Colo													
Calumet & Hecla, Mich	259				259		259						18
Catalpa, Colo									.15				50
Central, Mich													
Coeur d'Alene, Id													
Con. Cal. & Va., Nev													
Dunkin, Colo													
Eureka, Nev													
Franklin, Mich					12.50	12.00	12.00		12.00				382
Honorine, Utah													
Horn Silver, Utah													
Kearsarge, Mich	10.50		10.50	10.00	10.50		10.50		10.50				420
Lake Superior, Iron													
Little Pittsburg, Colo													
Minnesota Iron													
Napa, Cal													
Ontario, Utah													
Osceola, Mich	24.50				25.00	24.50	25.25		24.75				700
Quincy, Mich													
Ridge, Mich													
Sierra Nevada, Nev													
Silver King, Ariz													
Stormont, Utah													
Tamarack, Mich	148	147	147		147½				148				206
Tecumseh, Mich													

NAME OF COMPANY.	Feb. 12.		Feb. 13.		Feb. 15.		Feb. 16.		Feb. 17.		Feb. 18.		SALES
Allouez, Mich						1.06	1.00			1.25	1.00	1.13	1.00	510
Arnold, Mich														
Aztec, Mich														
Brunswick, Cal														
Butte & Boston, Mont	14.50	14.13	14.50	14.00	14.50	14.00	14.38	14.25	14.50	14.13	14.50	14.13		1,858
Centennial, Mich	7.50	6.75	6.75	6.63	7.13	6.50			8.00	6.75	8.00			1,988
Colchis														
Copper Falls, Mich														
Crescent, Colo					.12									1,200
Dana, Mich														
Don Enrique, N. M														
Geyser														
Hanover, Mich														
Humboldt, Mich														
Hungarian, Mich														
Huron, Mich														
Mesnard, Mich														
National, Mich														
Native, Mich														
Oriental & M., Nev														
Phoenix, Ariz														
Pontiac, Mich														
Rappahannock, Va														
Santa Fe, N. Mex	.37½									.25		.22½		3,450
Shoshone, Idaho														
South Side, Mich														
Star, Mich														
Washington, Mich														
Wolverine														

Dividend shares sold, 3,092. Non-dividend shares sold, 9,006. Total shares sold, 12,098.

COAL STOCKS.

NAME OF COMPANY.	Feb. 13.		Feb. 15.		Feb. 16.		Feb. 17.		Feb. 18.		Feb. 19.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
American Coal													
Cambria Iron									78				10
Cameron Coal & I. Co			2	1⅝									200
Ches. & O. R. R													
Chic. & Ind. Coal R. R													
Do. pref													
Col. C. & I	37¾	37	37⅞	37¼	37¾	37	37¼	36¾	37⅜	37	37¼	37	7,300
Col. C. & Hocking C. I													
Consolidation Coal													
Del. & H. C	134⅛	133¾	136	134⅝	135¼	134⅛	135	134	134⅜	133⅞	135⅛	134⅛	13,574
D., L. & W. R. R	161	159⅝	161¾	159⅝	160¾	158⅜	158⅝	157	158⅝	157⅜	159⅛	156⅝	71,997
Hocking Valley	31⅝		31⅝	31⅛	31⅝		31⅛	31	33⅛	31⅜	32¾	31⅜	11,670
Hunt & Broad Top	27				27	26¾	27⅛		27				945
Do. pref	47⅛	46¾			47¼		47¼		47¾	47¼			1,212
Illinois C. & Coke Co													
Lehigh C. & N	54⅛	53⅜	55¼	54⅛	54⅝	54	54⅜	54⅛	54⅜	54⅛			28,645
Lehigh Valley R. R	61⅝	59¾	61⅝	60	59⅝	58⅞	59⅝	59	59⅝	59⅛			21,299
Lehigh & Wilk. Coal													
Mahoning Coal													
Do. pref							100						270
Maryland Coal													
Morris & Essex					145½	145					146	145⅝	137
New Central Coal									118				300
N. J. C. R. R	136¾	133	140	138	138¾	137	137¾	136¾	138½	137	140¾	138	18,455
N. Y. & S. Coal													
N. Y., Susq. & West	13⅛	12⅛	14⅝	13¼	14⅛	13¾	14⅛	13⅝	13¼	13	13¼	13	22,570
Do. pref	54¾	50¾	57¾	55⅛	59¼	58	58	56½	57¼	56⅛	57¾	56¾	12,450
N. Y. & Perry C. & I													
Norfolk & West. R. R													
Do. pref			50¾	49⅛	50¼						51	50⅛	530
Penn. Coal													
Penn. R. R	56⅛	55¾	55⅞	55¾	55⅛	55¼	55⅝	55⅛	55¼	55⅛			12,640
Ph. & R. R. R	59	57⅛	62	59⅝	60½	59	59	57¼	58¾	57¼	60⅝	58	1,128,231
Sunday Creek Coal													
Do. Pref													
Tennessee C. & I. Co	43	42¾	43¼	42¼	43⅝	43	44⅛	43	46	44¼	47	45	28,852
Do. pref													
Westmoreland Coal													

Total shares sold, 1,381,197.

San Francisco Mining Stock Quotations.

NAMES OF STOCKS.	CLOSING QUOTATIONS. Feb. 12.	Feb. 13.	Feb. 15.	Feb. 16.	Feb. 17.	Feb. 18.
Alpha						
Alta	1.00	1.00	1.00	1.00	1.00	1.00
Belcher						
Belle Isle			.30	.30	.30	.30
Best & Belcher	2.80	2.65	2.70	2.70	2.65	2.80
Bodie	.60	.60	.60	.60	.60	.55
Bulwer	.45	.50	.45	.45	.45	.45
Challar	1.70	1.60	1.70	1.80	1.75	1.70
Commonwealth				.20		
Cons. Cal. & Va	5.37½	5.00	5.12½	5.00	5.12½	4.75
Cons. Pacific						
Crown Point	1.30	1.30	1.30	1.25	1.20	1.20
Del Monte, Nev						
Eureka Consolidated	1.95	2.00		2.00		
Gould & Curry	1.70	1.60	1.65	1.60	1.65	1.45
Hale & Norcross	2.05	1.85	2.00	2.05	2.35	2.10
M. White						
Mexican	1.75	1.70	1.95	2.00	1.95	1.80
Mono	1.10	1.05	.90	.85	.95	1.00
Mt. Diablo						
Navajo	.05	.05	.05	.05	.05	.05
Nev. Queen			.25	.25	.30	.35
N. Belle Isle			.30	.20	.20	.20
N. Commonwealth						
Ophir	2.95	2.85	2.95	2.85	2.90	2.75
Potosi	1.75	1.75	1.70	1.70	1.60	1.60
Savage	1.30	1.25	1.30	1.30	1.35	1.30
Sierra Nevada	1.45	1.55	1.50	1.50	1.60	1.50
Union Con	1.65	1.65	1.65	1.65	1.70	1.60
Utah	.40	.45	.40	.35	.35	.35
Yellow Jacket	1.05	1.00	.95	.95	.90	.85

DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Par	Assessments. Total levied.	Date and amount of last			Dividends. Total paid.	Date & amount of last.		
1	Adams, S. L. C.	Colo.	$1,500,000	150,000	$10	*				$637,500	Jan.	1892	.05
2	Alice, S.	Mont.	10,000,000	400,000	25	*				975,000	Nov.	1891	.06¼
3	Alma & Nel Wood., G	Idaho	300,000	30,000	10	*				60,000	Jan.	1889	.50
4	Amador, G.	Cal.	1,250,000	250,000	5	*				31,250	Aug.	1890	.12½
5	American Belle, S.G.C	Colo.	2,000,000	400,000	5	*				50,000	April	1891	.12½
6	Americ'n & Nettie, G.S	Colo.	...	300,000	..	...				160,000	Jan.	1892	.05
7	Amy & Silversmith, S.	Mont.	...	341,419	...	...				247,530	Aug.	1887	.12½
8	Atlantic, C.	Mich.	1,000,000	40,000	25	$280,000	April	1875	$1.00	700,000	Feb.	1891	1.00
9	Argenta, S.	Nev.	10,000,000	100,000	100	335,000	July	1889	.10	40,000	Feb.	1880	.20
10	Aspen Mg. & S., S. L.	Colo.	2,000,000	200,000	10	*				660,000	May	1891	.10
11	Aurora, I.	Mich.	2,500,000	100,000	25	...				155,000	April	1891	1.00
12	Badger, S	Ont.	250,000	50,000	5	...				37,500	Mar.	1890	.25
13	Bangkok Cora-Bell, S.	Colo.	600,000	600,000	1	*				44,510	Aug.	1890	.00½
14	Belle Isle, S.	Nev.	10,000,000	100,000	100	190,000	Dec.	1889	.15	300,000	Dec.	1879	.25
15	Belcher, S. G.	Nev.	10,400,000	104,000	100	2,978,000	Feb.	1891	.50	15,397,000	April	1876	1.00
16	Bellevue, Idaho, S. L.	Idaho	1,250,000	125,000	10	120,000	Dec.	1889	.25	200,000	Jan.	1890	.19
17	Bi-Metallic, S. G.	Mont.	5,000,000	200,000	25	...				1,800,000	Nov.	1891	.35
18	Bodie Con., G. I.	Cal.	10,000,000	100,000	100	550,000	June	1890	.25	1,602,572	April	1885	.50
19	Boston & Mont., G.	Mont.	2,500,000	250,000	10	*				520,000	June	1886	.15
20	Boston & Mont., C. S.	Mont.	3,125,000	125,000	25	*				2,075,000	Nov.	1891	1.00
21	Breece, I.	Colo.	5,000,000	200,000	25	*				2,000	Feb.	1880	.01
22	Brooklyn Lead, L. S.	Utah	500,000	50,000	10	...				127,000	July	1887	.05
23	Bulwer, G.	Cal.	10,000,000	100,000	10	130,000	Aug.	1889	.25	175,000	Jan.	1884	.10
24	Bunker Hill & S. S.L.	Idaho	3,000,000	300,000	10	*				150,000	Oct.	1883	.06⅜
25	Caledonia, G.	Dak.	10,000,000	100,000	100	505,000	May	1885	.15	192,000	Oct.	1890	.08
26	Calliope, S.	Colo.	1,000,000	1,000,000	...	...				140,000	Jan.	1891	.00½
27	Calumet & Hecla C.	Mich.	2,500,000	100,000	25	1,200,000				36,850,000	Mar.	1892	5.00
28	Catalpa, S. L. I.	Colo.	3,000,000	300,000	10	*				270,000	May	1884	.10
29	Centen'l-Eureka, S.L.	Utah	1,500,000	30,000	50	...				532,500	Feb.	1892	.50
30	Central, C.	Mich.	500,000	20,000	25	100,000	Oct.	1861	.65	1,970,000	Feb.	1891	1.00
31	Chrysolite, S. L.	Colo.	10,000,000	200,000	50	*				1,650,000	Dec.	1884	.25
32	Clay County, G.	Colo.	200,000	200,000	1	*				56,000	Nov.	1891	.02
33	Cœur D'Alene, S. L.	Idaho	5,000,000	500,000	10	...				310,000	Nov.	1891	.02
34	Colorado Central, S.L.	Colo.	2,750,000	275,000	10	*				447,500	Jan.	1892	.05
35	Commonwealth, S.	Nev.	10,000,000	100,000	100	170,000	Nov.	1888	.50	20,000	Nov.	1890	.20
36	Confidence, S. L.	Nev.	2,496,000	24,960	100	1,575,000	Nov.	1891	.75	199,680	April	1889	1.00
37	Cons. Cal. & Va., S.G.	Nev.	21,600,000	216,000	100	108,000	Jan.	1885	.20	3,682,800	Aug.	1891	.50
38	Contention, S.	Ariz.	12,500,000	250,000	50	...				+2,587,500	Dec.	1884	.25
39	**Cop. Queen Con., C.	Ariz.	1,400,000	140,000	10	...				210,000	Feb.	1889	.50
40	Cortez, S.	Nev.	1,500,000	300,000	05	*				592,000	July	1891	.46
41	Crescent, S. L. G.	Utah	15,000,000	600,000	25	*				228,000	Oct.	1888	.03
42	Crown Point, G. S.	Nev.	10,000,000	100,000	100	2,425,000	Sept.	1889	.50	11,588,000	Jan.	1875	2.00
43	Cumberland, L. S.	Mont.	5,000,000	500,000	10	*				15,000	Nov.	1889	.03
41	Daly, S. L.	Utah	3,000,000	150,000	20	...				2,250,000	Jan.	1892	.25
45	Deer Creek, S. G.	Idaho	1,000,000	200,000	5	*				20,000	June	1889	.05
46	Deadwood-Terra, G.	Dak.	5,000,000	200,000	25	*				1,070,000	Feb.	1892	.05
47	DeLamar, S. G.	Idaho	2,000,000	400,000	5	...				216,000	Jan.	1892	.18
48	Derbec B. Grav., G.	Cal.	10,000,000	100,000	100	90,000	Dec.	1881	.10	260,000	Aug.	1891	.10
49	Dunkin, S. L.	Colo.	5,000,000	200,000	25	*				390,000	Oct.	1889	.05
50	Dunstone, G. S. L.	Mont.	1,000,000	200,000	5	*				6,000	Nov.	1888	.03
51	Eclipse, L. S.	Colo.	100,000	100,000	1	...				20,000	Nov.	1887	10
52	Elkhorn, S. L.	Mont.	1,000,000	200,000	5	*				¶571,000	Dec.	1891	.37½
53	Enterprise, S.	Colo.	100,000	10,000	10	*				250,000	Nov.	1891	10 p.c.
54	Eureka Con., S. L. G.	Nev.	,000,000	50,000	100	550,000	June	1889	.50	5,017,500	Jan.	1892	.25
55	Evening Star, S. L.	Colo.	500,000	50,000	10	*				1,450,000	Dec.	1889	.25
56	Father de Smet, G.	Dak.	10,000,000	100,000	100	200,000	Nov.	1878	1.00	§,125,000	Dec.	1885	.20
57	Franklin, C.	Mich.	1,000,000	40,000	25	220,000	June	1871	...	1,020,000	Jan.	1892	2.00
58	Freeland, S. G.	Colo.	5,000,000	200,000	25	*				190,000	July	1886	.10
59	Garfield Lt., G. S.	Nev.	500,000	100,000	5	...				90,000	April	1888	.12½
60	Gould & Curry, S. G.	Nev.	10,800,000	108,000	100	4,564,200	Jan.	1892	.30	3,826,800	Oct.	1870	10.00
61	Grand Prize, S.	Nev.	10,000,000	100,000	100	785,000	Jan.	1890	.30	495,000	Mar.	1884	.25
62	Granite, S. L.	Idaho	500,000	500,000	1	*				83,400	Nov.	1890	.02
63	Granite Mountain, S.	Mont.	10,000,000	400,000	25	...				11,800,000	Feb.	1892	.25
64	Green Mountain, G.	Cal.	1,250,000	125,000	10	*				212,000	Nov.	1881	.07½
65	Hale & Norcross, G. S.	Nev.	11,200,000	112,000	100	5,422,800	Jan.	1892	.50	1,822,000	Aug.	1888	.50
66	Hecla Con., S. G. L. C.	Mont.	1,500,000	30,000	50	...				1,755,000	Jan.	1892	.50
67	Hel'a Mg. & Red, S.L.G.	Mont.	3,315,000	663,000	5	*				197,970	July	1886	.06
68	Holmes, S.	Nev.	10,000,000	100,000	100	370,000	May	1890	.25	75,000	April	1886	.25
69	Homestake, G.	Dak.	12,500,000	125,000	100	200,000	July	1878	1.00	4,806,250	Feb.	1892	.10
70	Honorine, S. L.	Utah	500,000	250,000	2	37,500	April	1889	.05	125,000	Sept.	1887	.05
71	Hope, S.	Mont.	1,000,000	100,000	10	*				233,252	April	1888	.25
72	Horn-Silver, S. L.	Utah	10,000,000	400,000	25	*				4,350,000	Dec.	1891	.12½
73	Hubert, G.	Colo.	1,000,000	1,000,000	1	*				247,000	Dec.	1889	.00½
74	Idaho, G.	Cal.	310,000	3,100	100	...				2,340,950	Feb.	1892	1.00
75	Illinois, S.	N. M.	100,000	100,000	1	*				45,000	April	1889	.20
76	Iron Hill, S.	Dak.	2,500,000	250,000	10	134,000	July	1889	.03	156,250	Nov.	1887	.07½
77	Iron Mountain, S.	Mont.	500,000	500,000	1	*				120,000	Feb.	1891	.05
78	Iron-Silver, S. L.	Colo.	10,000,000	500,000	20	...				2,500,000	April	1889	.20
79	Jackson, G. S.	Nev.	5,000,000	50,000	100	237,500	Nov.	1880	.20	60,000	Jan.	1891	.10
80	Jay Gould, G. S.	Mont.	2,000,000	40,000	5	*				459,000	May	1890	.04
81	Kearsarge, C.	Mich.	1,000,000	40,000	25	190,000	Oct.	1887	1.00	80,000	Jan.	1890	2.00
82	Kentuck, S. G.	Nev.	3,000,000	30,000	100	454,180	Oct.	1891	.15	1,350,000	Dec.	1886	.10
83	La Plata, S. L.	Colo.	2,000,000	200,000	10	*				610,000	Sept.	1882	.30
84	Leadville Con., S. L.	Colo.	4,000,000	400,000	10	*				435,500	Dec.	1891	.03
85	Lexington, G. S.	Mont.	4,000,000	40,000	100	*				609,000	Jan.	1890	2.00
86	Little Chief, S. L.	Colo.	10,000,000	200,000	50	*				820,000	Dec.	1890	.05
87	Little Rule, S.	Colo.	500,000	500,000	1	...				220,000	Dec.	1891	.02
88	Mammoth, S. L. C.	Utah	10,000,000	400,000	250	110,000	...	1882	.25	1,040,000	Dec.	1891	.10
89	Martin White, S.	Nev.	10,000,000	100,000	100	1,225,000	Oct.	1890	.25	140,000	Dec.	1886	.25
90	Mary Murphy, S. G.	Colo.	350,000	3,500	101	*				175,000	May	1888	5.00
91	Matchless, S. L	Colo.	500,000	500,000	1	*				15,000	Feb.	1890	.00½
92	May Mazeppa, S. L.	Colo.	1,000,000	100,000	1	...				205,000	Oct.	1891	.03¾
93	Minas Prietas, G. S.	Mex.	1,000,000	100,000	10	*				350,000	Dec.	1890	.50
94	Minnesota, C.	Mich.	1,000,000	40,000	25	420,000	April	1886	1.00	1,820,000	Mar.	1876	...
95	Mollie Gibson, S.	Colo.	5,000,000	1,000,000	5	*				1,200,000	Feb.	1892	.10
96	Monitor, G.	S.Dak	2,500,000	250,000	10	...				45,000	Oct.	1890	.03
97	Mono, G.	Cal.	5,000,000	50,000	100	760,000	Sept.	1890	.25	12,500	Mar.	1886	.25
98	Montana, Lt., G. S.	Mont.	3,300,000	660,000	5	*				2,619,075	June	1891	12½
99	Morning Star, S. L.	Colo.	1,000,000	100,000	10	...				925,000	April	1891	.25
100	Moulton, S. G.	Mont.	2,000,000	400,000	5	*				380,000	Dec.	1887	.07½
101	Mount Pleasant, G.	Cal.	150,000	150,000	1	*				150,000	Feb.	1887	.30
102	Mt. Diablo, S.	Nev.	5,000,000	50,000	100	137,500	June	1880	2.00	210,000	July	1891	.10
103	Napa, Q.	Cal.	700,000	100,000	7	...				440,000	Jan.	1892	.10
104	Navajo, G. S.	Nev.	10,000,000	100,000	100	520,000	May	1891	20	229,950	April	1889	.10
105	New California, G.	Colo.	800,000	160,000	5	*				48,800	May	1890	.12½
106	New Guston, S.	Colo.	550,000	110,000	5	...				995,000	Oct.	1891	1.00
107	N. Hoover Hill, G. S.	N. C.	300,000	120,000	2½	*				30,000	Dec.	1885	.06½
108	Northern Belle, S.	Nev.	5,000,000	50,000	100	425,000	Jan.	1884	8.00	2,400,000	April	1883	.50
109	North Belle Isle, S.	Nev.	10,000,000	100,000	100	445,000	Aug.	1891	.25	230,000	May	1888	.50
110	North Star, G.	Cal.	1,000,000	100,000	10	...				300,000	April	1889	.50
111	Ontario, S. L.	Utah	15,000,000	150,000	100	...				12,575,000	Jan.	1892	.50
112	Ophir, G. S.	Nev.	10,000,000	100,000	100	4,210,640	April	1890	.60	1,595,800	Jan.	1880	1.00
113	Original, S. C.	Mont.	1,500,000	60,000	25	*				138,000	Jan.	1889	.05
114	Oro, S. L. G.	Colo.	500,000	100,000	5	...				95,000	July	1890	.20
115	Osceola, C.	Mich.	1,250,000	50,000	25	480,000	April	1876	1.60	1,547,500	Oct.	1891	1.00
116	Parrot, C.	Mont.	1,800,000	180,000	10	...				1,074,000	Jan.	1892	.10
117	Peacock, S. G. C.	N. M.	2,000,000	200,000	10	*				60,000	Nov.	1886	...
118	Plumas Eureka, G.	Cal.	1,406,250	140,625	10	...				2,618,246	Oct.	1891	.15
119	Plymouth Con., G.	Cal.	5,000,000	100,000	50	*				2,280,000	Feb.	1888	.40
120	Quicksilver, pref., Q.	Cal.	4,300,000	43,000	100	...				1,823,911	June	1891	1.25
121	" com., Q	Cal.	5,700,000	57,000	100	...				643,867	July	1882	.40
122	Quincy, C.	Mich.	1,250,000	50,000	25	200,000	Dec.	1862	...	6,170,000	Feb.	1892	4.00
123	Reed National, S. G.	Colo.	500,000	500,000	1	*				50,000	Dec.	1890	.01
124	Rialto, G.	Colo.	300,000	300,000	1	*				41,250	Feb.	1892	.01½
125	Richmond, S. L.	Nev.	1,350,000	54,000	25	*				4,346,387	Aug.	1891	.25
126	Ridge, C.	Mich.	500,000	20,000	25	219,939	Mar.	1886	.50	99,785	Feb.	1880	.50
127	Robinson Con., S. L.	Colo.	10,000,000	200,000	50	*				585,000	Mar.	1886	.05
128	Running Lode, G.	Colo.	1,000,000	1,000,000	1	*				30,000	Dec.	1891	.00½
129	Savage, S.	Nev.	11,200,000	112,000	100	6,604,000	Nov.	1889	.50	4,460,000	June	1869	3.00
130	Sheridan, S. G.	Colo.	300,000	3,000	100	*				300,000	Oct.	1891	2.50
131	Shoshone, G.	Idaho	150,000	150,000	1	...				7,500	April	1883	.01
132	Sierra Buttes, G.	Cal.	2,225,000	122,500	10	...				1,492,557	April	1888	.12½
133	Sierra Nevada, S. G.	Nev.	10,000,000	100,000	100	6,446,910	Oct.	1890	.50	102,000	Jan.	1871	1.00
134	Sierra Nevada, S. L.	Idaho	1,000,000	1,000,000	1	*				40,000	May	1889	.02
135	Silent Friend	Colo.	500,000	500,000	1	...				60,000	Aug.	1891	.02½
136	Silver Cord, S. L. G.	Colo.	4,500,000	450,000	10	...				265,000	April	1889	.10
137	Silver King, S.	Ariz.	10,000,000	100,000	100	130,000	Nov.	1890	.30	1,950,000	July	1887	.25
138	Silver Mg. of L.V., S.L.	N. M.	500,009	500,000	1	...				300,000	Dec.	1891	.05
139	Small Hopes Con., S.	Colo.	5,000,000	250,000	20	*				3,162,500	Oct.	1890	.10
140	Spring Valley, G.	Cal.	200,000	200,000	1	50,000	Oct.	1886	.25	50,000	Jan.	1881	.25
141	Standard, G. S.	Cal.	10,000,000	100,000	100	100,000	June	1890	.50	3,615,000	Jan.	1892	.10
142	Stormont, S.	Utah	500,000	500,000	1	*				155,000	Nov.	1881	.05
143	St. Joseph, L.	Mo.	1,500,000	150,000	10	*				1,974,000	Dec.	1890	.02
144	Tamarack, C.	Mich.	1,250,000	50,000	25	520,000	April	1885	3.00	2,490,000	Mar.	1892	4.00
145	Tombstone, G. S. L.	Ariz.	12,500,000	500,000	25	*				1,250,000	April	1882	.10
146	United Verde, C.	Ariz.	3,000,000	300,000	10	*				207,500	Jan.	1892	.10
147	Viola Lt., S. L.	Idaho	750,000	150,000	5	...				337,500	Nov.	1888	.37½
148	Ward Con., S.	Colo.	2,000,000	200,000	10	...				20,000	Dec.	1889	.05
149	Woodside, S. L.	Utah	100,000	100,000	10	...				25,000	Oct.	1889	.25
150	W. Y. O. D.	Cal.	80,000	15,000	2	22,500	May	1891	.10	9,000	Jan.	1892	.10
151	Yankee Girl, S.	Colo.	2,500,000	250,000	10	...				1,405,000	April	1891	.50
152	Yellow Jacket, G. S.	Nev.	12,000,000	120,000	100	5,508,000	Mar.	1889	.50	2,184,000	Aug.	1871	2.50
153	Young America, G.	Cal.	...	...		...				175,000	Jan.	1889	10

NON-DIVIDEND PAYING MINES

	Name and Location of Company.		Capital Stock.	Shares. No.	Par	Assessments. Total levied.	Date and am't of last.		
1	Allegheny, S.	Colo.	$5,000,000	500,000	$10	*			
2	Alliance, S. G.	Utah	100,000	100,000	1	$120,000	Feb.	1891	.20
3	Allonez, C.	Mich.	2,000,000	80,000	25	737,000	Jan.	1890	.70
4	Alpha Con., G. S.	Nev.	3,000,000	30,000	100	112,500	Sept.	1890	.25
5	Alta, S.	Nev.	10,080,000	100,800	100	3,369,880	Jan.	1892	.10
6	American Flag, S.	Colo.	1,250,000	125,000	10	300,000	June	1887	...
7	Amity, S.	Colo.	250,000	250,000	1	...			
8	Anchor S. L. G.	Utah	3,000,000	150,000	20	410,000	June	1890	.20
9	Anglo-Montana, Lt.	Mont.	600,000	120,000	5	...			
10	Astoria, G.	Cal.	200,000	100,000	2	...			
11	Barcelona, G.	Nev.	5,000,000	200,000	25	*			
12	Bechtel Con., G.	Cal.	10,000,000	100,000	100	173,500	...	1883	.10
13	Belmont, G.	Cal.	500,000	500,000	1	*			
14	Belmont, S.	Nev.	5,000,000	50,000	100	735,000	April	1886	.10
15	Best & Belcher, S. G.	Nev.	10,080,000	100,800	100	2,279,275	Aug.	1890	.25
16	Black Oak, G.	Cal.	3,000,000	300,000	10	*			
17	Boston Con., G.	Cal.	10,000,000	100,000	100	170,000	Nov.	1883	.25
18	Bremen, S	N. M.	5,000,000	500,000	10	*			
19	Brownlow, G.	Colo.	250,000	250,000	1	...			
20	Brunswick, G.	Cal.	2,000,000	400,000	5	*			
21	Buckeye, S. L.	Mont.	1,000,000	500,000	2	...			
22	Bullion, S. G.	Nev.	10,000,000	100,000	100	2,790,000	Dec.	1889	.25
23	Butte & Boston, C. S.	Mont.	5,000,000	200,000	...	...			
24	Calaveras, G.	Cal.	500,000	500,000	1	*			
25	Carisa, G.	Wy.	500,000	100,000	5	*			
26	Carupano, G. S. L. C.	Ven.	200,000	100,000	2	*			
27	Cashier, G. S.	Colo.	500,000	250,000	2	*			
28	Cherokee, G.	Cal.	1,500,000	150,000	10	...			
29	Chollar, S. G.	Nev.	11,200,000	112,000	100	1,540,000	Nov.	1889	.50
30	Cleveland, T.	Dak.	1,000,000	500,000	2	*			
31	Colchis, S. G.	N. M.	500,000	50,000	10	...			
32	Colorado Silver	Colo.	1,625,000	325,000	5	...			
33	Comstock Tun.	Nev.	10,000,000	100,000	100	35,000	Mar.	1887	.15
34	Con. Imperial, G. S	Nev.	5,000,000	50,000	100	2,062,500	Jan.	1892	.25
35	Con. New York, S. G.	Nev.	5,000,000	100,000	50	70,000	Nov.	1890	.15
36	Con. Pacific, G.	Cal.	6,000,000	60,000	100	198,000	June	1890	.10
37	Con. Silver, S.	Mo.	2,500,000	250,000	10	...			
38	Crescent, S. L.	Colo.	3,000,000	300,000	10	*			
39	Crocker, S.	Ariz.	10,000,000	100,000	100	160,000	Jan.	1892	.10
40	Crowell, G.	N. C.	500,000	500,000	1	...			
41	Dahlonega, G.	Ga.	250,000	250,000	1	*			
42	Dandy, S.	Colo.	5,000,000	500,000	10	...			
43	Decatur, S	Colo.	1,500,000	300,000	5	*			
44	Denver City, S.	Colo.	5,000,000	500,000	10	*			
45	Denver Gold, G.	Colo.	300,000	60,000	5	...			
46	Dickens-Custer, S.	Idaho	2,100,000	420,000	5	...			
47	Durango, G.	Colo.	500,000	500,000	1	*			
48	Eastern Dev. Co., Lt.	N. S.	1,500,000	150,000	10	990,000	Mar.	1886	1.00
49	El Cristo, G. S.	U.S.C.	1,000,000	500,000	2	...			
50	El Dorado, G.	Cal.	1,000,000	250,000	4	*			
51	El Talento, G.	U.S.C.	1,000,000	500,000	2	...			
52	Emmons, S. L.	Colo.	2,000,000	2,000,000	1	...			
53	Empire, S.	Utah	10,000,000	100,000	100	...			
54	Eureka Tunnel, S. L.	Nev.	10,000,000	100,000	100	*			
55	Exchequer, S. G.	Nev.	10,000,000	100,000	100	890,000	Jan.	1892	.25
56	Found Treasure, G. S.	Nev.	10,000,000	100,000	100	81,500	May	1890	.25
57	Gogebic I. Syn., I.	Wis.	5,600,000	200,000	25	...			
58	Gold Cup, S.	Colo.	500,000	500,000	1	*			
59	Golden Era, S.	Mont.	2,000,000	200,000	10	*			
60	Gold Rock, G.	Cal.	1,000,000	500,000	2	*			
61	Goodshaw, G.	Cal.	10,000,000	100,000	100	*			
62	Grand Belt, C.	Tex.	12,000,000	120,000	100	...			
63	Grand Duke	Colo.	800,000	80,000	10	...			
64	Great Remance, G.	U.S.C.	1,000,000	500,000	2	*			
65	Gregory Con., G.	Mont.	3,000,000	300,000	10	...			
66	Harlem M. & M. Co., G.	Cal.	1,000,000	200,000	5	...			
67	Hartery Con., G.	Cal.	1,000,000	100,000	10	22,000	Oct.	1890	.05
68	Head Cent. & Tr., S. G.	Ariz.	10,000,000	100,000	100	...			
69	Hector, G.	Cal.	1,500,000	300,000	5	45,000	Jan.	1889	.15
70	Highland, C.	Mich.	500,000	25,000	20	...			
71	Holywood	Cal.	200,000	100,000	2	...			
72	Hortense, S.	Colo.	2,000,000	200,000	10	...			
73	Huron, C.	Mich.	1,000,000	40,000	25	280,000	May	1887	3.00
74	Iron, Gold & Silver, S.	N. M.	2,000,000	200,000	10	*			
75	Ironton, I.	Wis.	1,000,000	40,000	25	...			
76	Iroquois, C.	Mich.	1,250,000	50,000	25	...			
77	J. D. Reymert, S.	Ariz.	10,000,000	100,000	100	...			
78	Julia Con., G. S.	Nev.	11,000,000	110,000	100	1,463,000	Jan.	1889	.10
79	Lacrosse, G.	Colo.	1,000,000	100,000	10	*			
80	Lee Basin, S.	Colo.	5,000,000	500,000	10	*			
81	Madeleine, G. S. L.	Colo.	750,000	750,000	1	*			
82	Mammoth Gold, G.	Ariz.	245,000	49,000	5	*			
83	Mayflower Gravel, G.	Cal.	1,000,000	100,000	10	585,000	Mar.	1890	.56
84	Medora, G.	Dak.	250,000	250,000	1	...			
85	Merrimac Con., G. S.	Colo.	5,000,000	500,000	10	*			
86	Mexican, G. S.	Nev.	10,000,000	100,000	100	2,816,960	Jan.	1892	.25
87	Middle Bar, G.	Cal.	400,000	200,000	2	*			
88	Mike & Starr, S. C.	Colo.	1,000,000	200,000	5	*			
89	Milwaukee, S.	Mont.	500,000	500,000	1	12,500	May	1891	.01
90	Monitor, G.	Colo.	100,000	000,000	1	*			
91	Mutual Mg. & Sm.	W'sh.	100,000	100,000	1	*			
92	Native, C.	Mich.	1,000,000	40,000	25	...			
93	Neath, G.	Colo.	1,000,000	100,000	10	...			
94	Nevada Queen, S.	Nev.	10,000,000	100,000	100	200,000	Oct.	1889	.25
95	New Germany, G.	N. S.	100,000	100,000	1	*			
96	New Pittsburg, S. L.	Colo.	2,000,000	200,000	10	*			
97	North Standard, G.	Cal.	10,000,000	100,000	100	20,000	Nov.	...	...
98	Noonday	Cal.	600,000	60,000	10	208,000	Dec.	1881	.10
99	Oneida Chief, G.	Cal.	500,000	125,000	100	*			
100	Oriental & Miller, S.	Nev.	10,000,000	400,000	25	...			
101	Osceola, G.	Nev.	5,000,000	500,000	10	*			
102	Overman, G. S.	Nev.	11,520,000	115,200	100	3,909,680	Sept.	1891	.50
103	Park, S.	Utah	2,000,000	200,000	10	...			
104	Peer, S.	Ariz.	10,000,000	100,000	100	180,000	Nov.	1891	.15
105	Peerless, S.	Ariz.	10,000,000	100,000	100	405,000	Oct.	1890	.15
106	Phœnix	Ariz.	500,000	500,000	1	*			
107	Phœnix Lead, S. L.	Colo.	100,000	100,000	1	*			
108	Pilgrim, G	Cal.	600,000	300,000	2	*			
109	**Pioche M.&R., S.G.L.	Utah	20,000,000	‡2,000,000	10	...			
110	Potosi, S.	Nev.	11,200,000	112,000	100	1,573,000	Mar.	1890	.50
111	Proustite, S.	Idaho	250,000	250,000	1	*			
112	Puritan, S. G.	Colo.	1,500,000	150,000	10	*			
113	Quincy, C.	Colo.	3,000,000	300,000	10	...			
114	Rappahannock, G. S.	[illegible]	250,000	250,000	1	*			
115	Red Elephant, S.	Colo.	500,000	500,000	1	*			
116	Red Mountain, Ltd., S	Colo.	300,000	60,000	5	*			
117	Ropes, G. S.	Mich.	2,000,000	80,000	25	167,200	Feb.	1891	.50
118	Ruby & Dun., S. L. G.	Nev.	25,300	506	50	...			
119	Russell, G.	N. C.	1,500,000	300,000	5	...			
120	Sampson, G. S. L.	Utah	10,000,000	100,000	100	288,15[illegible]	July	1888	1.08
121	San Sebastian, G.	San S.	1,600,000	320,000	5	*			
122	Santa Fe, G	N. M.	5,000,000	500,000	10	...			
123	San[illegible]o, G	U.S.C.	400,000	200,000	2	...			
124	Silver Age, S. L. G.	Colo.	2,000,000	200,000	10	...			
125	Silver Queen, C.	Ariz.	5,000,000	200,000	25	*			
126	South Bulwer, G	Cal.	10,000,000	100,000	100	100,000	May	1881	.25
127	South Hite	Cal.	10,000,000	100,000	100	195,000	Jan.	1883	.05
128	South Pacific	Cal.	500,000	100,000	5	...			
129	Stanislaus, G.	Cal.	2,000,000	200,000	10	...			
130	St. Kevin, S. G.	Colo.	100,000	100,000	1	*			
131	St. Louis & Mex., S.	Mex.	,000,000	500,000	10	*			
132	St. Louis & St. Elmo.	Colo.	[illegible]	200,000	10	...			
133	St. L. & St. Felipe, G.S.	Mex.	[illegible]	150,000	10	...			
134	St. L. & Sonora, G. S.	Mex.	1,500,000	150,000	10	...			
135	St. Louis-Yavapai	Ariz.	3,000,000	300,000	10	*			
136	Sunday Lake, I.	Mich.	1,250,000	50,000	25	...			
137	Sullivan Con., G.	Dak.	600,000	200,000	3	*			
138	Sylvanite, S.	Colo.	5,000,000	500,000	10	*			
139	Taylor-Plumas, G.	Cal.	1,000,000	200,000	5	10,000	Feb.	1888	.10
140	Tioga Con., G.	Cal.	10,000,000	100,000	10	295,000	May	1888	.25
141	Tornado Con., G. S.	Nev.	100,000	100,000	1	*			
142	Tuscarora, S.	Nev.	10,000,000	500,000	20	15,000	Oct.	1889	.10
143	Union Con., G. S.	Nev.	10,000,000	100,000	100	2,335,000	Jan.	1892	.25
144	Utah, S.	Nev.	10,000,000	100,000	100	245,000	Aug.	1890	.25
145	Ute & Ulay, S. L.	Colo.	500,000	100,000	5	*			
146	Whale, S.	Colo.	500,000	500,000	1	...			
147	Washington, C.	Mich.	1,000,000	40,000	25	...			
148	West Granite Mt., S.	Mont.	5,000,000	500,000	10	*			
149	Yuma, C. S. G.	Ariz.	10,000,000	400,000	25	...			
150	Zelaya, G. S.	C. A.	600,000	300,000	2	*			
151									

G. Gold. S., Silver. L., Lead. C., Copper. * Non-assessable. + This company, as the Western, up to December 10th, 1881, paid $1,400,000. ‡ Non-assessable for three years. § The Deadwood previously paid $275,000 in eleven dividends and the Terra $75,000. Previous to the consolidation in August, 1884, the California had paid $31,320,000 in dividends, and the Con. Virginia 40,000,000. ** Previous to the consolidation of the Copper Queen with the Atlanta, August, 1885, the Copper Queen had paid $1,350,000 in dividends. ¶ This company paid $190,000 before reorganization in 1890 **This company acquired the property of the Raymond & Ely Company which had paid $3,075,000 in dividends.

STOCK MARKET QUOTATIONS

Aspen. Feb. 13.

The closing quotations were as follows:

Agnes C	$
Argentum Junista	1.27½
Aspen Deep Shaft	.11
Aspen Contact	5.10
Best Friend	.36½
Bimetallic	.34
Bushwacker	.35
Carbonate Chief	.10
Delia S.	10.00
Homer & Alta	
Justice	.10
Little Annie	.22
Mollie Gibson	9.00
Nolan Creek	
Park, Mamie & Queen	
Pontiac	.10½
Sheep Mountain S. & M. Co	.25
Smuggler	16.50
St. Joe & Mineral Farm	.16
Yellow Boy	.20

Baltimore, Md. Feb. 18.

	Bid.	Asked.
COMPANY.		
Atlantic Coal	$	$
Balt. & N. C.		.15
Big Vein Coal		
Conrad Hill		.13
Cons. Coal	.28	.30
Diamond Tunnel		
George's Creek Coal.	1.08	1.10
Lake Chrome		
Maryland & Charlotte		
North State		
Silver Valley	.55	.60

Pittsburg, Pa.

Prices highest and lowest for the week ending Feb. 17:

COMPANY.	H.	L.
Allegheny Gas Co.	$	$
Bridgewater Gas Co.		
Chartiers Val. Gas.	6.00	5.75
Columbia Oil Co.		
Consignee Mining Co.		
Consolidated Gas Co.		
East End Gas Co.		
Fisher Oil Co.		
Forest Oil		
Hazlewood Oil Co.		
Hidalgo Mining Co.	5.00	
La Noria Mining Co.	.30	
Luster Mining Co.	9.33	9.00
Mansfield C. & C. Co.		
Manufacturers Gas Co.	26.00	
Nat. Gas Co. of W. Va.		
N. Y. & Clev. Gas Coal Co.	51.00	
Ohio Valley Gas Co.		
Pennsylvania Gas Co.		
People's Natural Gas Co.	15.00	
People's N. G. & P. Co.	9.00	7.75
Philadelphia Co	15.75	14.88
Pine Run Gas Co.		
Pittsburg Gas Co.		
Red Cloud Mining Co	3.00	
Silverton Mining Co.	2.13	
South Side Gas Co.		
Sterling Silver Mining Co.		
Tuna Oil Co.		
Union Gas Co.		
Washington Oil Co.		
W'moreland & Camb.		
Wheeling Gas Co.	19.50	19 00
W'house E. Light	15.00	14.50
W'house Air Brake Co	110.00	102.00
W'house Brake Co., Ltd	75.00	

St. Louis. Feb. 17.

CLOSING PRICES.	Bid.	Asked.
Adams, Colo.	$1.25	$1.35
American & Nettie, Colo	.95	
Bi-Metallic, Mont.	18.50	18.75
Central Silver	.15	.16¼
Elizabeth, Mont.	.42½	.45
Granite Mountain, Mont.	17.00	18.75
Hope	2.00	2.75
Little Albert	.06	.06½
Montrose Placer, Colo.	.06	
Mickey Breen		.02
Pat Murphy, Colo.	.03	
Small Hopes, Colo.	.92½	
Silver Age	.02	.04
Silver Bell	.30	
Yuma, Ariz.	.06	.10

Helena, Mont.

(Special report by SAMUEL K. DAVIS.)

Prices highest and lowest for week ending Feb. 13, 1892:

	H.	L.
Bald Butte (Mont.)	$2.25	$2.10
California (Castle), Mont.	.25	.20
Champion (Oro Fino), Mont.	.20	.15
Combination(Philipsb'g), Mont.	1.50	1.35
Copper Bell (Cataract), Mont.	.05	.03½
Cumberland (Castle), Mont.	1.50	1.25
Elizabeth (Phillipsburg), Mont.	.51	.47
Florence (Neihart), Mont.		
Fourth of July, Wash.	.20	.15
Glengary (Butte), Mont.	.90	.75
Helena & Victor, Mont.	2.25	2.00
Iron Mountain(Missoula), Mont.	.80	.77
Iron Mountain Ext.	12½	.10
Jersey Blue (Butte)	.15	.12
Jumbo (Castle), Mont.		
Lone Pine Consolidated	2.75	2.50
Mac (Unionville), Mont.	.30	.25
None Such (Unionville), Mont.	.15	.10
Poorman (Cœur d'Alene), Idaho	1.00	.95
Queen of the Hills(Neihart)		
SouthernCross(DeerLodge), Mont	15	.10
Yellowstone (Castle), Mont.	.35	.27

Deadwood. Feb. 13.

	Bid.	Asked.
Bullion		
Caledonia	.65	.70
Calumet	.08	.10
Cambrian	.00½	.00¾
Carthage	.01	.01½
Deadwood Terra	1.95	2.00
De Smet	.25	.30
Double Standard	.10¼	.11
Elk Mountain	.00½	.01
Emmett	.01	.02
Equitable	.00¾	.01
Florence	.02¼	.02¼
Golden Reward		.70
General Merritt	.08	.10
Harmony	.06	.08
Hester A	.02	.03
Homestake	12 00	12.00
Hermit	.01½	.02½
Iron Hill		.25
Isadorah	.20	.25
Maggie	.07	.10
Monitor	.08	.10
Rainbow	.01½	.02½
Retriever	.10	.11
Ross-Hannibal		.07
Ruby Bell	.07	.10
Ruby Wilkes	.01	.02
Seabury-Calkins		.03
Silver Queen		.04
Stewart	.06	.10
Tornado	.12	.15
Troy	.01	.01½
Uncle Sam	.05	.10

Trust Receipts.

Sales at the New York Stock Exchange for week ending Feb. 19:

	Sales.	Price H.	Price L.
American Cotton Oil			
National Lead	120	20½	20¼

Trust Stocks.

Special report by C. I. Hudson & Co., members New York Stock Exchange. The following are the closing quotations Feb 19:

CERTIFICATES.		
Am. Cotton Oil, Com	$34¼@$35	
" " " Pfd	66 @ 66¼	
Am. Sugar Refineries, Com	82½@ 83	
" " " Pfd	92½@ 93	
Distillers' & Cattle Feeders'	49 @ 49¾	
Linseed Oil	31 @ 32	
National Cordage, Com	94⅞@ 95⅛	
" " Pfd	108 @109	
National Lead Co.	35 @ 35¾	
" " " Pfd	84 @ 84½	
" " " Trust	20¼@ 20¾	
" " Certificates	20 @20¾	
Standard Oil	171 @172	
W. U. Beef Co.	11½@ 13	

Foreign Quotations.

London.	Highest.	Lowest.
Amador, Cal.	5s.	4s. 6d.
American Belle, Colo.	3s. 9d.	3s. 3d.
Appalachian, N. C.	1d.	
Can. Phosphate, Can.	10s.	5s.
Colorado, Colo.	1s. 9d.	1s. 3d.
Cons. Esmeralda, Nev.	1s. 3d.	9d.
De Lamar, Idaho	25s.	24s.
Dickens Custer, Idaho.	1s.	6d.
East Arevaio, Idaho.		
Elkhorn, Mont.	£1½	£1⅜
Elmore, Idaho	9d.	6d.
Emma, Utah	1s. 3d.	9d.
Flagstaff, Utah	4s. 6d.	4s.
Garfield, Nev	6d.	3d.
Golden Feather	11s.	10s.
Golden Gate, Cal.	4s. 9d.	4s. 3d.
Golden Leaf, Mont.	5s. 3d.	4s. 9d.
Golden River, Cal.		
Jay Hawk, Mont.	9s.	8s. 6d.
Josepbine, Cal.		
Kohinoor, Colo.	1s. 3d.	9d.
La Luz, Mex.	1s. 9d.	1s. 3d.
La Plata, Colo.	1s. 3d.	1s.
La Valera, Mex.	2s. 9d.	2s. 3d.
Maid of Erin, Colo.	£1⅜	£1¼
Mammoth Gold, Ariz.	2s.	1s. 6d.
Montana, Mont.	9s. 3d.	8s. 9d.
New California, Colo.	1s. 6d.	1s.
New Consolidated	6d.	3d.
New Eberhardt, Nev.	9d.	6d.
New Gold Hill, N. C.	1s.	6d.
New Guston, Colo.	3s.	2½s.
New Hoover Hill, N.C.	9d.	3d.
New Russell, N. C.	6d.	3d.
New Viola, Idaho	9d.	6d.
Old Lout, Colo.	£3-16	£1-16
Parker Gold, N. C.	9d.	3d.
Pittsburg Cons., Nev	2s. 6d.	2s.
Richmond Con., Nev.	15s.	10s.
Ruby, Nev.	6d.	3d.
Sam Christian, N. C.	1s. 3d.	9d.
Sierra Buttes, Cal.	7s. 6d.	5s.
" Piumas Eur., Cal.	£9-16	£7-16
United Mexican, Mex.	3s. 6d.	2s. 6d.
U. S. Placer, Colo.		
West Argentine, Colo.	4½d.	1½d.
Yankee Girl, Colo.	14s. 6d.	14s.

Paris.	Francs.
East Oregon, Ore.	2.50
Forest Hill Divide, Cal.	60.00
Golden River, Cal.	130.00
" " parts	30.00
Laurium	770.00
Lexington, Mont	127.00
" parts	3.75
Nickel	945.00
Rio Tinto, Spain	428.75
" " oblig.	520.00
" " "	512.50
Tharsis, Spain	141.25
Vieille-Montagne	550.00

CURRENT PRICES.

These quotations are for wholesale lots in New York unless otherwise specified.

Acid—Acetic, No. 8, pure, 1,040, ℔ lb. .05
Commercial, in bbls. and cbys. 01¾@.02¼
Carbonic, liquefied, ℔ lb. .30
Chromic, chem. pure .90
for batteries .40
Hydrobromic, dilute, U. S. P. .25
Hydrocyanic, U. S. P. .45
Hydrofluoric .20
Alcohol—95%, ℔ gall. $2.30@$2.40
Absolute $3.80
Ammoniated $2.80
Alum—Lump, ℔ lb. .016@.017
Ground, ℔ lb. .0165@.0175
Powdered .04½@.05
Lump ℔ ton, Liverpool £5
Aluminum—℔ lb. .50
Aluminum Chloride—Pure, ℔ lb. $1.25
Amalgamating solution, ℔ lb. .60
Sulphate .01¾@.03
Ammonia—Sul., in bbl. lots, ℔ lb 03 1-16
Carbonate, ℔ lb., English and German .07¾
Muriate, white, in bbls., ℔ lb. .08½
Aqua Ammonia—(in cbys) 18° ℔ lb .03¾
20°, ℔ lb. .04¾
26°, ℔ lb. .07½
Antimony—Oxymur, ℔ lb. .04¾
Regulus, ℔ ton, London £47@£49
Argols—Red, powdered, ℔ lb. .15
Arsenic—White, powdered ℔ lb. .02¾@.03
Red ℔ lb. .05@.055
Yellow .08@.09
White at Plymouth, ℔ ton £12 2 6
Asbestos—Canadian, ℔ ton $50@$300
Italian, ℔ ton, c. i. f, L'pool £18@£60
Ashes—Pot, 1st sorts, ℔ lb. .04¾@.05
Pearl .06@.06¼
Asphaltum—
Prime Cuban, ℔ lb. .04@.05½
Hard Cuban, ℔ ton $28.00
Trinidad, refined, ℔ ton $30.00
Egyptian, ℔ lb. .08@.09
Californian, at mine, ℔ ton $12.00
at San Francisco, ℔ ton $15.00
Barium—Carbonate, pure, ℔ lb. .45
Carbonate, commercial, ℔ lb. .05@.10
Chlorate, crystal, ℔ lb. .75
Chloride, commercial, ℔ lb. .05@.10
pure, ℔ lb. .16
Iodide, ℔ oz. .40
Nitrate, powdered, ℔ lb. .15
Sulph., Am. prime white, ℔ ton $21@$23
Sulph., foreign, floated, ℔ ton $21.50@$23.50
Sulph., off color, ℔ ton $11.50@$14.00
Carb., lump, f. o. b. L'pool, ℔ ton £6
No. 1, Casks, Runcorn, " " £4 10 0
No. 2, bags, Runcorn, " " £3 15 0
Bauxite—℔ ton $10.00
Bichromate of Potash—Scotch, ℔ lb. .10@.12
American, ℔ lb. .09½@.10
Bichromate of Soda—℔ lb. .08½@.11½
Borax—Refined, ℔ lb., in car lots .08¾@.09
San Francisco .08¾@.09
Concentrated, in car lots .08@.08¼
Refined, Liverpool ℔ ton £29
Bromine—℔ lb. .23@.25
Cadmium Minion—℔ lb. $2.00
Cadmium Iodide—℔ lb. $5.50
Chalk—℔ ton $1.75@$2.00
Precipitated, ℔ lb. .05@.06
China Clay—English, ℔ ton. $13@$18.00
Southern, ℔ ton $13.50
Chlorine Water—℔ lb. .10
Chrome Yellow—℔ lb. .10@.25
Chrome Iron Ore—℔ ton, San Francisco $10.00
Chromalum—Pure, ℔ lb. .40
Commercial, ℔ lb. .12
Cobalt—Oxide, ℔ lb. $2.50@$2.90
Copper—Sulph. English Wks. ton £20@£21
Vitriol (blue), ordinary. .03¾@.04
" extra .01½
Nitrate, ℔ lb. .40
Copperas—Common, ℔ 100 lbs. .85
Best, ℔ 100 lbs. .85@$1.00
Liverpool, ℔ ton, in casks £2
Corundum—Powdered, ℔ lb. .01½@.09
Flour, ℔ lb. .03
Cryolite—Powdered, ℔ lb., bbl. lots. .07
Emery—Grain, ℔ lb. (℔ kg.) .01½@.05
Flour, ℔ lb. .02½@.10
Epsom Salt—℔ lb. .01¼
Feldspar—Ground, ℔ ton $11.00
Crude $5.25
Fluorspar—Powdered, No. 1, ℔ ton. $30.00
French Chalk—
Fuller's Earth—Lump, ℔ bbl. .90@.95
Glauber's Salt—in bbls., ℔ lb. .0075
Glass—Ground, ℔ lb. .10
Gold—Chloride, pure, crystals, ℔ oz. $12.00
pure, 15 gr., c. v., ℔ doz. $5.40
liquid, 15 gr., g. s. v., ℔ doz $5.50
Chloride and sodium, ℔ oz $6.00
15 gr., c. v., ℔ doz. $2.88
Oxide, ℔ oz. $27.25
Gypsum—Calcined, ℔ bbl. $1.25@$1.50
Land Plaster
Iodine—Resublimed $3.35@$4.00
Iron—Nitrate, 40°, ℔ lb. .01¼
47°, ℔ lb. .02½
Kaolin—*See China Clay.*
Kieserite—℔ ton $9@$10
Lead—Red, ℔ lb. .06¾@.07¼
White, American, in oil, ℔ lb. .03½@.07½
White, English, ℔ lb., in oil .08½@.08¾
Acetate, or sugar of, white .12@.13
Granulated
Nitrate .09@.10
Lime Acetate—Am. Brown, $1.00@$1.05
Gray, $1.75@$1.87½
Litharge—Powdered, ℔ lb. .06½@.07½
English flake, ℔ lb. .06@.09½
Magnesite—Crude, ℔ ton of 1,015 kilos $14 75
Calcined, ℔ ton of 1,015 kilos $23.75
Brick, ℔ ton of 1,015 kilos $50.00
Manganese—Ore, per unit .23@.28
Oxide, ground, per lb. .02½@.06¼
Mercuric Chloride—(*Corrosive Sublimate*) ℔ lb. .84
Powdered, ℔ lb. .94
Marble Dust—℔ bbl. $1.25
Metallic Paint—Brown ℔ ton. $20@$25
Red $20@$25
Mineral Wool—Ordinary slag .01½
Ordinary rock .02½
Ground, ℔ ton
Mica—In sheets according to size.
1st quality, ℔ lb. .25@$6.00
Naphtha—Black
Nitre Cake—℔ ton $10.00
Ochre—Rochelle, ℔ lb. $1.50@$1.55
Washed Nat Oxf'rd, Lump, ℔ lb. .06¾@.06¾
Washed Nat Oxf'rd, Powder, ℔ lb. .07@.07½
Golden, ℔ lb. .03¾@.04
Domestic, ℔ lb. .03¾@.01½
Oils, Mineral—
Cylinder, light filtered, ℔ gal. .15@.20
Dark filtered, ℔ gal. .12@.15
Extra cold test, ℔ gal. .18@.20
Dark steam refined, ℔ gal. .16@.18
Phosphorus—℔ lb. .55@.60
Precip., red, ℔ lb. .88
white, ℔ lb. .93
Plumbago—Ceylon, ℔ lb. .04@.05
American, ℔ lb. .03@.07
Potassium—Cyanide, ℔ lb., C. P. .70
67%, ℔ lb. .45
50%, ℔ lb. .40
Bromide, domestic, ℔ lb. .23@.25
Chlorate, English, ℔ lb. .10½@.11
Chlorate, powdered, English, ℔ lb. .10½@.10¾
Carbonate, ℔ lb., by casks, 82% .04½@.05¾
Caustic, ℔ lb., pure slick .06¾@.07½
Iodide, ℔ lb. $2.58@$2.63
Nitrate, refined, ℔ lb. .06@.08
Bichromate, ℔ lb. .095@.10
Yellow Prussiate, ℔ lb. .23½@.24¼
Red Prussiate, ℔ lb. .40@.45
Pumice Stone—Select lumps, lb. .04@.12
Original cks., ℔ lb. .01½@.02
Powdered, pure, ℔ lb. .03¾@.02¼
Pyrites—Non-cupreous, p. units. .12@.15
Quartz—Ground, ℔ ton $12.50@$17.50
Rotten Stone—Powdered, ℔ lb. .03¾
Lump, ℔ lb. .06@.10
Original cks, ℔ lb. .04½@.05½
Rubbing stone, ℔ lb .07
Sal Ammoniac—lump, in bbls., ℔ lb. .80½
Salt—Liverpool, ground, ℔ sack .70
Domestic, fine, ℔ ton $7@$7.50
Common, fine, ℔ ton $4.50@$5
Turk's Island, ℔ bush .26@.28
Salt Cake—℔ ton $10.00
Saltpeter—Crude, ℔ lb. .03¾@.04½
Soapstone—
Sodium—Prussiate, ℔ lb .17½@.18
Phosphate, ℔ lb. .07@.18
Stannate, ℔ lb. .08@.15
Tungstate, ℔ lb. .02¾
Hyposulphite, ℔ lb., in casks. .0235@.0245
Strontium—Nitrate, ℔ lb. .09½@.10
Sulphur—Roll, ℔ lb. .02½
Flour, ℔ lb. .02¾
Sylvinit, 23@27%, S.O.P., per unit. 40@42½
Talc—Ground French, ℔ lb. .01¼@.01½
Terra Alba—French, ℔ lb. .90@$1.00
English, ℔ lb. .50@.60
American, No. 1, ℔ lb. 1.00
American, No. 2, ℔ lb. .40@.50
Tin—Crystals, in kegs or bbls. .14@.51
feathered or flossed. .25
Muriate, single .07
Double or strong, 51° B. .09
Oxy, or nitro .10
Tin Plates, ℔ box, Swansea, best charcoal .18@.19
best coke .15@.16
Vermillion—Imp. English, ℔ lb. .90@.95
Am. quicksilver, bulk .65
Am. quicksilver, bags .68 @ .72
Chinese .95 @$1.00
Trieste .90 @ .95
American .11½@ .13
Zinc White—Am., Dry, ℔ lb .04½@ .05
Antwerp, Red Seal, ℔ lb. .07½
Paris, Red Seal, ℔ lb. .07½@.07¾
Muriate solution .06
Sulphate crystals, in bbls., ℔ lb. .03¾

THE RARER METALS.

Arsenic—(Metallic), per lb. .40
Barium—(Metallic), per gram $1.00
Bismuth—(Metallic), per lb. $2.40
Cadmium—(Metallic), per lb. $1.00
Calcium—(Metallic), per gram $10.00
Cerium—(Metallic), per gram $7.50
Chromium—(Metallic), per gram $1.00
Cobalt—(Metallic), per lb. $6.00
Didymium—(Metallic), per gram $9.00
Erbium—(Metallic), per gram $7.50
Gallium—(Metallic), per gram $140.00
Glucinum—(Metallic), per gram $12.00
Indium—(Metallic), per gram $9.00
Iridium—(Metallic), per oz. $7.00
Lanthanum—(Metallic), per gr. $10.00
Lithium—(Metallic), per gram $10.00
Magnesium—(Powdered), per lb. $4.00
Manganese—(Metallic), per lb. $1.10
Ohem. pure, per oz. $10.00
Molybdenum—(Metallic), per gm .50
Niobium—(Metallic), per gram $5.00
Osmium—(Metallic), per oz. $65.00
Palladium—(Metallic), per oz. $35.00
Platinum—(Metallic), per oz., $16.50@$20.00
Potassium—(Metallic), per lb. $28.00
Rhodium—(Metallic), per gram $5.00
Ruthenium—(Metallic), per gm. $5.50
Rubidium—(Metallic), per gram $2.00
Selenium—(Metallic), per oz. $1.80
Sodium—(Metallic), per lb. $2.50
Strontium—(Metallic), per gm .60
Tantalum (Metallic), per gram $9.00
Tellurium—(Metallic), per lb. $5.00
Thallium—(Metallic), per gram .20
Titanium—(Metallic), per gram $2.20
Thorium—(Metallic), per gram $47.00
Tungsten—(Metallic), per lb. $1.00
Uranium—(Oxide), per lb. $5.00
Metallic, per gm .20
Vanadium—(Metallic), per gm $22.00
Yttrium—(Metallic), per gram $9.00
Zirconium—(Metallic), per oz. $65.00