

THE ENGINEERING AND MINING JOURNAL



Entered at the Post-Office of New York, N. Y., as Second-Class Matter.

VOL. XXXVII. APRIL 19, 1884. No. 16.

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P.O. Box 1833. 27 Park Place, New York.

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MR. J. F. LEWIS, who has been for a number of years connected with the Quinnimont furnaces and mines, West Virginia, has severed his connection with the company, and may now be addressed either at No. 401 East Franklin street, Richmond, Va., or care of Rand Drill Company, No. 240 Broadway, New York City.

A MOVEMENT is on foot to organize the American Institute of Electrical Engineers. A meeting is to be held on Tuesday, May 12th, at a place to be announced hereafter. Those interested may obtain particulars by addressing Mr. N. S. KEITH, No. 237 Broadway, New York City.

THE Silesian zinc-works in 1883 produced 70,184 metric tons of spelter and marketed 69,425 tons, against 69,146 and 62,165 tons respectively in 1882, thus showing that stocks have accumulated but little. In 1883, 449,906 tons of calamine and 124,807 tons of blende were mined, compared with 447,024 tons of the former and 120,300 tons of the latter in 1882. In

1883, however, only 395,227 tons of calamine and 124,807 tons of blende were marketed, as compared with 438,832 tons of calamine and 98,248 tons of blende in 1882.

SPAIN goes on steadily increasing its output of lead. In 1881, the production was 110,875 metric tons; in 1882, it went up to 115,368 tons; and in 1883, reached the aggregate of 126,889 tons. Although the proportion of the lead refined and desilverized in Spain is steadily growing in importance, it is certain that the bulk of it goes out in the form of base bullion, to be worked principally in English desilverizing establishments. It is safe, therefore, to make a deduction of at least three per cent from the above totals for silver contents and loss in refining, which would make the figures 107,550 tons for 1881, 111,900 tons for 1882, and 123,000 tons of refined lead. So Spain is second best, after all, the United States occupying the first rank in the production of lead.

THE *Minero Mejicano* republishes an article from a Hidalgo paper, in which there are given the results of a few trial runs at a neighboring reduction-works with the Kroehnke process. This would be very well in its way, if the person conducting them, a certain YBBECKEN, did not claim that he had made a contract with the Chilean government, giving him the right to introduce the process in Mexico, in which it was distinctly stipulated that he must keep the method a secret. Since the Kroehnke process has been minutely described over and over again, and a very large model was exhibited at the Centennial Exhibition in 1876, it looks very much as though YBBECKEN were trying to take an unfair advantage of the ignorance of some Mexican metallurgists. The files of any of the leading American, French, or German mining journals will tell all about the secret.

In the beginning of February, a highly interesting contest took place before the Joint Standing Committee on Manufactures of the Massachusetts Legislature, on an amendment to strike out the following words in the fourteenth section of the sixty-first chapter of the Public Statutes, "or more than ten per cent of carbonic oxide." The law, as it now stands with the words quoted, practically prevents the manufacture of water-gas in the State, and the hearing in question was a pitched battle between the water-gas and coal-gas interests, hinging mainly on the point whether or not carbonic oxide is dangerous to public health, in an odorous gas containing from 30 to 50 per cent of carbonic oxide. The testimony is very voluminous, a large number of our best known chemists having been arrayed against each other. We shall review it at length in a future issue, and have referred to the subject now only to submit some news concerning more recent developments in the matter, which we owe to the kindness of Mr. GEORGE W. GRAEFF, Jr., of Philadelphia, managing editor of the *Progressive Age and Water-Gas Journal*, a bright newspaper published in that city. The Committee on Manufactures has reported to the House in favor of the amendment striking out the obnoxious clause, and that body, after almost unanimously passing the bill to third reading, has carried it through with no amendments. It must now go to the Senate, whose consent it is to be hoped it will obtain.

MR. JOHN H. JONES has, much earlier than usual, published his statement showing the general distribution of the production of anthracite coal. As compared with the preceding year, the figures stand as follows:

	1883.		1882.	
	Tons.	Per cent.	Tons.	Per cent.
To Pennsylvania, New York, and New Jersey.....	21,830,504	68.7	19,957,789	68.5
To New England States.....	5,387,700	16.9	5,064,775	17.4
To Western States.....	2,537,174	8.0	2,213,107	7.6
To Southern States, including Delaware, Maryland, and the District of Columbia.....	1,284,093	4.0	1,168,730	4.0
To Pacific coast.....	24,635	0.1	49,066	0.1
To Dominion of Canada.....	690,498	2.2	616,875	2.2
To foreign ports.....	38,423	0.1	49,735	0.2
Total.....	31,793,027	100.0	29,120,076	100.0

A glance at the percentages that we have calculated from Mr. JONES'S figures will be sufficient to illustrate how comparatively insignificant have been the changes in the distribution of anthracite coal. The most astonishing fact to those who have been told over and over again what wonderful strides the consumption of anthracite has made in the West will be that, after all, there was only an increase of a little more than 300,000 tons. It is true, on the other hand, that much of the agitation on the subject was due to the discussion of the very extensive preparations made for carrying, handling, and distributing largely increased quantities of anthracite, and this has led to some extent to a discounting of the future. The facilities now provided should allow of putting the fuel into the hands of consumers at better figures, and it would be a decidedly good policy to aid its introduction by keeping the cost as low as is consistent with fair profits to producers, carriers, middlemen, and dealers. Even the best article—and that no one will deny that anthracite undoubtedly is for domestic purposes—can only be brought into use gradually. We are not therefore inclined to take so

sanguine a view of the development of the Western anthracite trade, so far as the immediate future is concerned, as most of those in the trade seem to hold. The utmost that the West can be counted upon to take this year may be estimated at 3,000,000 tons, while the East is likely to fall back to 5,000,000 because of the raid of the bituminous coals upon the manufacturing business, and the general falling off in the consumption in that quarter.

The course of the anthracite coal trade during the past few months has proved that we were correct when we insisted that it could not escape the influences of the general depression. It has been marked by the same hesitating policy on the part of the companies that appears to have become characteristic of them. They decided, some time ago, to suspend mining for a whole week and on Thursday had another meeting, at which it was decided to suspend mining entirely during the first week of May, and three days during a later week in the same month. It seems that they have at last fully realized the gravity of the situation, and that fact and the action at last taken give assurance that the production will be kept for the present within the limits of the needs of the country.

The suggestion has recently been made that the most equitable basis for the reduction of output on the part of the anthracite producers would be an allotment of percentages. This, it is understood, is the outgrowth of a feeling of dissatisfaction with the manner in which some of the companies have increased their output. We have therefore thought it interesting to trace their growth during the past four years, computing the percentages, to enable a clearer insight to be obtained more rapidly :

	1880.	1881.	1882.	1883.
Philadelphia & Reading RR.	5,933,923	6,940,263	7,000,113	12,232,402
Central Railroad of New Jersey	3,470,141	4,085,423	4,211,052	
Lehigh Valley Railroad	4,394,533	5,721,869	5,933,739	6,271,773
Delaware, Lack. & Western RR.	3,550,348	4,348,968	4,638,717	5,079,123
Delaware & Hudson Canal Co.	2,674,705	3,211,496	3,203,168	3,512,972
Pennsylvania Railroad	1,864,032	2,211,363	2,332,973	2,773,419
Pennsylvania Coal Company	1,138,466	1,475,380	1,469,820	1,541,145
N. Y., Lake Erie & Western RR.	411,095	465,230	330,510	382,194
	23,437,242	28,500,016	29,120,096	31,793,028

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

	1880.	1881.	1882.	1883.
Philadelphia & Reading Railroad	25.3	24.3	24.0	38.5
Central Railroad of New Jersey	15.0	14.3	14.5	38.5
Lehigh Valley Railroad	18.3	20.0	20.4	19.8
Delaware, Lack. & Western Railroad	15.1	15.4	15.9	15.0
Delaware & Hudson Canal Company	11.5	11.3	11.0	11.0
Pennsylvania Railroad	8.0	7.8	8.0	8.7
Pennsylvania Coal Company	5.0	5.2	5.0	4.9
N. Y., Lake Erie & Western RR.	1.8	1.7	1.2	1.2

It will be seen, therefore, that, in the years 1881, 1882, and 1883, the fluctuations were very small only, and that there is substantially a striking uniformity. The figures for the first three months of this year, however, show a striking variation from what might almost be called the standard.

	First quarter.	Second quarter.	Percentages.	Average per cent. 1881 to 1883.
Philadelphia & Reading Railroad	1,957,442	2,428,016	38.0	38.5
Central Railroad of New Jersey	1,342,028	1,151,254	21.0	20.7
Lehigh Valley Railroad	1,018,019	994,794	15.9	15.7
Delaware, Lack. & Western RR.	710,388	608,445	11.1	11.1
Delaware & Hudson Canal Company	515,896	741,444	8.1	8.1
Pennsylvania Railroad	298,897	246,645	4.7	5.0
Pennsylvania Coal Company	76,010	73,698	1.2	1.3
N. Y., Lake Erie & Western RR.				

This shows that the Pennsylvania Railroad, which maintains an independent attitude, has been forging ahead considerably, followed by the Delaware, Lackawanna & Western Company : all the others have relatively fallen off, the Philadelphia & Reading Company in the most serious manner. It will be particularly noticed that this movement is confined to the present year. In 1883, as our percentages of the first quarter show, it varied but little from the general average of the years 1881, 1882, and 1883. It can hardly be expected that it is viewed with complacency by the officers of the other companies.

THE VITIATION OF AIR BY DIFFERENT ILLUMINANTS.

The following table shows the oxygen consumed, the carbonic acid produced, and the air vitiated by the combustion of certain bodies burnt so as to give the light of twelve standard sperm candles, each candle burning at the rate of 120 grains an hour :

	Cubic feet of oxygen consumed.	Cubic feet of air consumed.	Cubic feet of carbonic acid produced.	Cubic feet of air vitiated.	Heat produced in lbs. of water raised 10° F.
Cannel gas	3.30	16.50	2.01	217.50	195.0
Common gas	5.45	17.25	3.21	348.25	278.6
Sperm oil	4.75	23.75	3.33	356.75	233.5
Benzole	4.45	22.30	3.54	376.30	232.6
Paraffine	4.81	24.05	4.50	484.05	361.9
Camphene	4.85	23.25	4.77	510.25	325.1
Sperm candles	8.41	42.05	5.90	632.25	351.7
Wax	8.62	44.10	6.25	669.10	374.7
Stearic	12.00	60.00	8.73	933.00	505.4
Tallow	none	none	none	none	13.8
Electric light					

NEW PUBLICATIONS.

ABSTRACT OF REPORT ON THE SILVER-LEAD DEPOSITS OF EUREKA, NEVADA. By JOSEPH STORY CURTIS. (Extract from Report of the Director of the U. S. Geological Survey, 1882-83.) Washington. 1884. 4to, 28 pages, with two Plates.

Mr. Curtis was detailed by Mr. George F. Becker, the United States Geologist in charge of the division including Eureka, to study the ore-deposits of that district ; and this is the abstract of his observations and conclusions. Taken together with the study of the general geology of the district, recently published by Mr. Arnold Hague, it constitutes an excellent summary of the facts thus far ascertained concerning this important and interesting group of ore-deposits.

Mr. Curtis distinguishes several belts of "shale," and several belts of "mineral" or metalliferous limestone, in the rocks of Prospect Mountain and Ruby Hill. He has also determined the existence and position of numerous faults and fissures, which explain to some extent the irregular shape and relations of the limestone "zones." These details could not have been developed without a prolonged and minute examination, such as has now been made. They tend not to simplify the problem of the structure and history of these deposits, but rather to show that it is more complicated than has been supposed. On the other hand, the main features of the generally accepted theory as to the Eureka deposits, particularly those of Ruby Hill, are confirmed. Thus Mr. Curtis says :

"The main formations of Ruby Hill are an underlying mass of quartzite, a broad zone of mineral limestone, and an overlying belt of shale, all of which have been tilted so that they stand at an angle of about 40 degrees, this angle being somewhat greater in the upper than in the lower workings of the mines.

"The central surface between the limestone and shale, like that between the quartzite and limestone, is very irregular, but there seems to be little similarity between them, owing to the presence of a fault. This fault has had a very important bearing upon the structure of the mineral zone, as well as upon the ore-deposits themselves."

After tracing the course of this fault (which, he says, "is to be looked upon as the main fissure") as it is encountered in the underground workings, striking from the American shaft a little west of north, and then northwest (thus, in going northward, diverging from the quartzite contact, and giving a wider limestone zone between them), and dipping over 70 degrees westerly (thus approaching, in depth, the quartzite), Mr. Curtis continues :

"At the time of the uplift which produced this fault, another secondary fissure was formed along the contact of the quartzite and limestone, giving rise to the formation of a limestone wedge between the quartzite on the one hand and the main fissure on the other.

"Up to the present time, all the ore of any importance taken from Ruby Hill has been extracted from the country southwest of the fissure, between it and the quartzite. The limestone northeast of the fissure, or the 'front limestone,' as it is called, although it has been considerably prospected, has yielded no remunerative ore."

Mr. Curtis's limestone wedge is the "limestone zone" of the celebrated Eureka case ; the quartzite is the foot-wall, and the fault or "main fissure," as Mr. Curtis calls it, is the hanging-wall, of that zone. We surmise that the term "main fissure" is not meant to carry the notion that this fissure (now everywhere filled with rhyolite or clay) was the main channel of the metalliferous solutions. The crushed and fissured condition of the limestone throughout the limestone zone or "wedge" renders both impossible and unnecessary the designation of any one conduit, through which it may have received its metalliferous contents.

We copy in full Mr. Curtis's interesting speculation as to the source of the ore :

"One of the most important inquiries connected with the geology of the Eureka District relates to the source of ore ; for a successful and detailed solution of this problem would afford valuable information in the search for further deposits, besides possessing great scientific interest. It can not be claimed that a complete solution has been found, but it is believed that the evidence points clearly in one direction, and that the probabilities indicated are not without practical value.

"Had the ore been deposited simultaneously with the marine beds, either in its present form or in regular strata, and afterward been brought into its present position by the upheaval of the inclosing rocks, its relations to the latter would have been greatly modified, and it would have been found mingled with masses of shattered limestone. A few cases occur, indeed, in which ore and limestone boulders are mixed together, but these are rare and are due to local causes which have come into play since the general upheaval.

"It is conceivable that the ore should have been deposited in small particles with the limestone and afterward segregated into nearly isolated bodies, either by chemical or mechanical agencies ; but a thorough examination of all the varied kinds of limestone composing the metalliferous zone of Ruby Hill at the present time fails to give any evidence which would sustain this supposition. It is hardly possible to imagine a segregation, either chemical or mechanical, so complete that scarcely more than a trace of the precious metals, no lead (as far as any tests which have been applied could detect it), and but a small percentage of iron were retained in the least metamorphosed rock of the limestone zone. Yet such must have been the case if this theory were true. Numerous and careful assays have revealed the fact that the least metamorphosed limestone is that which carries the smallest percentage of the precious metals.

"The fact must not be lost sight of that iron oxide forms the gangue of the ore-bodies, and that nearly one half of the ore is composed of this mineral, the other portion being made up of lead, arsenic, sulphur, zinc, carbonic acid, silica, etc. The first four of these substances do not seem to occur in the least metamorphosed limestone, and only appear in the more altered limestone in small bunches and seams in the neighborhood of ore-bodies. Although the periods at which these different minerals were brought into their present position may have been separate and distinct (a point as to which there is very little evidence one way or the other), it is improbable that some of them should have been segregated from the country-rock and others should either have been washed into the ore-chambers from above or brought up in solutions from below. There is a large block of ground on the sixth level of the Richmond that is distinctly stratified, though the strata are much bent and twisted. If the limestone were the source of the ore, it should be possible to obtain evidence of the fact from this comparatively fresh rock, which would contain a larger percentage of metals than the material from which the ore had been extracted. The fact is, however, that it contains only a very minute quantity of the metals. The highly altered limestone, on the other hand, contains notable quantities of the metals, and these relations seem to show conclusively that the metallic contents of the limestone are not an original component, but an impregnation from the ore-bodies. In the Richmond mine, careful assays were made of the limestone on two lines leading up to a large ore-body. Although these assays do not show a uniform increase

of silver as the ore-bodies are approached, they prove that the limestone in the neighborhood of the ore is richer than that at some distance from it. The want of regularity in this increase is owing to the fact that there is no uniformity in the character of the limestone. As has been explained before, the limestone is far from uniform, and many different varieties are found within a short distance. Nor has it been possible to fix on any particular kind of limestone which is to be regarded as the richest or poorest, its contents in the precious metals bearing no relations to its physical properties.

"Was the ore segregated from the country-rock on either side of the mineral zone? Most decidedly not from the shale. That rock is nowhere found to carry more than a trace of silver or gold. That the ore came from the quartzite is also unlikely, although silver, gold, and lead have all been found in it. Ores were never obtained from this rock in paying quantities, and occurred chiefly in small seams and fissures, though the mass everywhere contains faint traces of gold and silver. It does not seem probable that the large bodies of ore found in the Ruby Hill mines came from the quartzite, at least by lateral segregation or infiltration. It has been explained that there has been considerable motion of the quartzite upward against the limestone along a fissure that contains a great deal of clay. This fissure, as has been shown, existed before the ore-bodies were formed, so that all the ore, if it was derived from the quartzite, must have passed across this fissure and clay. It seems incredible that, if this were the case, the ore should not have been concentrated on the foot-wall side of this fissure, and should have traversed the clay, and in some cases hundreds of feet of limestone, to deposit itself near the northwest fissure.

"The most probable supposition is, that the ore came from below. It is impossible to suppose that the ore was introduced from above; for none of the rocks that may have covered the present surface contain any heavy metals. In the first place, as it was not washed in from the surface, was not deposited either in masses or particles equally distributed through the country-rock and afterward segregated into bodies, and was not secreted either from the external limestone and shale or from the quartzite, there is but one source from which it could have been derived, namely, from below. It has been remarked that the ore-bodies are almost invariably connected with fissures and also with each other. The character of these fissures and their connection with caves and ore-chambers seem to prove that they were the channels through which the ore was brought into its present position. In all probability, it entered in the form of solutions brought about by the solfataric action consequent upon the eruption of rhyolite. From exactly what source the solutions derived the metals they contain can not be determined with absolute certainty; but it is likely that water coming in contact with the rocks heated by volcanic action decomposed them to a considerable extent, and dissolved out metals which were afterward precipitated in the upper and cooler portion of the ground, where an opportunity was afforded for free circulation and precipitation. It must be remembered that the dissolving power of these waters was immeasurably increased by heat and pressure. That many of the channels through which these solutions passed should at present show but few signs of ore is not strange, as solutions flowing quickly through crevices would not deposit anything, and would be more likely to wear away the rock itself than leave a precipitate. Many of the original channels have no doubt been closed by the pressure of the rock in which they existed. In the Eureka and other mines south of the compromise line, these channels were for the most part connected with the fissure on the quartzite down to the level at which the fissures met. In the Richmond, no connection has as yet been found between the two prominent ore-channels, or between these and the two main fissures between which they lie."

These remarks are specially interesting at the present time, on account of the tendency among experts to look with favor upon the lateral secretion theory of Professor Sandberger. That theory finds no support in Mr. Curtis's observations. Nor, indeed, do we recall any facts which favor its application to lead-bearing deposits in limestone, though Wallace, writing on the English deposits of this character, holds the limestone to be the source of the lead ores. But Wallace, to answer the objection that lead is not found in the limestone, propounds the startling suggestion that the lead is there, in a form not detected by chemical analysis! We presume nobody else entertains this wild notion. At the present stage of the discussion, it may be assumed that the lateral secretion theory, however plausibly established for single cases, is not universally applicable. In Emmons's Leadville report, the overlying and intercalated porphyry is indicated as the original matrix of the metalliferous minerals. Here, at Eureka, no such matrix has been shown, thus far, to exist.

On the subject of the future of Ruby Hill, Mr. Curtis says:

"The workings in the mines of Ruby Hill have at present reached a depth of over 1200 feet, the deepest point being the bottom of the Richmond shaft. The lowest workings of the Eureka are 200 feet higher than the bottom of this shaft. From the lower workings of the latter mine, up 200 feet, the ground has been flooded for several years. The water rises 150 feet in the Richmond shaft, but remains at that point. From this, it will be seen that there is a difference in water-level of 250 feet between the two mines. The surplus water from the twelfth level of the Eureka flows down a winze to the Richmond ninth, 70 feet below, and finally reaches a permanent level in another winze 180 feet deeper. In the Richmond mine, no ore has been found below the ninth level, 900 feet from the surface, so that it can not be determined with certainty what its mineralogical character may be below the water-level. In the Eureka mine, however, bodies of sulphurets have been found on the twelfth level, so that it is but reasonable to suppose that a change has begun to take place in the nature of the ore. That such a change should occur at the water-level is to be expected. It is probable, however, that this change is merely a transition from an oxidized to a sulphuret state. The fact that the water from the Eureka can be said to disappear in the lower levels of the Richmond proves that there are large openings below, and that the broken character of the country continues under the present workings. Although this is not a positive sign of the existence of ore, yet it is evidence of the similarity of the structure of this ground to that which contained ore-bodies above.

"The limestone in the lower levels of the Eureka below the lower belt of shale on the northeast side of the fissure is beginning to widen out. This limestone corresponds to the ore-bearing limestone above, and there seems to be no reason why it should not offer favorable conditions for the deposition of ore. Nevertheless, it is by no means a certainty that ore exists in the deeper portion of this limestone, and proof of its presence can only be obtained by actual exploration.

"That the various companies owning these mines are fully justified, in view of the former enormous production and the probabilities of finding ore, in prosecuting a diligent although expensive search at this depth, seems to be beyond question."

The whole of this "abstract" is well worth reading. Being an abstract, it scarcely permits further condensation, and our extracts and comments fail to do it justice. But we have, we trust, given enough to show its general nature and value. It is a highly praiseworthy essay, and adds another to the list of interesting and suggestive monographs with which the United States Geological Survey has enriched the literature of American economic geology.

OFFICIAL STATEMENTS AND REPORTS.

THE CONGLOMERATE MINING COMPANY, LAKE SUPERIOR, MICH.

The report of Mr. Henry C. Davis, of Philadelphia, President of the Conglomerate Mining Company, is particularly interesting as showing how heavy is the investment to equip a mine in Lake Superior so that it is capable of earning on rock of fair grade. The cost of underground openings and of plant in three years has been as follows:

	1881.	1882.	1883.	Total.
Underground work	\$122,596.54	\$142,764.68	\$116,084.80	\$381,446.02
Surface and incident to mine.	76,588.63	110,673.12	82,255.12	269,516.87
Compressor	43,072.51			43,072.51
Railroad	895.19	8,119.12	136,670.86	145,685.17
New mill		100,134.14	81,913.18	182,047.32
New hoisting-engine*			44,411.41	44,411.41
Canal improvements			17,841.07	17,841.07
Improvements at Lac la Belle		907.25	7,420.87	8,328.12
New house, store, and warehouse at mine	31,561.63	3,738.21		35,299.84
Sundry construction and addition to mine plant	86,875.25	24,229.55		111,104.80
Totals	\$361,589.75	\$390,566.07	\$486,597.91	\$1,238,753.73
Sundry credits	11,615.55	25,672.68	34,590.76	71,879.02
Copper sold, net	50,244.99	97,696.32	39,425.27	187,366.58
Copper on hand			17,771.07	17,771.07
Net cost	\$299,729.18	\$267,197.07	\$394,810.81	\$961,737.06

The Lac la Belle & Calumet Railroad, now completed, is 7.6 miles long, with a maximum grade of 158 feet per mile. It connects the mine with the mill, and is equipped with two locomotives, 24 rock-cars, 6 platform-cars, and 2 box-cars. The superintendent, Mr. C. H. Palmer, Jr., advocates the purchase of a suitable passenger car. The new stamp-mill at Lac la Belle, now completed, has 3 head of Ball's stamps, built by the Cuyahoga Steam Forge Company, each with cylinders 16 inches in diameter, and 24 inches stroke. One head was started in the latter part of November, the second in December, and the third in January. The superintendent, in his report, says that the mill is doing as well as can be expected for new machinery of such magnitude. Much of the work of operation depends for its success on experience, and as the stamp-heads in this mill are larger and heavier than any heretofore used, time must be given to obtain the desired experience. Many minor changes in grates and spring timbers, in valves and cylinders are found necessary to obtain the best results. What the stamping capacity of the mill will be, has not yet been demonstrated. For the month of February, the average duty for each head per working hour was 8.01 tons of rock stamped. "I have no doubt that this duty will be largely increased as experience in their operation is acquired." The mill machinery is driven by a 20 by 48 Corliss engine and four Babcock & Wilcox boilers, and comprises 84 Collum washers, built by S. E. Cleaves & Son, of Houghton, 8 Evans slime-tables, and 8 Coggin separators. Concerning the latter, the superintendent states that, though the results are not yet satisfactory, their working is continually improving. From various assays made of the sands going into the lake from the mill, it is found that about one half of one per cent of the copper is lost. Mr. Palmer suggests the building of a tail-house, the cost of which he estimates at \$3500. The mill is lighted by 74 electric lights, driven by an Edison dynamo.

The new hoisting plant consists of two 24 by 48-inch Corliss engines and three of Webster, Camp & Lane's band friction-drums, each 14 feet in diameter with 7-foot face, its capacity being 1000 tons a day from a depth of 2800 feet, or double the depth of the present workings. The machinery is supplied with steam by two Babcock & Wilcox boilers.

The superintendent advocates the purchase of an 18 by 24 rock-breaker and the substitution of an automatic tram and direct tramways for the present method of transportation from shaft-house to rock-house.

Mr. Davis states that the cost of stamping in December of 6264 tons in the new stamp-mill was only 62 cents a ton. He estimates the average cost of milling and mining at \$2 a ton. On this basis, rock containing 0.8 per cent of ingot would pay current expenses, even if copper were to go down to 13 cents.

The product of the mine in 1883, from crushing 20,295 tons of rock, was 372,355 pounds of mineral, or 0.917 per cent. What the average yield of the rock will be, the workings of the present year must show. During the year, 1293.4 feet of winzes and shafts have been sunk, 4350.2 feet of levels driven, and 1489.8 fathoms of stopes excavated, besides 35.4 feet and 22.6 fathoms of miscellaneous contracts, the average cost being:

	1883.	1882.	1881.
Sinking, per foot	\$13.23	\$12.31	\$14.75
Drifting, "	10.02	10.52	11.11
Stopping, per fathom	8.88	9.23	17.63

The average wages per month were:

	1883.	1882.	1881.
Contract miners	\$53.66	\$56.68	\$56.42
Company "	41.49	45.00	46.54
Underground laborers	39.62	38.74	37.31

The capital stock of the company is 50,000 shares, fully paid \$25, or \$1,250,000, and 50,000 shares investment stock, on which \$20 has been paid, or \$1,150,000, so that only \$2 per share, or \$100,000, remains subject to future calls. From the treasurer's statement, it appears that the installments still due are \$49,346.

The operations of this year, and particularly the second half of it, when all the plant should be working harmoniously and to full advantage, will prove whether and to what extent the company will be able to reimburse its stockholders for the large amount of money expended. That it has been judiciously done, and that the managers have not failed to take advantage of any modern improvements, appears to be beyond all doubt. This year ought to carry the company into the front rank of Lake Superior producers, and we should not be surprised to see it reach an output above two million pounds of ingot copper.

THE CENTRAL MINING COMPANY, LAKE SUPERIOR, MICH.

This mine, of which Mr. John Stanton is secretary and treasurer, produced in 1883 1,822,710 pounds of mineral, of which 999,445 pounds were stamp copper, 520,595 kiln copper, and 302,670 pounds the yield of 152 masses, the average yield of mineral per fathom of ground broken being

* Twenty-six thousand four hundred dollars mine charges since charged to this account, which will appear in the accounts for 1884.

712 pounds, and the yield of ingot 496 pounds. The quantity smelted was 1,838,075 pounds, yielding 69 per cent, or 1,268,556 pounds of refined copper. The sales during the year were 700,858 pounds, averaging 15.12 cents, and 425,052 pounds at 15 cents, realizing \$169,852.82. At the close of the year, 142,646 pounds were on hand, valued at 14.5 cents, or \$20,683.67. Deducting \$3936.10 as the difference in the value of the mineral on hand at the mine at the close of 1883, as compared with the value of that in stock a year previous, and adding \$1023.17 as the value of silver mined, the net value of the product of the mine was \$187,923.56. Adding interest received, \$7751.70, the total receipts were \$195,675.29, as compared with \$230,776.10 in 1882. The working expenses at the mine were \$158,274.23 in 1883, against \$157,908.37 in 1882, and the cost of smelting, freight, and other expenses was \$31,451.12 in 1883, against \$33,850.15 in 1882—a total of net operating expenses of \$189,725.35 in 1883 and \$191,758.72 in 1882, leaving only \$5949.94 in 1883, against a profit of \$39,017.58 in 1882, and \$47,620.06 in 1881. The directors, however, sold timber lands on the Tobacco River for \$100,000 in 1882, payable in installments running over three years, and received in 1882 \$40,000, and in 1883 \$30,000 on account. Against this, they wrote off in 1882 \$20,988.25, the cost of all the lands owned by the company, exclusive of the mine location, and they have thus added \$19,011.75 to the profits of the year 1882 and \$30,000 to those of 1883, enabling them to pay a dividend of \$60,000 in 1882 and \$40,000 in 1883.

The surplus from the year 1882 was, after the disposal of copper on hand and the payment of the dividend, \$214,192.67, making the net surplus on December 31st, 1883, \$250,142.61, or, deducting the dividend of \$40,000, \$210,142.61.

It will be seen, therefore, that the product of the mine and the expenditure incurred have varied but slightly from the figures of the previous year; but the large decline in the market value of copper has reduced the receipts to such an extent as to leave but little profit on the year's business.

The vein has continued to be of small size, and the productive portion of it limited in extent. The improvement which has been expected for two years past did not appear in 1883. Within a few weeks, however, the drift in the 23d level, at the farthest point south yet reached in the mine, has opened a larger and more promising vein; and if this improvement should continue, and extend to the levels above and below, an important increase of production may be looked for when this ground is reached by those levels.

In all, 2557 fathoms of ground were broken in openings and stopes in 1883, against 4097 fathoms in 1882, the average yield of mineral per fathom being 712 pounds in 1883, against 440 pounds in 1882, and of ingot 496 and 310 pounds, respectively.

The following figures will show the reduction in the average cost of underground work:

	1883.		1882.	
Sinking in shafts and winzes..	201 feet	\$26.39	278 feet	\$28.69
Drifting on the vein.....	1199 "	9.23	1288 "	10.50
Drifting on the conglomerate..	92 "	11.61	149 "	12.11
Stopping on the vein.....	1682 sup. fathoms	14.82	1659 sup. fathoms	15.26
Stopping on the vein.....	22 cu. "	23.61	37 cu. "	22.98
Stopping on the conglomerate..	138 sup. "	23.56	283 sup. "	23.62
Sinking on the conglomerate..	370 feet	13.75	192 feet	16.29

The stamp-mill, in treating 18,639 tons of rock in 1882, against 18,146 in 1883, running 24 heads 142 days in 1882, against 152 days in 1883, or 5.4 tons per day per head in 1882, compared with 4.9 tons in 1883, required the following outlay:

	1882.	1883.
Labor.....	\$6,774.59	\$7,382.39
Wood, 1913 cords.....	6,217.24	5,305.75
Lights, oil, shovels.....	411.26	336.26
Repairs, materials, fixtures.....	2,653.44	950.67
Lumber, freight, and teaming.....	425.94	58.24
	\$16,482.48	\$14,093.31

The cost of breaking and selecting the rock and tramming it to the mill was 11.17 cents in 1883, against 11.6 cents in 1882, and the cost of washing and stamping per ton was 77.66 cents in 1883, against 88.43 cents in 1882. The stamp rock ran 3.12 per cent of mineral in 1882 and 2.75 per cent in 1883, or 2.20 per cent of ingot in 1883, against 1.9 per cent in 1882. As the Central does not produce stamp copper exclusively, it is impossible to estimate the cost of mining this grade of copper from the data given. The mine yielded 1,822,710 pounds of mineral, running about 69 per cent of ingot, or about 1,268,556 pounds of copper, at a cost, including mining, crushing, smelting, and marketing, of \$195,866.10, or 15.4 cents per pound, which shows that the Central can not meet present prices with such low-grade rock. Any improvement in the mine will, of course, put it into much better condition to compete.

GEORGE FREUND, of Durango, Colorado, is the publisher of a new pocket map of the San Juan mining districts by Mr. E. Fischer. Its size is 21 by 15 inches, the scale being one inch to three miles. It shows the mineral location, wagon-roads and trails, county lines, etc.

PRODUCTION OF LEAD IN GERMANY.—The following are the preliminary estimates of the production of lead in Germany, as compared with last year, the unit being the metric ton:

Works.	Lead.		Litharge.	
	1883.	1882.	1883.	1882.
Stolberg.....	13,753	14,919	27	40
Rhein-Nassau.....	671	6,239	.....	.....
Mechemich.....	25,582	25,055	.....	.....
Commern.....	1,640	2,727	.....	.....
A. Poensgen & Sons.....	3,540	3,100	.....	.....
V. Giesche's heirs.....	5,154	5,858	841	488
Friedrich's Works, Tarnowitz.....	9,561	8,680	1,102	1,077
Rothenbach.....	44	40	342	208
Clausthal.....	9,749	9,428	.....	.....
Lower Hartz.....	599	579	1,829	1,596
Remy-Hoffman, Ems.....	5,227	5,803	445	286
Goldschmidt, Braubach.....	3,187	3,716	.....	.....
Freiberg.....	5,274	5,084	458	752
Total.....	89,767	90,671	5,044	4,456

ELECTRIC PROPULSION.

Under this head, Mr. Thomas Whiteside Rae, C.E., of this city, contributes to the New York Tribune an hypothetical estimate for adapting and equipping the elevated railroads for electric propulsion; and of the consequent reduction in running expenses. After alluding to what has been done at Lichterfelde, Port Rush, Zankerode, and Saratoga, Mr. Rae continues substantially as follows:

The elevated railroad system of New York City comprises—inclusive of sidings, etc.—32 miles of track. Upon this road-bed are, or may be, running simultaneously 150 locomotives, each weighing, with its coal, water, and personnel, 44,800 pounds, and drawing, at a speed of 13.25 miles per hour, 3 cars, each weighing, with its seated load of 48 persons and the gateman, 34,230 pounds. Summing up, it amounts to a total weight of 22,123,500 pounds, moved 1166 feet per minute. Taking the commonly accepted coefficient for resistance to traction in rapport of weight moved, under average conditions of rolling gear and road-bed, to be .004 (vide Clark, Holley, Molesworth, Haswell, et al.), the total work performed by the locomotives in any one minute is 3127 horse-power nearly. It is unnecessary to consider grade or curvature in applying the coefficient of tractive resistance, since, of the total number of trains running to and fro, as many will be assisted as retarded by the former; and there being but 12 curves which change directions as much as ninety degrees on all the routes, only 24 of the 150 trains in simultaneous motion could, by any possibility, be passing them at the same instant, and this would not materially affect the total resistance of traction. Further, the influence of curves on the elevated railroads is minimized by the admirable method of coupling trains, and it may be added that electric propulsion readily admits of fitting a motor to each car and manipulating them all from one, which would almost entirely neutralize curve resistance.

To make sure that the estimate shall include the most adverse conditions possible, the cars may be considered as crowded to their utmost, or carrying say 100 persons each, and encountering strong side winds. In such a case, the coefficient of traction might rise to .006, and the total work done at any instant would be at the rate of 5444 horse-power nearly.

The expense of performing this work with steam locomotives may be thus stated: It requires 227 of them; each costs \$6500, and is served by a driver and stoker, whose combined daily pay is a trifle over \$5. Each may also be called upon at any moment to exert some 36 horse-power, and the coal required per horse-power may be estimated as follows: Each engine burns 40 pounds per mile run, in the ordinary routine service of drawing trains, and the average speed per hour, inclusive of stops, is 12.5 miles. This is a consumption per engine of 500 pounds per hour. The quantities hitherto dealt with have been maxima, and it will be necessary to modify them to get a fair average consumption of fuel per horse-power developed. The weight of locomotive and the number of cars per train remain unchanged, but the feet moved through per minute are reduced to 1100, and, assuming a load of 25 persons per car as a reasonable mean between running crowded morning and evening, half full in the middle of the day, and nearly empty at night, the load moved may be taken at 136,690 pounds. Applying the general coefficient of traction, .004, this becomes 547 pounds moved 1100 feet per minute, or 18 horse-power, at a cost of nearly 28 pounds of coal per horse-power per hour.

Of course, it is almost impossible that each engine should burn this quantity for each actual horse-power of work it performs. The warming of trains is included in it, and the average is no doubt vastly increased by the number of reserve engines which must be kept standing with banked fires ready for immediate service. The cause is not any unusual inefficiency of particular locomotives—although, at best, they are four times more wasteful performers of work than large stationary engines of the best type—but it is one inseparable from the system of subdivision of locomotive power, and it is therefore correct to say that, in such a system, a horse-power costs 28 pounds of coal.

The statement will then be, taking an hour as the unit of time:

Interest upon and depreciation of 227 locomotives at \$6500, at the rate of 15 per cent per annum.....	\$25.26
Wages of attendants for 227 locomotives.....	47.30
Total coal at \$3 per ton for 150 locomotives, developing 18 horse-power each, at 28 pounds per horse-power.....	102.00
Total per hour.....	\$174.56

To do the same work electrically, would require the following named equipment:

It is quite possible to obtain dynamos which will return at any ordinary distance 75 per cent of a horse-power developed by steam-engines at the generating station, and this can readily be had for two pounds of coal per hour from large improved constructions. But assuming 50 per cent, or thereabout, to be the ultimate, and a duplicate installation to be superfluous—which latter assumption is in accord with expert opinion—the items will be:

6 stationary steam-engines, 1800 horse-power each, with boilers, costing, inclusive of erection.....	\$270,000
8 generating dynamos, each 1350 horse-power capacity, inclusive of erection.....	273,375
1 station-house at East 129th street, for the Second and Third avenue lines.....	20,000
1 ditto at Battery for the Sixth and Ninth avenue lines.....	30,000
227 electro-motors at \$3000.....	681,000
32 miles central rail, 35 pounds per yard, laid.....	40,000
Total.....	\$1,314,375

This amount would in all likelihood be largely modified by the sale of the steam locomotives—which are of standard gauge—for use in short surface railroads; but letting this probable rebate stand as an offset to unforeseen contingencies, the statement of current expense of electrical motive power and concomitant plant will be, taking an hour as the unit of time:

Interest upon and depreciation of installation at 10 per cent per annum.....	\$15.00
Total coal at 2 pounds per horse-power, and \$3 per ton.....	28.93
Labor at power stations, 2 chief and 4 assistant engineers at \$22 a day, 40 stokers at \$80 a day.....	4.25
Wages of 1 attendant per motor, 227 at \$3 a day.....	28.38
Total per hour.....	\$76.56

It should be explained that the lower rate per cent for depreci-

ation of electrical machinery is based on superior durability due to its simplicity, few parts, and the absence of reciprocating movement.

This amount is the total current cost of the maximum work done in any one hour upon all the lines. In comparison with the same quantity obtained through steam locomotives, the ratio is about as 1 to 2.28. In other words, electricity will perform for \$1 the identical work for which steam charges \$2.28.

Surprising as the result is, it does not embrace various advantages to which it is impossible to fix a quantitative value, such as reduced wear of road-bed by the great diminution of weight in the tractors. Some notion of this may be had by reflecting that the average adhesion to the rails of an electro-motor is—by reason of some molecular change in the contiguous surfaces of wheel and rail caused by the current circulating through them—about forty per cent of its weight, as compared with twenty per cent in the steam locomotive. That is to say, an electro-motor of half the weight of a steam locomotive will haul the same load. The absence of smoke, exhaust steam, noise, and cinders dropping to the streets, is also of incalculable advantage in a city service.

SOME REMARKS ON WINDING APPLIANCES AND ROUND WIRE ROPES.—II.

By R. J. Frecheville, Assoc. Mem. Inst. C.E., H.M. Inspector of Mines for Cornwall, Devon, etc.

Since any extra strain on a rope leaves it weaker than it was before, on no account should a rope used for raising men be ever worked above a fair working load. In drawing mineral in this county, the custom, as you are aware, is to let the skip down on a gate put across the shaft. Probably the greatest strain the rope has to bear is when the full skip is lifted. Experiments made at some of the coal mines prove that, when the full cage is lifted from the bottom, about double the ordinary strain due to the load is produced. This arises from the inertia of the mass to be moved. In the case of a skip resting on a gate, the more slack chain there is, the greater will be the strain on the rope at starting. In winding men, there should be no resting-place for the cage; the engine should be started gently, driven regularly, and with a speed of only about two thirds of what is otherwise usual. The rope also should be examined every twenty-four hours, and this should be done by winding it slowly through the operator's hands; if he does not happen to see the broken wires, in all probability he will feel them. Occasionally the rope should be thoroughly cleaned, and its condition more minutely ascertained. When broken wires are found, the longest may be tucked underneath and the others cut off to prevent their catching and doing further mischief. The most careful watch must be kept on the portion of the rope where they occur.

A new rope should be tested with several days' winding before men's lives are trusted to it. It is indispensable for the preservation of steel wire ropes that they should be greased regularly. The grease used should be perfectly free from acid, and be soft enough to work into the strands right through to the hemp core. It must not be of such a nature as to harden; for in that condition, it allows rust to form between it and the wire, so that a rope that appears to be well greased may be corroded to a sensible depth. A mixture of Stockholm or Archangel tar, a vegetable oil, and a little lime boiled together, is often recommended. In this county, the tar is mixed with tallow. These mixtures, however, form too stiff a grease, tend to hide defects, and render the thorough examination of the rope difficult. A mixture containing gas-tar is still more objectionable. Of all the lubricants for wire rope that have come under my observation, the best is a mineral oil in use at Wheal Sisters. It is of the right consistency, and keeps the ropes in splendid condition. Some of the heavy mineral oils, such, for instance, as the Russian, their specific gravity being higher than the American, possess sufficient viscosity to be used as a lubricant for wire ropes, and will, if tried, owing to their freedom from acid and to their power of resisting decomposition, be found to give satisfactory results. At the Wearmouth colliery, they have a patented apparatus, consisting of a pair of wire brushes for cleaning the ropes, and a pair of strong hair brushes, fed with lubricant from feeders above, for oiling them. Both sets of brushes revolve, being actuated by the traveling-rope. It is claimed that this arrangement lubricates very thoroughly, and effects a great saving in oil and labor.

When a rope is used for winding men, the shackle should be cut off regularly every two or three months, the rope thoroughly examined, and the shackle reset. This is a point of vital importance for wire ropes. In order to arrive at economical results with wire ropes, accurate accounts should be kept of their working. By this means, the kind most suitable may be ascertained, and a considerable saving effected by using an article best adapted for the purpose. However well a rope may seem to be lasting, it should always be suspected as soon as its duration approaches the average that corresponds with the conditions under which it is working: it should, at any rate, cease to be used where human life depends on it.

Owing to trade competition, there is great danger of inferior metal being used in the manufacture of ropes, so that, when a new one is required, only the best makers should be applied to, and they should be furnished with full information as to the conditions under which it has to work. There can be no greater false economy than choosing a cheap rope. When a rope is for the purpose of winding men, it would be advisable to have a sample piece of it (say a length of from 10 to 12 feet) tested before use, in order to see that the quality of the metal and the breaking strain are as represented.

The connections usual in this district between the rope and cage consist of the shackle or socket, screw-heater, double-chain runner, swivel and coupling chains. The shaft being perpendicular at East Pool, the runner and swivel are dispensed with.

Now, as to the shackles or sockets, we have three different types: 1, the shackle with rivets, as used at East Pool; 2, the conical socket, as used at South Frances; and 3, the double-pin socket, as used at Wheal Sisters.

At East Pool, to put on the shackle, the rope is first lashed around with copper wire about 8 inches from the end; the strands are next untwisted, and the wires turned back singly; some are cut off at different lengths,

so as to make the requisite taper; the whole is then bound around with copper wire. The shackle, being heated to redness, is, after the tapering end of the rope has been inserted, hammered down to fit it snug. A coupling is then screwed on, and the shackle brought as tight as possible on the rope. Finally, a steel punch is driven through, to make place for the rivets, which are put in and fastened in the same way as boiler-rivets. The rope end is manipulated at both South Frances and Wheal Sisters in very much the same way as described above, being made of a conical shape like the inside of the socket. It is then pulled back, and a round center-pin of steel driven up in the middle to wedge it. With the socket used at Wheal Sisters, each chain of the runner passes over a separate heater-pin: this is certainly safer. The comparative merits of these attachments have not been ascertained by testing; it is very desirable, however, that this should be done. In many of the coal mines, they use a shackle (capel) with hoops and rivets, which is fastened to the rope as follows: The end is untwisted for about 6 inches; it is then doubled to suit the length of the capel, the loose end twined around the main rope, and the whole bound with hemp twine soaked in tar; rivets with countersunk heads are put through both ropes and the capel; the hoops are next put on and driven home tight. This, though doubtless a very strong connection, is not suitable for passing over pulleys and rolls, as our shackles are required to do.

The screw-heater and swivel, with their pins, should be made of from 1½ to 1¾-inch, the runner chains of from ¾ to 1-inch, and the coupling-chains of from ½ to ¾-inch best wrought-iron bar. The pins should be secured in their places by jam-nuts. There should be five coupling-chains—one at each corner of the cage and one attached to the center; the latter carries no weight, but hangs a little slack, and is provided, in case a corner one should break, in order to prevent the cage tipping to one side and jamming itself in the shaft. The links should be made as short as is consistent with easy play, and those at the extremities a little larger and stronger than the rest. Chains require frequent and careful examination, as the links may wear into each other without being detected if not well looked after; also, owing to the shocks, jerks, and alternations of temperature they are subjected to when in work, the iron undergoes a change in structure, and gradually becomes hard, crystalline, and liable to snap, as is seen in the case of railroad wagon couplings, which often break short with a crystalline fracture, apparently having had very little wear.

So far as this district is concerned, some of the principal details connected with our winding appliances, and more especially the precautions to be observed in the selection and treatment of wire ropes, have now been briefly touched on. There still confronts us, however, this most important question: In those mines where the men ascend and descend by cages, what means should be adopted in order to avoid the consequences of the breakage of the winding rope? We are forcibly reminded of the terrible catastrophe that occurred here last summer, by the sad accident resulting in the death of ten men, and caused by the breakage of the winding rope that has just taken place at the Garnant colliery, in Carmarthenshire. The rope—a round steel one 1½ inches in diameter—broke about 17 yards from the cage just as it began to descend.

An attempt has been made to deprive accidents of this nature of their serious character by the application of safety-catches to the cage. About thirty years ago, many different sorts were invented, and for some time were in general use in the collieries, but now you seldom meet with them. It is said that they are liable to come into action when not wanted, especially with quick winding and during the descent of the cage, thus introducing an extra source of danger. It is possible, indeed, that this objection would not apply here, on account of the very slow rate of speed in winding; but, on the other hand, the varying underlie and different character of our shafts introduce fresh elements of difficulty.

Most of these catches depend on the action of a spring, which comes into play on the breakage of the rope, and forces against the guides either eccentric clutches or levers with sharp points; the weight of the cage then causes the clutches to grip the guides, or, in the case of the levers, the sharp points to penetrate into the wood.

Although there are instances of life having been saved by some of these contrivances, there are also instances of their failing to act, as in the case of the rope breakage at the Duke Hardenburg colliery (Westphalia), on December 21st, 1882, when 25 men lost their lives. The rope broke just as the cage, fitted with safety-catches, reached the surface; but unfortunately, these did not come into operation.

There appears to be a very general dislike to trust to the action of a spring in such a wet and dirty place as a shaft, and it is also thought that the use of catches would have a tendency to produce a want of attention to the condition of the rope, and to encourage an attempt to unduly increase its working life.

Last year, at a meeting of the Royal Cornwall Polytechnic Society, and at our own exhibition of mining machinery, there were to be seen several models of safety-catches invented in this country. Although very ingeniously constructed, none of them has so far inspired sufficient confidence to be adopted at any of our mines. It may be, however, that among these appliances, or among those which have been used in the coal districts, there will be found one capable by some slight modification of being made into a safe and reliable apparatus.

All those among us possessing mechanical ability, and acquainted with the varying conditions under which such an appliance would have to work in our shafts, should consider it a sacred duty to devote their attention to this subject, so that, if possible, our miners may be guarded against the extra risk they encounter in those mines where they are lowered to and raised from their daily work by cages.

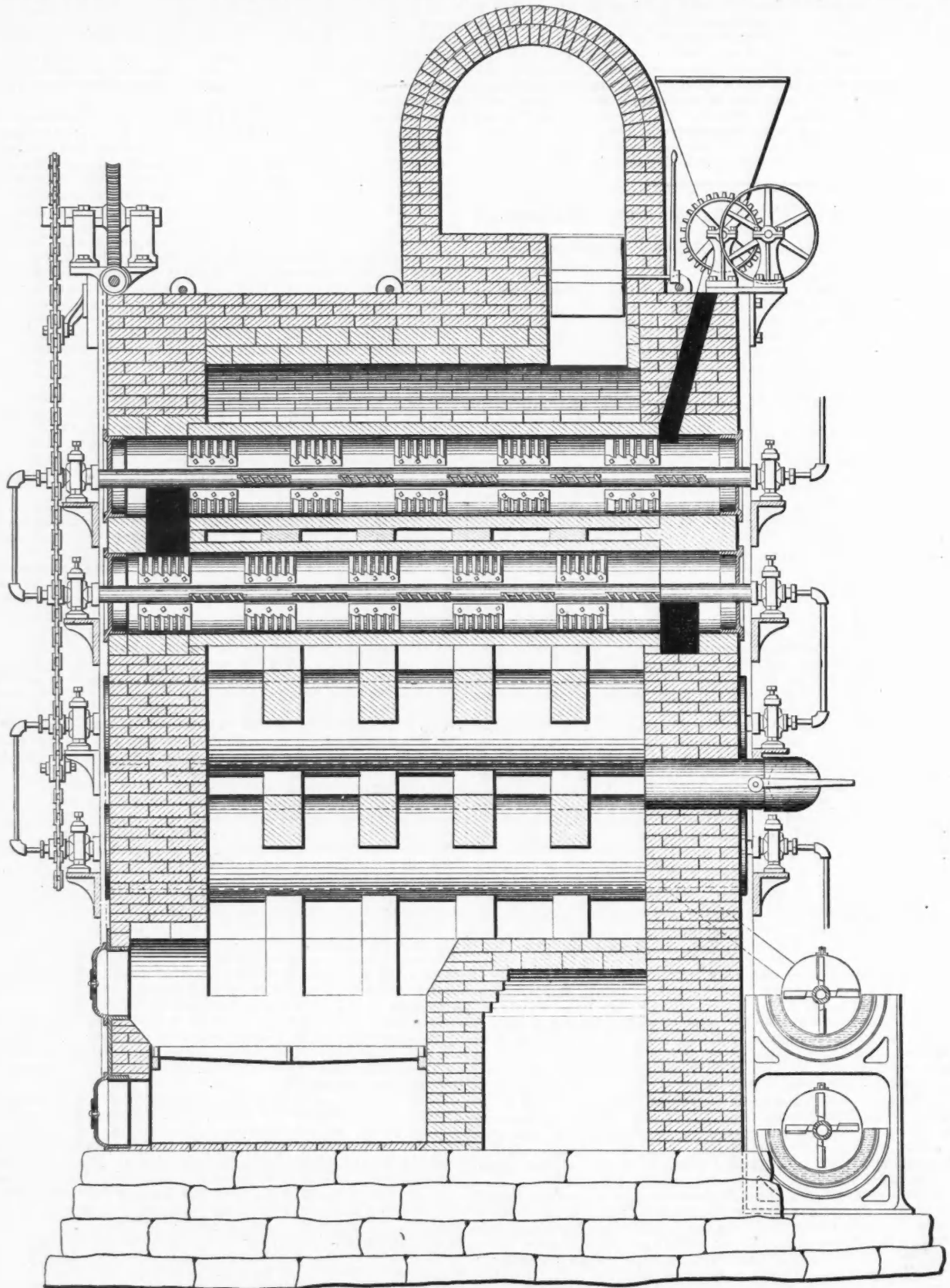
Meantime, in order to prevent accidents of this class, we must pay the most minute attention to every detail of the winding appliance, especially to the selection, maintenance, and examination of the ropes.

PLATINUM IN A VEIN.—Mr. J. A. Pond, in a paper contributed to the Transactions of the New Zealand Institute, notes the occurrence of platinum in rounded grains and in perfect octahedral crystals in a quartz vein impregnated with gold-bearing iron pyrites, met with in deepening the shaft of the Queen of Beauty Gold Mining Company, Thames gold district, New Zealand, from the 540 foot to the 600-foot level. The interest of this note lies in the fact of the extreme rarity of platinum in place.

THE WALKER & CARTER ROASTING-FURNACE.

In 1882, reports came from Colorado concerning the working at the Bancroft-Carter mill, North Empire, Clear Creek County, of a roasting-furnace and an amalgamator. Since then, furnaces have been built at the phosphate-works of Messrs. Walton, Whann & Co., Wilmington, Del., which we have had occasion to visit recently. The accompanying

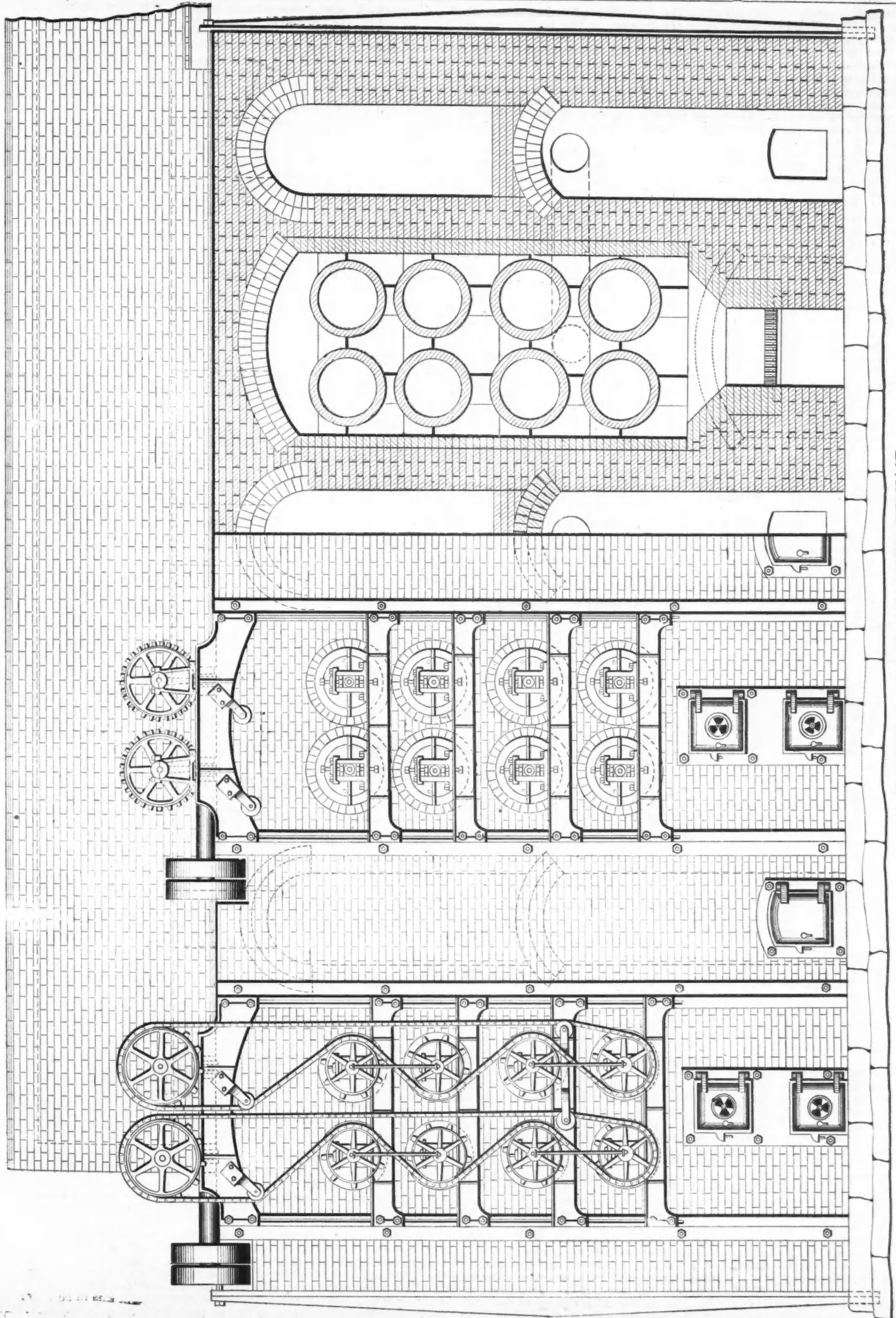
the retorts themselves are very thick. Each retort is provided with a hollow iron shaft, through which a stream of water flows constantly, cooling it in such a manner that its rigidity is not impaired. It was found, however, that this cooling unnecessarily increased the consumption of fuel, chilling the retorts, and of late the shafts have been successfully covered with a coating of asbestos. Annealed steel rakes are attached to these shafts, their office being to stir



THE WALKER & CARTER ROASTING-FURNACE.

engravings, copied from the working drawings of the furnace, will aid in obtaining a clear notion of its construction and method of working. It consists of eight fire-clay retorts in four sets of two, their length, including the cast-iron end, being twelve feet. The two lower retorts are supported by saddles resting on fire-clay piers placed at short intervals in the fire-box, the upper retorts being supported by the lower ones, resting on fire-clay saddles ground to a bearing. The spaces between the retorts in the center and next the side-walls of the furnace are partly filled in with center and side blocks of fire-clay. In this manner, any displacement is provided against, and it should be stated also that

the ore and gradually convey from the receiving end of each retort to the discharge end. The ore is fed into the two upper retorts from a hopper, by means of a right and left-hand screw, driven by pulley and gearing. The rakes gradually move it to the other end, when it drops into the retort below, moving then in an opposite direction, falling into the second (from below) retort and into the first, the lowest one, from which it is discharged. The design, therefore, complies with the leading principle to be observed in all ore-roasting furnaces, that of moving the ore in a contrary direction to that of the fire-gases, so that the fresh ore is exposed to the relatively lowest temperature, while the nearly desul-



THE WALKER & CARTER ROASTING-FURNACE.

phurized material is subjected to the highest heat. The shafts are revolved by a link belt, as shown in the drawings. The power required is not large, a very small engine doing all work at Wilmington.

Each bench of four retorts is connected with a dust-chamber by flues through which the sulphurous acid escapes, the necessary air for combustion being admitted through small openings in the cast-iron end covers opposite the furnace flue. The supply of air can be cut off from any one of the retorts at any time, and the temperature of any retort can be regulated by dampers. The entire distance traveled by the ore through the four retorts below one another is about 40 feet, which, as the rakes are at present operated, takes four hours.

At Wilmington, the furnace is experimented with for roasting pyrites smalls, and when we saw it at work, the top retort was black, the third one (from below) was hot enough to start the burning of the pyrites; while the first, the lowest, was fairly though irregularly bright red. The action of the valves appeared to be satisfactory, though the roasted ore showed some magnetic oxide. Mr. E. N. Riote, of this city, in a report dated March 3d, gives the following as the result of a trial:

"After six hours' firing with coke, the furnace was deemed hot enough to ignite the pyrites in the second retort. The feed was set at about three tons per twenty-four hours. A Virginia pyrites, containing between 40 and 42 per cent of sulphur and 13 per cent of silica, was used. It had been ground by means of a pulverizer, so as to pass a sixty-mesh screen. The temperature rapidly rose until the ore had reached the second retort, so that soon the ore began to burn in the third retort, after which the sparkling zone that had at first come near the discharge rapidly receded back into the second retort, leaving the lower retort merely the work of 'finishing,' that is, expelling the sulphuric acid formed above. But it was apparent, owing to the great cooling effect of the water running through the unprotected shafts, that a sufficient degree of heat to expel the last percentage (a cherry red being needed) could not be achieved."

This defect, as stated above, is remedied by the protective coating of asbestos. "A careful sample taken still showed 2.8 per cent of sulphur, all but a trace in the shape of sulphuric acid."

"On the second day after the furnace was hot, a feed from eight to ten tons per twenty-four hours was maintained. This proved too much for the furnace, again owing entirely to the chilling effects of the water passing through the shafts. Samples of ore taken at this period still showed from 5 to 6 per cent of sulphur, of which 1.5 per cent was as sulphur in undecomposed sulphide."

"To test the proposition that this trouble was due to the cooling of the furnace by the unprotected shafts, it was decided to continue half of the furnace without coursing water through the shafts. The effect was instantaneous. Within fifteen minutes, the retorts became red. The ore began to burn in the third retort. In half an hour, the heat was so great in the lowest retort as to cake the ore, and it was ignited even in the top retort. A sample taken at this time contained only traces of sulphur. This, I think, shows conclusively what the furnace is capable of doing."

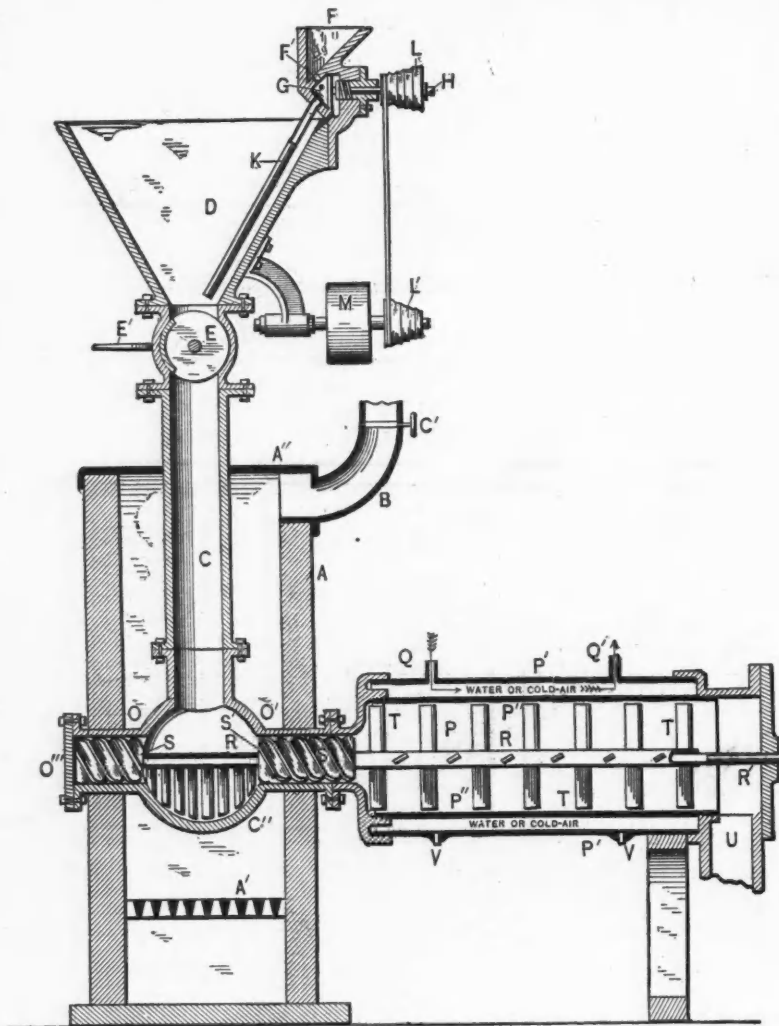
"As to the profitable use of the furnace for sulphurous acid production, no definite figure can be given. If two benches will take ten tons, well and good; but if it takes twice two benches to roast this amount, the expense per ton will not be very much increased. If two benches roast ten tons, the expense per ton will be about \$1; and if it takes twice two benches, the expense will not be more than \$1.50."

Dr. C. M. Cresson, of Philadelphia, reports that samples taken by him at the furnace showed the pyrites to contain 42.2 per cent of sulphur, of which 0.156 per cent was present as sulphuric acid. One sample of roasted ore carried 3.48 per cent of sulphur, all as sulphuric acid, and another contained 0.523 per cent of sulphur as sulphuric acid, and 1.613 per cent as sulphur not volatilized. Dr. Cresson, unfortunately, does not state under what conditions the roasting was conducted.

Concerning the applicability of the furnace for roasting gold ores, we give below an abstract from a report by Messrs. J. Alden Smith and E. E. Burlingame as the result of a test made by them. As it refers to the amalgamator, we preface it by a description of that apparatus:

The Walker Amalgamator.—The Walker amalgamator consists of a furnace A, inclosing part of a retort C, the upper part projecting upward through the roof A' of the furnace. The roasted ore is fed in a continuous stream into the hopper D. The pulley M is started at the same time, and the metallic mercury will then run into the mass of moving

ore in retort C and down into the pan C''. The furnace-fire will then operate to heat the ore and to vaporize the metallic mercury in pan C'', which, rising, saturates the ore and becomes united with the noble metals therein. Any vapors of mercury rising still higher will be cooled and condensed by the incoming cool ore. Meanwhile the shaft R, operated by a pulley upon its outer end, will continue revolving and delivering the ore from the retort C to the condensing or cooling-chamber P, and thence through the delivery-outlet U. The object of the cooling-chamber P is to condense the vapors of mercury in the ore before the latter is discharged through the outlet U. The operation is continuous. It will be observed that, with the exception of valve E, designed only to close the retort when the operation is over, there are no obstructions in the interior of the retort to militate against the free and continuous operation of the amalgamator. The thorough union of the vapors of mercury and the noble metals is to be effected in the retort C. It is claimed that, as the vapors rise from the pan C'', they pass through the hot ore, and that what is not taken up rises until it meets the incoming moving mass of cool ore near the top of retort C. The cool ore condenses the vapors, and the metallic mercury thus formed passes with the supply from the hopper or basin F down to the basin or pan C'', where it is again vaporized, and driven up with the new supply into the ore under treatment, the operation being continued indefinitely. The aim is to thoroughly and completely saturate the entire mass of ore with the vapors of mercury continuously, so that no particles of the noble metals can escape recovery. The heat from the furnace is communicated to the moving ore in the lower part of the retort to such a degree as to so heat the ore for a certain space in the retort as will permit the rising vapors to pass through and thoroughly saturate the mass of heated ore. When the operation of the apparatus has reached a point when it is desirable to cease, the valve E is closed in the manner indicated in the above description. The edge of the valve, coming into contact with the ore, cuts through the moving mass and shuts off the further entrance of the same. The ore thus left in the retort continues descending, and is discharged by screw S' and vanes T. As this ore descends, it is heated; and as it descends, it will leave a gradually increasing unoccupied space in the top of the retort C, between the top of its own body and the closed valve E. This unoccupied space will thus be receiving the vapors of mercury arising from depression C'', and no cold ore will be entering to condense them. Their escape, however, is to be prevented by the closed valve E and the cold ore in hopper D above the valve, which latter, it is claimed, will condense any escaping vapors; and when the ore is all removed and the retort cools, the vapors will be condensed by the lowering of the temperature. If, on the other hand, the furnace-fire is kept up, the vapors will remain confined in the retort by the valve E, and be prevented from rising and escaping by the cold ore



THE WALKER AMALGAMATOR.

in the hopper D, which cold ore will condense what vapors do pass through the valve; and when the valve is again opened to permit the entrance of the cold ore, the operation will go on as before. When the operation is thus checked, the belt is thrown off or shifted from the pulley M to check the feed of metallic mercury from the basin F. Any vapors which may pass through the screw S' will be condensed in the chamber P. It will be observed that the packing of the ore between the screw-threads of screw S' will prevent the escape of the vapors of mercury through this screw to the chamber P.

V V are two short nozzles to be furnished with cocks to empty the contents of the annular chamber contained between the outer and inner shell of the chamber P.

Messrs. Smith & Burlingame state, concerning the working of the roasting-furnace and the amalgamator at the mill at North Empire:

"1. It is but just to state that the examination was conducted under very unfavorable circumstances for an entirely satisfactory showing of the process. To begin with, in its mechanical construction, the mill is extremely defective.

"2. The ore given us for the test contained but \$3.20 per ton, a grade which can not be profitably reduced by any method in existence. It is well known by all practical mill-men that it is impossible to extract all the gold from ores by any appliance established on a working scale. If only one dollar remains in the tailings from ore that assays but three dollars per ton (and the most experienced will concede this to be very low-grade residuum), it amounts to 33 1/3 per cent of the assay value, while the

same loss on that which assays \$30 per ton would be but 3.3 per cent. From the results of our investigations, we are convinced that no more than double the quantity of gold would be left in the tailings in working ore worth \$30 than was found in the grade treated. In the first instance, the saving would amount to 93.4 per cent, while in the latter it was only 66½ per cent.

"3. Practical operators will comprehend us when we state that the mercury was very 'foul;' in other words, heavily charged with lead, copper, and other impurities, which caused it to be exceedingly 'lazy,' even after slow and careful retorting.

"4. The arrangements for pulverizing and screening were defective and irregular. Owing to the fact that a high per cent of the crushed ore was returned to the crushing-floor and fed back into the rolls, some of it several times, at irregular intervals, the percentage of sulphur entering the furnace varied greatly, being at times not more than eight per cent, and again as high as fourteen per cent. Experienced mill-men will at once discover that such variation would naturally create a material difference in the action of a furnace continuously operated. The sizing also was seriously defective; 21.093 per cent of the ore, as it passed into the furnace, was too coarse for an eighty-mesh screen; 4.687 per cent for a sixty-mesh; and 2.344 per cent for a forty-mesh. This makes a decided difference on ores containing very fine particles of gold, since there can be no grinding after it has entered the furnace. Our examination was conducted in the following manner: We first weighed out ten tons of ore after it had been thoroughly dried. This was then passed through a Dodge crusher and Cornish rolls, next elevated to screens in the upper story of the mill, whence all that was too coarse for the screens was returned to the crushing-floor by an automatic conveyor. The portion screened was conveyed to a large hopper over the roasting-furnace. At the point where it descended into the hopper, an automatic sampling apparatus caught a small portion at regular intervals. At the close of each twelve-hour shift, this sample was removed, carefully divided, placed in glass bottles, sealed with wax, and stamped. The samples so obtained were assayed separately, so that, in the event of an error with one, we might have abundant checks against it. We carefully measured the wood consumed in roasting and amalgamating the ore. Three hundred and fifty-seven (357) pounds of quicksilver were used in the operation. This was retorted before weighing, and again retorted and weighed after the completion of our test. The results were as follows, beginning with the roasting. The crushing appliances being quite imperfect, no notes of the time or cost of that department were taken.

"The exact time occupied in roasting the ten tons of ore was thirty-six and a half hours, in which period eleven feet of pine fuel were burned. As the furnace was comparatively cold when we began, fully four hours were consumed in heating it up to proper working condition. We are of the opinion, however, that, under regular and continuous operation, the consumption of fuel will be less than one cord for each ton of this class, and a 'dead' roast secured. Further, that it will desulphurize an average of ten tons every thirty hours. The retorts ran easily and lightly, with but little power, and appear to be very durable. The only point where there seems to be a probability of material wear, is in the iron 'rakes' or stirrers, and even here it must be slight. With this exception, we see no reason why a furnace of this kind should not run continuously for years, with but occasional repairs. After exhaustive investigation, we are firmly convinced that, with judicious attention in all departments, this furnace can be made to roast sulphurets ores at considerably less expense than any other within our knowledge.

"The amalgamation appeared to be as near absolute perfection as it is possible to reach on a practical working scale. As an inevitable result of the volatilization and subsequent condensation of the mercury in a mass of pulverized ore, it comes from the amalgamator in a very finely divided condition; but with proper settling-tubs or pans, and ordinary skill by the person in charge of the pans, there will be no difficulty in collecting it if kept in reasonably good order, and the loss should not exceed one pound per ton. It is more than probable, also, that, with right instruction, a careful man would be able to reduce the loss from one third to one half on ores yielding from \$15 to \$30 gold per ton. The settling-pans in this mill are very bad. They are, in fact, much better agitators than settlers. With the exercise of the utmost care and skill by the pan-tender, a greater loss of mercury will occur than would be necessary with a good system of settlers.

FINAL RESULTS.

"Following are the results in brief:

Assay of raw ore, 16-100 ounces gold, or.....	Per ton.
Ten tons contained 1 62-100 ounces.....	\$3 20-100
Fine bullion saved, 937-1000 ounces.....	19.74
Per cent of assay value saved.....	61.70-100
Loss of quicksilver, pounds.....	1 2-10
Amount of sulphur in raw pulp.....	11 88-100
Amount of sulphur in tailings.....	0 82-100
Amount of gold in tailings, ounces per ton.....	0 06-100
Weight of tailings from ten tons raw ore, 8 tons 162½ pounds.	

"By this process, two very important advances in the treatment of low-grade refractory ores seem to have been accomplished; namely, thorough and complete oxidization of the ore, and a very perfect amalgamation, both at greatly reduced expense. We present the subjoined as a proper estimate of the legitimate cost per ton of reducing refractory gold ores by this process in a well-constructed mill of twenty tons capacity a day:

Two feeders, one for each 12-hour shift, at \$3.....	\$6.00
Two roasters, one for each 12-hour shift, at \$3.....	6.00
Two engineers, one for each 12-hour shift, at \$3.....	6.00
Two pan-men, one for each 12-hour shift, at \$3.....	6.00
One mill superintendent.....	6.00
Four roustabouts to dry ore, etc., at \$2.50.....	10.00
Five cords of wood, at \$3.....	15.00
Interest on investment, insurance, wear and tear, repairs, lights, oil, loss of quicksilver, etc.....	30.00
One assayer and refiner.....	6.00
Or a total of.....	\$91.00
	\$4.55 per ton.

ON THE DEPARTMENT OF SILVER AND SILICON COMPOUNDS; WITH A DESCRIPTION OF A NEW OXIDE OF SILVER.

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

In argentiferous lead smelting, it has been supposed that a part of the silver losses were due to the formation of silicate of silver; and that this compound was indirectly due to the presence of manganese, or some other unknown cause. It will, therefore, be seen that a correct understanding of this subject is important for metallurgical studies and investigations.

The literature on this subject is not very extensive, and I have deemed it advisable to first give such references as I have been able to find; since there will be occasion to refer frequently to these experiments. I will then give a detailed description of my experiments, with conclusions drawn from them.

Literature.—In Percy's *Metallurgy of Gold and Silver*, page 181, we find the following: "According to Berzelius, it is very easy to combine silver with a small quantity of silicon, by melting the two together;* and when a mixture of silica, charcoal-powder, and finely divided silver is strongly heated in a crucible under a layer of glass containing only alkaline or earthy bases, such as plate or crown-glass, a button of silver is obtained, which, on solution in nitric acid, yields gelatinous flocculi of silica.† Stromeyer states that, under these conditions, silver acquires both silicon and carbon. Berzelius also announces that a malleable alloy is produced by heating silver with silicon before the blow-pipe."‡

Dr. Percy then makes the following statement: "But I find that there is no sign of combination when crystallized silicon is so heated in contact with silver." Next follow the experiments as performed by Mr. E. Jackson (1875) that tend to disprove the statements of both Berzelius and Stromeyer.

On page 132, we find the following:

"Supposed Silicate of Silver.—It is well known that certain compounds of silver impart a yellow color to glass when heated in contact with it; and glass-stainers have long applied this fact in the practice of their art. But metallic silver in a finely divided state is also capable of staining glass yellow by heat. It is conjectured that the color is due to the formation of a yellow silicate of silver. Stas has endeavored to ascertain whether oxygen is absorbed when the color proceeds from metallic silver. He heated an intimate mixture of 100 grams of very refractory glass in fine powder and 30 grams of precipitated metallic silver in a long tube of refractory glass, through which a current of pure dry air was kept passing. Several experiments of this kind were made at different temperatures. The conclusion at which Stas arrived is, that silver, in contact with even very refractory glass, absorbs oxygen, and forms silicate of silver; but there is no such absorption below the temperature at which the glass softens. The tube, with its contents, after this alleged absorption of oxygen, weighed 289.6545 grams; and before, 0.0808 grams less. In this experiment, the tube was inclosed in a sheet-iron sheath, and was supported in the middle on a bed of pure magnesia, previously heated before the oxy-hydrogen blow-pipe. After the lapse of twenty minutes, the tube collapsed and bent, so as completely to stop the current of air through it.§

Dr. Percy then makes the following remarks upon the experiments of Stas: "Under such circumstances, it seems possible that the increase of weight may have been due, in part at least, to other causes than the absorption of oxygen. May it not be that the yellow color imparted by silver to glass is due to the diffusion of metallic silver in an extremely fine state of division, just as metallic gold has, in an extremely fine state of division, been proved by Faraday to be the cause of the ruby-red color in glass colored by gold? It has been previously stated (page 6) that light transmitted by silver-leaf of a certain thickness is yellow." The reference above alluded on page 6 is as follows: "Christomanos states that light transmitted by extremely thin silver-leaf is bluish-green, and by somewhat thicker ones, yellow to yellowish-brown." The above-mentioned yellow coloration which was supposed by Stas to be due to silicate of silver, and on which we think Dr. Percy makes a justifiable criticism, has also been obtained by Plattner,¶ by passing a current of dry oxygen over a mixture of finely divided silver and quartz in a glass tube that was heated to moderate redness. "The inner surface of the tube in contact with and adjacent to the mixture was colored yellow; and the lower portion of the quartz . . . was also tinted pale yellow." See Percy's *Silver and Gold*, page 18. On page 19, from the same author, we extract the following:

"The experiments of Plattner, above described, concerning the action of oxygen on finely divided silver, have been repeated with great care in my laboratory, both by Dick and Tooke, under my own observation, under exactly the same conditions as he specifies; but not the faintest appearance of sublimation of the metal and of its deposition on the surface of the tube in the form of a bright annular coating was observed. That part of the glass, however, upon which the mixture of silver and silica rested was stained yellow."

The most important and complete literature on this subject that we have been able to find is given by Dr. Percy.

Right here, I very much desire to make a retraction of a statement that I inadvertently made in a recent article in the *School of Mines Quarterly*. I there stated that "experiments were made in Dr. Percy's laboratory, clearly demonstrating the formation of this compound." It will be seen from the above quotations that the evidence is to the effect that neither silicate nor silicide of silver has as yet been established. Stas, Plattner, and Percy obtained a yellow coloration upon a glass tube by passing either air or oxygen over a mixture of silica and silver in a fine state of division, at an elevated temperature. This coloration has been supposed by Stas to be silicate of silver. We think there is just as good chemical reason for supposing it to be aluminate of silver, or a combination of either lime, potash, or soda with the oxide of silver (Ag₂O). Or the oxide of silver may be simply mechanically dissolved in the glass, owing to the heat employed. Furthermore, the evidence that this yellow coloration is

* *Traité de Chimie*, 1831, 3, p. 96. † *Traité de Chimie*, 1846, 2, p. 484. ‡ *Gmelin's Handbuch*, 6, p. 182. § *Nouvelles Recherches sur les Lois des Proportions Chimiques*, etc., 1865, p. 176. ¶ *Fresenius's Zeitschrift*, 7, p. 229. † *Die Metallurgischen Röstprozesse*, 1866, p. 121.

due to a fine film of metallic silver is very plausible. This yellow compound has never been analyzed, and is in short only a coloration, which of course affords very meager ground on which to base an idea of a new chemical compound.

In Plattner's *Blow-Pipe Analysis* (Richter, Cornwall), page 309, we find the following:

"Slags containing silver often owe its presence chiefly to fine, disseminated particles of argentiferous matte, although some slags contain silicate of silver." A statement without evidence is valueless, however good the authority. The only evidence I have been able to find that silicate of silver has been made in the wet way by chemical decomposition is to be found in Gmelin-Kraut's *Inorganic Chemistry*, vol. iii., page 970. Here we note a statement that "a solution of silver oxide in $2(\text{HF})\text{SiF}_4$, evaporated to the consistency of sirup, deposits hygroscopic crystals of $2\text{AgF}\cdot\text{SiF}_4 + 4\text{H}_2\text{O}$. Out of a solution of the above compound, ammonia precipitates a yellow basic salt, if added in small quantities. An excess of ammonia precipitates silicate of silver."

The above-mentioned experiments we have repeated, using as great care as possible, as follows: An aqueous solution of nitrate of silver was prepared by dissolving chemically pure crystals of this salt in distilled water. To this solution, there was allowed to drop an aqueous solution of chemically pure calcium oxide, after passing through a filter-paper. By this mode of procedure, we were able to prevent any contamination of the oxide of silver with either calcium or silver carbonate. Owing to the readiness with which Ag_2O is decomposed by sunlight, this salt was made at night. Owing to the instability of a solution of lime-water, we preferred to leave a small amount of nitrate of silver in the solution, before filtering and washing the precipitated oxide. This oxide, thus prepared, was treated with a strong solution of hydrofluorsilicic acid, which acid we prepared by causing SiF_4 to pass into distilled water, using the ordinary precautions. Upon evaporating this liquid, in which argentic oxide had been dissolved, upon the water-bath, some gelatinous silica separated, owing to the well-known property of this acid, which was used in excess. There was also a slight separation of either metallic silver or a mixture of $2\text{Ag}_2\text{O} + 3\text{Ag}_2\text{O}$, as pointed out by Vogel.*

Upon evaporating to a small volume, we filtered off this precipitated silica and the dark-brown to black compound, and continued the evaporation to the consistency of sirup, and obtained the crystals mentioned by Gmelin, which we have reason to believe have the formula $2\text{AgF}\cdot\text{SiF}_4 + 4\text{H}_2\text{O}$, as ascribed to it. Upon taking a portion of this concentrated salt and adding ammonia, we also obtained a yellowish precipitate, which soon darkened. This, we think, is a mixture of Ag_2O and gelatinous silica, and not a definite chemical compound. If to a solution of the above salt one adds ammonia in excess, it is stated that silicate of silver is precipitated. This statement must be, we think, entirely erroneous. This precipitate received no quantitative analysis, hence no formula and none of its properties are given. I find, under these circumstances, that a white gelatinous precipitate is formed, which is simply hydrated silicic acid, more or less contaminated with Ag_2O . It is difficult to remove the last traces of silver by washing, owing to the nature of the case, and there will not be found, by estimating the silver (which we did roughly by an ordinary assay), an amount of silver to correspond to the silicate of silver. In view of the above experiments, I think there are very good reasons for the belief that silicate of silver has not as yet been formed in the wet way.

I next made three experiments with the view of forming either silicate or silicide of silver through the agency of heat, as follows:

Experiment No. 1.—A number of silver beads, obtained from the assay of ores and lead bullion, was dissolved in nitric acid, the gold separated as usual. To the nitrate of silver thus formed, hydrochloric acid was added, and the resulting precipitated chloride, after washing, was reduced with metallic zinc. The silver thus obtained was scorified with lead and cupelled. I then took 6.119 grams of this silver, and after polishing and flattening upon an anvil, transferred it to a smooth scorifier. Upon the top of this silver was then placed 0.684 gram of pure anhydrous silicic acid. This scorifier was then covered with another scorifier, in the top of which had been previously filed four small semicircular openings at right angles, to allow a free access of oxygen. These scorifiers were then placed in an ordinary assay muffle and subjected to a heat for ten days and nights. The temperature during this trial of course greatly varied. During a portion of the nights, there was only a dull-red heat; and during the day, the heat was as great as it was possible to attain in an assay furnace. The silver was of course melted and cooled a great many times; and consequently there resulted considerable sprouting, and many very minute globules were noted to form from time to time around the sides of both the bottom and the upper scorifier. On observing this mixture from time to time, no chemical change was perceptible. At the end of the tenth day, on examining the silica quite closely, there could be seen a very faint buff tint in places; but this coloration was so slight that we certainly could not ascribe this to the formation of either silicate or silicide of silver. This tint may have been due to a small amount of alumina, or alkalis from the scorifier, or a trace of Ag_2O , or perhaps some accidental impurity. The silver had a very marked tendency toward crystallization; having upon the sprouted portions a slight resemblance to plate or tablet-like surfaces. The greater portion of the silver had some silica more or less imbedded in the surface. Owing to this last-named fact, together with the projection of the small globules of silver, it was impossible to weigh the silver and silica with any thing like accuracy; but the weights had practically remained the same. A portion of the silver was taken and placed in a blacksmith's vise, and filed into a square plate, and then treated with dilute nitric acid, when it was found that the silver readily dissolved, giving rise to no flocculi of gelatinous silica: neither was it possible to obtain any flocculi upon adding ammonia. I will state that, in filing the silver, I noticed a few grains of silica deeply imbedded, and for this reason there was noticed a trifling amount of granular silica from the nitric acid solution.

This experiment proves, we think, that silica and silver, *per se*, will not unite, forming a definite chemical compound. This view is strictly in accordance with the experiments made by Dr. Percy and his colleagues, as will be seen from the above extracts.

* Jahresbericht, 1862, p. 229.

Experiment No. 2.—One gram of pure nitrate of silver was placed in a scorifier and heated in the assay muffle for three hours at a low temperature. At the expiration of this time, the nitrate was found to be entirely decomposed into metallic silver, and a very minute film of what was supposed to be Ag_2O , because before removing the scorifier, the heat was allowed to drop to a point insufficient to decompose this oxide. By breaking the scorifier, it was plainly evident that there was some absorption of the nitrate of silver while in a fused state. This fact we made play an important rôle in experiment No. 3.

Experiment No. 3.—Since it has been shown that silica and silver can not be made to unite directly (see Experiment No. 1), it was thought that, by taking a salt of silver and intimately mixing with this pure silicic acid, a chemical change might be effected in a manner which has many analogies in organic chemistry. Inasmuch as the nitrate of silver melts at 198 degrees C., without suffering any change;* and inasmuch as, should there be an amount of nitrate greater than was necessary to unite with the silica, it would be readily absorbed by the scorifier, and thereby occasion a purer body than we could otherwise obtain, we decided, for these and other reasons, to use the nitrate of silver. If there be such a compound as silicate of silver, we supposed it could be produced, through the agency of heat, according to the following reaction: $2\text{AgNO}_3 + \text{SiO}_2$ (heated) = $\text{Ag}_2\text{SiO}_3 + \text{N}_2\text{O}_5 + \text{O}_2$,* the sum of the atomic weights of $2\text{AgNO}_3 = 340$, of $\text{SiO}_2 = 60$. Hence, by taking a quantity of nitrate of silver and silicic acid proportional to these numbers, and heating, the silicate of silver should be formed according to the above formula, if it is possible to form this silicate. We took 6.8 grams (that is, 3.40×2) of pure crystallized AgNO_3 , and 1.20 grams of pure anhydrous silica, which was obtained by the decomposition of a soluble silicate. These substances were each separately powdered in an agate mortar, combined, and again powdered. This mixture was then transferred to a scorifier, covered and subjected to a low heat in the assay muffle. At the expiration of three hours, the scorifiers were removed and allowed to cool. It was found to have suffered a very marked and unexpected change. The entire mass was slightly agglomerated together, giving a bright brick-red color. This color was remarkably homogeneous—if any thing, a trifle redder through the central portions. This product so closely resembled anhydrous sesquioxide of iron that I immediately tested for iron—of course, not finding a trace. I may add that, in all of these experiments, I have endeavored to operate upon strictly pure substances, and have preferred to make each substance myself, rather than to introduce uncertainties by using the commercial articles.

By closely observing this red product, a few grains of silica were detected; otherwise, it seemed to be homogeneous. There was a slight absorption of nitrate of silver by the scorifier, and a subsequent decomposition into metallic silver. (See Experiment No. 2.)

This red product, when treated with nitric acid, is readily acted upon, forming nitrate of silver, and leaves the silica chiefly in the granular state. There was, however, an insignificant amount of silica dissolved, which was detected by neutralizing with ammonia. We ascribe the presence of this soluble silica to the filter ash in the preparation of the silicic acid. It now became evident that this red body could not be due to any of the ordinarily described oxides of silver, nor could it be the nitride of silver.

Various portions of this red compound were powdered in an agate mortar, and duplicate experiments were tried, as follows: Half a gram of the substance was weighed out, transferred to a scorifier, containing some test-lead, mixed, covered with lead, and scorified and cupelled according to a regular assay:

a gave a button of 0.3175 grams.

b gave a button of 0.31675 grams.

This corresponds to 63.5 per cent Ag + 63.35 per cent Ag respectively. The formula Ag_2SiO_3 requires 73.97 per cent Ag. The very irrational formula AgSiO_2 requires 64.28 per cent Ag, which, while it agrees fairly well with the above-mentioned results, yet introduces a supposition entirely incompatible with chemical philosophy. By boiling this red compound with distilled water, a markedly alkaline liquid is obtained. Ammonia readily dissolves the red compound, which soon darkens; there is left granular silica. It now became evident that the red color was due to an oxide of silver, and that the silica was not chemically combined with the silver. It was noted that this red oxide was quite permanent in diffused light, but darkened in sunlight. Thinking that the silver might possibly be unevenly disseminated through the mass, I took the entire quantity, powdered in an agate mortar; and from this a half-gram of substance was taken, cupelled as before, yielding a button of silver that weighed 0.316 gram, or 63.2 per cent Ag, which showed that there was no unequal distribution. We next took a half-gram of this powder, placed it in a tared porcelain crucible, and subjected it to a high heat in the assay muffle. After remaining at this temperature for half an hour, the crucible was removed, allowed to cool, and weighed: it suffered a loss of 9.20 per cent. This loss was due unmistakably to oxygen. The silica was then determined, giving 25.80 per cent, which was evidently somewhat low, owing to a small amount of alkali, as previously mentioned. The analysis gave 63.20 per cent of silver, 9.20 per cent of oxygen, 25.80 per cent of silica; total, 98.20.

By dividing 100 into two numbers which exist in the ratio of 62:20:9.20, we obtain 87.29 + 12.71, or, if the silica was absent, we should have 87.29 per cent of silver; 12.71 per cent of oxygen; total, 100.

The formula Ag_2O_2 requires 87.10 per cent of silver, 12.90 per cent of oxygen.

Mr. Walter T. Page, chemist to the works, also carefully analyzed this compound, with the following results: 63.44 per cent of silver, 9.40 per cent of oxygen, 25.40 per cent of silica; total, 98.24.

By deducting the silica, we should obtain 87.09 per cent of silver + 12.90 per cent of oxygen, which is almost an exact agreement with the percentage composition required by the above formula.

Fownes states (p. 355): "Silver dioxide, Ag_2O_2 , is a black crystalline

* See Pohl, Jahresbericht, 1874, p. 906.

* Person found that before this salt reached the temperature of incipient redness, and while it was in tranquil fusion, bubbles of colorless gas (oxygen) were evolved from it, which soon acquired a slight reddish tint from the presence of nitrous vapor. See Percy, *Gold and Silver*, p. 118.

substance that forms upon the positive electrode of a voltaic arrangement employed to decompose a solution of silver nitrate. It is reduced by heat; evolves chlorine when acted upon by hydrochloric acid; explodes when mixed with phosphorus and struck; and decomposes ammonia with great energy and rapid disengagement of nitrogen gas."

Regnault-Strecker (p. 655) says that this oxide is also formed by allowing ozone to act upon moistened silver-leaf.

Bloxam tells us (p. 362) that peroxide, probably Ag_2O_2 , is not known in the pure state.

It will be seen from the above that the black oxide of silver, which is supposed to have the formula Ag_2O_2 , differs in many respects from the oxide that we have discovered and analyzed. The question now arises, Is this red oxide isomeric with the black oxide of silver? Since there is ground for the statement that the black oxide is not known in the pure state, it is highly probable that the oxide formed by electrolysis does not possess the formula Ag_2O_2 .

While there are cases of isomerism in inorganic chemistry, yet the number is quite limited; and it appears to me that it is more reasonable to suppose that, since there has been detected an oxide of silver, which is unquestionably the most stable oxide known, the formula Ag_2O_2 is the correct one for this new oxide; and that the formula for the black oxide is not yet known. Owing to the great instability of the black oxide, a sharp and accurate determination is necessarily difficult.

The only evidence that I have been able to find that this red oxide of silver has been previously observed is to be found in Plattner's *Blow-Pipe Analysis*, and also in an article by the writer, which was read before the American Chemical Society, and subsequently published in the *American Chemical Journal*.

Plattner states, page 309, that "compounds of silver with metals volatile at a high heat, as *antimony*, *lead*, and *bismuth*, yield a coat on coal. After nearly the whole of these metals have been volatilized by long blowing, the coat becomes reddish to carmine-red, from oxide of silver, if there is not too little of that metal present, and the remaining button shows a more or less pure silver color. This reddening of the coat is highly characteristic, and may always be regarded as indicating silver." And on page 409, it is said, "When a large silver button is heated for some time after it has brightened, some silver may easily volatilize, as can be seen from the rose-colored coat that forms on the cupel."

This surmise by Plattner we think we have established, and have given its formula as seen above. This rose tint I think many chemists have certainly observed.

I have noticed this tint also, in cupelling large quantities of silver by means of the English cupellation method.

We have also noticed upon two different occasions—once at Leadville, and once in Denver—a rose sublimate that formed upon the water-jacket, during an abnormal working of a lead shaft-furnace. This rose-colored body contained silver; but owing to the difficulty of obtaining the body in quantity, we were not able to give it any extended study, and hence we are not prepared to state positively that it was due to silver. In the article above referred to, we stated that, when chloride of silver is taken up in a loop of a platinum wire and "strongly heated in the oxidizing flame [of a blow-pipe], a brown vapor was noticed, which is in all probability oxide of silver." We further state in this article: "When the vapor from chloride of silver is allowed to deposit upon glass, there is seen chiefly a red spot, most intense in the center, bounded by a very faint tinge of yellow, which tint is not perceptible when one looks directly through the glass, but is distinctly seen when the glass is held at an obtuse angle. The yellow tint changes to a red upon exposure to light, and the entire spot assumes a much darker red tint."

In conclusion, I will state that I have repeated the experiment for forming this red oxide of silver, using in the second experiment silicic acid, which was prepared by the decomposition of silicon fluoride (SiF_4) by means of water; and that this oxide was in no way different from the body previously described. Upon removing the cover in this second experiment, during the heating operation, there were noticed the red fumes of nitrogen tetroxide (N_2O_4).

In preparing this oxide, care should be observed not to raise the temperature too high; otherwise, we should obtain only a mixture of metallic silver and silicic acid.

I should be glad to have some chemist or metallurgist repeat any or all of my experiments; and I think it would be a matter of much interest to prepare this oxide and thoroughly study its properties, which, owing to the limited time at my disposal, I shall not be able further to do.

THE CHICAGO MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.—Dr. R. W. Raymond, Secretary, has issued the following circular: The next meeting of the Institute will be held at Chicago, beginning Tuesday, May 27th. The following programme is provisionally announced: Tuesday evening, opening session; Wednesday, excursions to South Chicago and Pullman; Wednesday evening, session; Thursday, excursion to La Salle and other points; Friday morning and afternoon, sessions; Friday evening, banquet. The hotels in Chicago will probably be crowded; and members desiring hotel accommodations should write at once to Mr. John Crerar, Jr., No. 109 Dearborn street, Chicago. Headquarters will be at the Grand Pacific Hotel. Board, from \$3 to \$5 per day, according to rooms. Members expecting to attend the meeting should notify the Secretary (Box 223, New York P.O.) at an early day. Arrangements as to railroad facilities, etc., will be hereafter communicated to those who have so notified the Secretary.

FURNACE, MILL, AND FACTORY.

W. S. Estey, manufacturer of wire cloth, has moved his warerooms to No. 86 Fulton street, New York City.

Reiss Brothers' sheet-mill, at Newcastle, Pa., which has been idle since the failure of its owners several months ago, has started up in every department.

At Youngstown, Ohio, the nail factory of Brown, Bonnell & Co. is running to its full capacity. Andrews Brothers & Co. have their mill running to nearly its full capacity. The Hannah furnace has been damped down while necessary repairs are made. Arrangements are making to blow in the Falcon furnace the latter part of this week.

The citizens of Massillon, Ohio, have given to Wetherell & Wells, of Bellaire,

the old Volcano furnace property, comprising seventeen acres of land, on which the firm will erect a window-glass factory, employing 100 men. The plant will cost \$50,000.

The Gem furnace of the Shenandoah Iron Company goes into blast immediately. This will increase the output from 90 to 100 tons per day.

The furnace of the Crozier Steel and Iron Company, at Roanoke, Va., will go into blast on the 17th inst.

The Vulcan Iron-Works, of Wilkes-Barre, Pa., recently turned out a 25-ton ventilation-fan, and also a 24-inch cylinder 36-inch stroke engine to operate the fan, for the Susquehanna Coal Company at Nanticoke, and are constructing for the Lehigh & Wilkes-Barre Coal Company a pair of engines, 32-inch cylinders and 60-inch stroke, and a cast-iron conical drum that will wind 1600 feet of two-inch wire rope.

The vapor stove manufacturers of Cuyahoga County, Ohio, have organized a national association, the object being to equalize prices and establish uniform rates. The combination is said to include seventeen companies, eight in Cleveland, two in Detroit, two in Troy, two in St. Louis, and one each in Chicago, Albany, and Cincinnati. They have a capital of \$1,500,000. The factories are able to turn out annually 75,000 stoves, valued at \$750,000. The headquarters of this pool will be in Cleveland. Suits will be brought within the next few days against all manufacturers using without license the Davis-Blake safety tank, and Clough's movable perforating cup, which are essential parts of all modern vapor stoves.

The old Virginia Nail and Iron-Works, at Lynchburg, Va., are in full operation.

A company is to be organized at Denver, Colo., with a capital of \$20,000, for the manufacture of white lead.

An iron foundry to cost \$30,000 is to be built at Beverly for a son of Jesse W. Starr, of Camden, who formerly owned and operated Starr's Iron-Works.

Mr. E. T. Cassidy, representing the steel-works at Remler, Pa., proposes to enlarge the works at Cumberland, Md., at an expense of \$100,000, and conduct it on a large scale. For the purpose of lending him encouragement, a public meeting of business men and others has been held in that city.

The Youghiogheny River Coal Company, of Erie, Pa., has contracted with the Brown Hoisting and Conveying Machine Company, of Cleveland, for a large plant for handling coal and ore on the Lake Shore & Michigan Southern Railroad dock, at Ashtabula harbor.

Mr. Alexander E. Brown has recently obtained patents on an improved construction of tramway that enables him to carry material at long distances on a level tramway. He has also perfected an electric arc-lamp of decidedly practical utility.

Messrs. Corey & Co., of Chicago, build all kinds of mining and construction cars in wood and iron, and are the exclusive owners of the Healy patents. This company furnished the Conglomerate Mining Company, of Lake Superior, with a lot of side dumping-cars, of channel iron, of a capacity of seven tons, which frequently receive from the skip a single mass of rock weighing 2000 pounds, falling from a height of six feet, a blow that would crush any car made of wood, however braced.

LABOR AND WAGES.

In consequence of the strike of the coal-heavers at Harper's rolling-mill, Newport, Ky., for the restoration of the wages paid last fall, the mill was closed April 12th. There are about sixty strikers, and they cause the idleness of six hundred employes.

The City of Montreal, which reached this port April 13th, brought two hundred miners bound for the Pennsylvania coal-fields.

A cable from Paris dated April 13th says that a committee representing the various French miners' syndicates met on that day at St. Etienne. Delegates were present from all the northern portion of France. A proposal for a general strike was rejected. A resolution hoping that the government would not for any length of time leave the miners at the mercy of the companies, but introduce measures to revise the law and protect the workmen, was passed. The symptoms of a strike are weakening.

There was some excitement among the striking coal miners at Decatur, Ill., April 10th, when they learned that the coal company had got between twenty and thirty men to go into the mine and go to work. The men quit because they refused to submit to a cut of 10 cents a ton in the price of mining coal.

A meeting of workmen, under the auspices of the Central Labor Union, was held in Union Square, New York City, April 14th, for the purpose of supporting the eight-hour bill now before the Senate at Albany. It is estimated that about nine thousand people were present.

The striking colliers of the Anzin coal district, France, says a cable from Paris, dated April 15th, have decided to resume work.

The Molders' Union, at Troy, New York, has accepted a reduction of 20 per cent from last year's prices, and all the foundries will start up at once, after a dead-lock of three months. This affects about 2000 men.

The employes of four furnaces at Newcastle, Pa., struck April 16th, for an advance from \$1.60 to \$2 per day. The furnaces were closed and several hundred men are idle.

The announcement to all employes on the Grand Trunk Railroad of a reduction of 5 per cent in wages for the next six months gives grave fears of a strike all over Canada. The drivers and firemen are determined on stepping out, as, being well organized, they can stand a hard fight with the company. Meetings will be held at Montreal and Toronto Sunday, when the men will give an ultimatum. The extraordinary falling off in traffic receipts is the alleged cause of the proposed reduction, the decrease last week being \$70,000 on the corresponding week of last year.

The anti-Hungarian agitation has broken out in the vicinity of Wilkes-Barre, Pa., and the outlook is serious. The drivers, runners, and mine boys in the vicinity of Kingston have organized for the purpose of driving out the Hungarians. While the miners take no active part, they are in sympathy with the movement. The Hungarians are determined to hold their ground, and are procuring arms. The coal companies, while not supporting the Hungarians, will not oppose them, and will treat all alike.

A shut-down of all the coal mines in the Monongahela River District, Pa., is expected. The acceptance of the reduction by the miners of the third pool has caused general dissatisfaction. The operators of the first and second pools claim that the third pool coal is as valuable as that mined in the lower pools, and will accordingly order a similar cut. If they persist in this, the fourth pool operators will reduce to 2½ cents a bushel. The miners, who have already accepted the two reductions, assert that they will not submit to a further scaling of wages. The New York & Cleveland Gas-Coal Company denies that any trouble is anticipated in the Plum and Sandy Creek mines. A large majority of their miners accepted a half cent reduction, and those who refused sought work elsewhere, or were discharged.

Between thirty and forty Hungarians and Poles employed at the Edgar Thomson Steel-Works, at Braddock, Pa., engaged in a bloody riot April 17th. Pistols, knives, clubs, and every conceivable weapon were freely used. The fight lasted two hours, and when finally quelled by the citizens, who were compelled to organize a vigilance committee to suppress the riot, it was found that three men had sustained serious injuries, and that a number of others were slightly hurt. The riot was the result of ill-feeling between the Poles and Hungarians.

RAILROAD NEWS.

The annual report of the Denver & Rio Grande Railroad for the year 1883 shows gross earnings, including income from other sources, \$7,476,076.68; operating expenses (\$3042 per mile), \$4,743,111.52; income, after deducting operating expenses, \$1,753 per mile—\$2,732,965.15; interest on bonds, rolling stock, taxes, and insurance, exchange account, etc., \$2,574,968.29; leaving surplus over all charges, \$157,996.86. There was no payment to the sinking fund for 1883, such payment not being required until a 6 per cent dividend is shown to be earned on the stock. The amount paid on account of principal of rolling stock trusts in 1883 was \$525,000, of which \$51,000 were paid by surrendering that amount of certificates, Series E, which were held in the treasury, to the trustees, leaving the net cash payment \$474,000; \$1,000,000 of consolidated mortgage bonds were received from trustees during 1883, of which \$881,000 remain in the company's treasury.

A long-pending dispute between the Rochester & Pittsburg and the Erie Railroad has at length been submitted to arbitration. The former has selected Mr. Chauncey M. Depew, and the latter John A. Wright, of Philadelphia, as arbitrators. The dispute relates to a five years' contract by which the Rochester & Pittsburg was allowed the use of a part of the Erie's track in McKean County, Pennsylvania. The fight, at first conducted by the other two companies against the Rochester & Pittsburg, is now a triangular contest, in which the Rochester & Pittsburg seems to be getting the best of it. Erie is selling coal in Buffalo as low as \$1.60 per ton, for prompt delivery, though it will not make contracts at that figure. The regular price is \$2.40 per ton. Notwithstanding this competition, on April 15th, President Brown signed a contract with the Rome, Watertown & Ogdensburg Railroad to supply it with 240,000 tons of coal at \$2.35 per ton. Two weeks ago, at the letting of the contracts to supply the Grand Trunk Railroad with coal, the Rochester & Pittsburg secured contracts for 150,000, while the other two roads had to content themselves with 130,000 tons. The price is withheld.

The dispute over the 30,000 acres of coal land in the Green River districts, alleged to have been transferred by the Northern Pacific to the Oregon Improvement Company, is now in a fair way of being settled. Mr. Smith, of Boston, who represents parties interested in the company, has stated, according to the *World*, that, though the formal application of the Improvement Company for these lands has been somewhat sternly rejected by the Northern Pacific, yet he had been assured by a director of the Northern Pacific, and a member of its Land Committee, that this action had been taken merely that the facts in the case might be brought out and justice be done.

The Missouri Pacific Company is making extensive arrangements for developing large fields of coal in the Indian Territory, and is now mining within the limits of the Choctaw Nation at the rate of 250,000 tons per annum. The company is prospecting fields lying easterly from McAllister, and meeting with most encouraging results.

The Pittsburg, Cleveland & Toledo Railroad Company has leased 850 feet of the dockage on the Cuyahoga River at Cleveland, Ohio, about three miles from the mouth of the harbor, to facilitate its lake traffic in coal and iron ore.

The coal dealers and manufacturers in Washington avenue, Philadelphia, have issued a call for a meeting April 17th, to take action upon orders that have recently been issued by the Pennsylvania Railroad Company advancing its tolls on coal and merchandise coming from other roads for delivery on that thoroughfare. This action is regarded as a blow at the Philadelphia & Reading Railroad, and not only coal dealers, but all classes of manufacturers, are affected by it.

COAL TRADE NOTES.

MARYLAND.

At the annual meeting of the stockholders of the Cumberland & Elk Lick Coal Company, officers and directors were elected as follows: President, Alexander Shaw; Vice President, A. Chamberlin; Secretary and Treasurer, C. M. Hout; Directors, C. C. Baldwin, H. G. Davis, Lloyd Lowndes, Charles Marshall, Alexander Shaw, R. W. Baldwin, and A. Chamberlin.

The Maryland Coal Company started its New Detmold mine, at Lonaconing, April 10th, with a large force of miners.

In the case of the Atlantic & George's Creek Consolidated Coal Company vs. the Maryland Coal Company, an injunction, says the *Cumberland Times* of April 12th, had been granted to restrain the Maryland Coal Company from prosecuting a suit against the Atlantic & George's Creek Consolidated Coal Company for the mining of coal on land in Alleghany County which had been conveyed to that company by Henry G. Davis in 1872, and which he had obtained from the Maryland Coal Company. The injunction for this and for other relief was dissolved by the court below; and this decision was affirmed by the Court of Appeals.

It is stated that the suit of the George's Creek & Cumberland Railroad Company vs. Messrs. Phelps for \$200,000 for breach of contract has just been settled by the payment to the company, by the heirs of Willis Phelps, deceased (head of the Phelps firm), of a considerable sum of money.

PENNSYLVANIA.

ANTHRACITE.

A charter has been granted to the New York & Pennsylvania Coal, Iron, and Coke Company, with a capital of \$3,000,000. The business will be transacted in the counties of Somerset and Cambria.

A report from Pottsville states that a lease has been recorded there from the Delano Land Company to Caleb B. Knevals, trustee for Caleb B., Charles B., Jane A., and Stephen M. Knevals, Horace A. Foote, S. Anna Ives, and William Law, of New York, granting them the right to mine coal from the Daniel Hurley, William Dewart, and John Lytle tracts of land in this county. The lease runs until the 1st of June, 1901. The royalties are arranged upon an ascending scale, ranging from 35 cents a ton for stove and larger sizes and 15 cents a ton for nut and smaller sizes for the first year, to 49 and 29 cents a ton respectively in the last year. The lessees agree to mine 50,000 tons this year and 70,000 tons a year hereafter. They are associated under the name of the Primrose Colliery.

The machinery of old Coal Ridge colliery, drowned out and abandoned, is moving to Lost Creek.

Packer No. 5 colliery, of the Lehigh Valley Coal Company, promises to be a very important addition to the collieries of that company. The shaft is down over a hundred feet. The colliery is located at Rappahannock, the western end of the Shenandoah Valley.

An explosion of fire-damp occurred, April 14th, in the coal mine of John A. Wood & Sons, near Elizabeth, killing two men instantly, and injuring several others. The explosion fortunately occurred when but few men had gone to work, thus avoiding great loss of life.

A large mass of rock fell, on April 12th, in the gangway at the Excelsior colliery, killing Thomas Harper and fatally injuring Francis Glisick, miners.

The new slope at East Franklin will be completed in a month.

Lentz, Lilly & Co. are going to drive a 180-yard tunnel at Park colliery No. 1. A jig-house is building at Park No. 1 colliery. One hundred tenement-houses and a big company store are building at Park No. 2.

The drill-holes at East Franklin are down between 300 and 400 feet—about half-way.

The water is to be pumped out of the old slope at Middle Creek in the near future.

Logan colliery, near Centralia, operated by Lewis A. Rielly & Co., shipped 1200 cars of coal, averaging 6½ tons each, last week, in 5½ days.

Morris Ridge colliery lost four days' work last week, owing to the flooding of the mine by the tapping of a spring while driving an air-hole.

The Buck Mountain vein has been struck, and is worked at Morris Ridge colliery. The vein has proved far more productive than was expected.

The Richardson colliery is putting in two new steam-pumps in place of the old ones sent to the Pottsville shop for repairs.

Tunnel Ridge colliery is losing considerable time on account of the water inside, the pumps being unable to keep up with it at times.

The slope at Buck Mountain colliery, near Mahanoy City, is down 107 yards. It will be pushed 400 yards farther to the basin. The foundations are digging for the breaker.

At North Schuylkill colliery, the Diamond Drill Company has one of its machines at work, boring two holes from the surface into the workings of the slope. It is the intention to run hoisting ropes down through the holes thus made, to hoist cars from below up to the first lift, thus obviating the necessity of having an engine in the mine at the junction of the first and second lifts.

The Dorrance breaker, Wilkes-Barre, is practically finished.

The Pettesbone shaft, sinking on the property adjoining the river, which is owned by parties of that name, through which coal is to be brought to the surface by the Delaware, Lackawanna & Western Company, is now eighty-six feet deep.

The new Woodward shaft of the Delaware, Lackawanna & Western Coal Company, near Kingston, is down about 655 feet. The sinkers have just passed through the Baltimore seam, which is found to be five feet thick. The men expect to begin timbering again in about two weeks.

Work is rapidly pushed at the new breaker for the Parrish Coal Company, at Plymouth. The services of an extensive force of men are utilized in driving a slope tunnel into the base of the hill, and already excavations have been made for the foundation on which the large engines will be placed.

The extensive coal property owned by the Shoemakers at Forty Fort will soon be partially developed. A large inside tunnel from the eleven-foot vein to the six-foot vein is to be driven at Swoyer's Forty Fort colliery, a large force of men having been retained, and preparations are under way to begin operations at an early date.

COKE.

It is reported that the coke pool has succeeded in getting the control of the United Coke Company, and preventing it from falling into the hands of the Cambria Iron Company.

The Warden & Co. coke-works, at Stonerville, have been sold at sheriff's sale. This plant consists of 72 ovens, 30 houses, and 135 acres of coal. Frick & Co. became the purchasers, paying for the same \$79,500.

The *Connellsville Courier* says that a member of the Connellsville Coke Producers' Association says there will be another increase made in the price of coke on the first of May. He says it is the intention of the pool to gradually increase the price until they get it to \$1.50 a ton at least. President Boyle, when spoken to in regard to the question, said that coke would be cheap fuel at \$1.50. He was unable to give the figures for May, but said there would be several advances made in the next few months. Shipments for the past ten days have been as heavy as usual.

A Westmoreland company is said to have bought 4000 acres of coal in Loyalhana township at prices ranging from \$15 to \$40 per acre. The ovens at the Smithton mines will be fired up shortly.

VIRGINIA.

The Virginia Mining and Manufacturing Company of Cass County has been incorporated with a capital of \$200,000, for the purpose of making tile and mining coal.

POCAHONTAS.—It is stated that 150 bodies have been recovered. The reports as to the number are conflicting. The coroner's jury rendered a verdict that the victims lost their lives by an explosion that was unexpected, unforeseen, and unavoidable. The jury exonerated the mining company, and praised it for its efforts and appliances to prevent such a catastrophe.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY—TOMBSTONE DISTRICT.

EMPIRE.—The mine for the present will remain shut down, owing to the inability of the company to agree upon putting in pumps.

WORONOCO.—Operations will be resumed shortly. All old indebtedness has been cleared, and lead ore has been engaged to run with the manganese and dry ores of the camp. The smelter will start again soon, and from all accounts will be in a position to continue operations.

PIMA COUNTY.

The erection of reduction-works at Tucson is apparently a question of great interest to that city. At present, two gentlemen have come to the front with a suggestion that they will start reduction-works if they can get sufficient encouragement.

PINAL COUNTY.

SILVER KING.—The Windsor mill has been leased for a year to this company, and is getting in working order. Work in the mines continues with favorable results.

RAY COPPER.—The late flood on the Gila River has played sad havoc with this mine, says the *Tucson Citizen*, and placed the company at an expense that was not only unlooked for, but damaging to the workings. The company has a frontage on the Gila River of 2800 feet, and the improvements made by it have resulted in the building up of a town of considerable importance. The company has sixty miners at work and has sixty-five thousand pounds of ore on the dump. It will in a short time begin work on a bridge across the Gila River at Riverside, and will expend a large amount of money in the improvement of roads in the vicinity.

QUIJOTA DISTRICT.

Work continues with unceasing vigor on the Bonanza Company's mines. As the tunnels acquire depth, prospects are growing correspondingly better. From calculations made by the *Prospector* (not allowing for a dip), the vein is still distant about 70 feet. The winze continues to be driven downward through high-grade ore.

The water question is not yet positively settled, but enough has been found to prove that there need be no further doubt on the question. Water in abundance exists in the Baboquivari Mountains, only thirty-five miles east.

CALIFORNIA.

CALAVERAS COUNTY.

MORGAN.—The Supreme Court of the United States has affirmed the decree of the lower court, with costs, in the suit involving the title to this gold mine.

INYO COUNTY.

INDIAN QUEEN.—This mine has been worked all winter. New ground is opening by a long, deep tunnel, and preparations are making to start the mill.

KEARSARGE.—The mines and the old 10-stamp mill have been bonded for a

large amount to P. S. Tulley, who is the agent for some wealthy Western capitalists. Work on the mines will be commenced soon.

MONTEZUMA.—Arrangements have been made to move this old furnace across the mountains to Antelope Springs, Deep Spring Valley, where it will be put to work on ores of that section.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—The official financial statement for March shows cash on hand March 11th, \$116,313.23; bullion bars, \$33, \$76,010.70; total, \$192,323.93; superintendent's drafts, \$18,084.87; dividend No. 13, \$38,446.50; sundry expenses at mine, etc., \$11,103.60; cash on hand, \$124,688.96; total, \$192,323.93; cash on hand March 31st, \$124,688.96.

BULWER CONSOLIDATED.—The south drift from west cross-cut No. 2, 500-foot level, has been advanced 12 feet during the past week, the total length being 183 feet. The vein still holds a width of 15 inches.

GOODSHAW.—The face of the south drift on No. 3 ledge, 600-foot level, shows about two feet of good quartz, the vein-matter being about six feet wide. The indications are very encouraging for a valuable development. The drift was advanced 16 feet during the week ended April 8th.

MONO.—On the 400 level, a vein of ore $2\frac{1}{2}$ feet wide, supposed to be the continuation of the Bruce ledge from the Bodie, has been cut, and it is said will pay to mill Sixty feet east of this, on the same level, a vein from 12 to 18 inches wide of very good ore has also been found, which, it is thought, belongs to the Fortuna ledge.

STANDARD CONSOLIDATED.—For the week ended April 8th, there were extracted and shipped to the mill 481 tons of ore, and 1118 ounces of crude bullion were received. April 7th, \$11,427 were shipped to the company. North drift No. 2, 700-foot level, has been run 6 feet; total length, 170 feet, showing 6 feet of vein. The uprise from this drift has been raised 9 feet; total height, 139 feet, to a point where the vein is $6\frac{1}{2}$ feet wide, and continues broken and mixed with porphyry. The south drift from west cross-cut No. 1, 500-foot level, is in 368 feet, a gain of 8 feet during the week. The vein in the face is about a foot wide. The north drift from the main west cross-cut, 335-foot level, has been advanced 9 feet, making a total length of 67 feet. The south winze is down 124 feet; progress, 9 feet, with a vein 2 feet wide in the bottom. South drift No. 4 from east cross-cut No. 2 is in 34 feet, having progressed 10 feet. The vein is 2 feet wide. The north drift from the Bulwer station is in 25 feet, having advanced 12 feet, with the vein 2 feet in width.

CANADA.

PROVINCE OF NOVA SCOTIA.

OXFORD.—The superintendent telegraphs that the semi-monthly clean-up on the 16th, of \$3500, from the Mill & Coleman lode, yielded respectively \$58 and \$26 a ton. The additional machinery, consisting of new engine and boiler, pump, and a complete system of wire rope transmission, has been in operation for several weeks, and gives satisfaction. Underground operations in the Mill, Coleman, and Paris lodes are pushed with a force of 75 men, so that the mill can be run on full-time twenty-four hours a day. Unusually fine ore has been exposed on the Mill lode in the tunnel east of No. 5 shaft, and also in the stope just east of No. 9 shaft on the Coleman lode.

SATEMO GOLD QUARTZ COMPANY.—The mining property, machinery, and every thing belonging to this company will be sold at public auction at the Exchange salesroom, No. 111 Broadway, New York City, May 2d, at twelve o'clock M.

COLORADO.

CHAFFEE COUNTY.

GARFIELD.—The mine shows a large body of ore, from which a sample car-load has been shipped to Denver. The vein is about eight feet wide, and the workings on it consist of a shaft, from which, at a depth of seventy feet, drifts are run in both directions. From the main drift, the car-load of ore was taken. This ore for the most part consists of honeycomb quartz, and the width of the pay streak is about eighteen inches. A peculiar feature of this mine is its entire freedom from water, even at its greatest depth, 120 feet from the surface. This fact, together with the looseness of the vein, enables the mine to be worked very cheaply.

CLEAR CREEK COUNTY.

LEBANON.—It is rumored that this company intends to begin development-work.

MENDOTA.—The report for the month of March shows that the mine is paying better than it ever has before, and all the lessees are making money. The shipments for the month were twelve car-loads, valued at \$10,061.73. The Victoria tunnel, now driving to intersect the Mendota, is in 506 feet, eighty and a half feet having been driven last month. The breast of the tunnel is 275 feet from the lode, and the owner expects to have it finished by about the first of July.

GRAND COUNTY.

ALICE ORMAND.—The mine is worked systematically and with good results. A night and day shift are running, and the ore is improving in quantity and in quality.

HINSDALE COUNTY.

CALIFORNIA.—There is a fair prospect that the mine will pass into the hands of capitalists who will develop and work it extensively.

LAKE COUNTY.

There are to-day in this district, says the Leadville Herald, no less than a dozen idle prospect properties, well equipped with mining machinery, and on which their owners have expended from \$25,000 to \$100,000. Among the most important are such enterprises as the Wolfe Tone, Cyclops, Niles-Augusta, Thesplan, and Modoc, on Carbonate Hill; the Denver City, Lee Basin, Alleghany Consolidated, and Little Miami, on Yankee Hill; American, Bangkok, and Aztec, on East Fryer Hill; the Horseshoe and several others on Iron Hill; the Mike & Starr, Highland Chief, Alps, Antioch, and a score of minor properties on Brece Hill and Bald Mountain.

BRECE.—For over a month, this property has been steadily worked. The daily shipments at present range from ten to forty tons. The product of the mine is all sent to the steel-works of the Colorado Coal and Iron Company, at Pueblo, where it is manufactured into steel rails. The Brece Company has contracted with these works for fifty tons a day after April 15th, when it is thought the roads will be in better condition and less difficulty encountered in hauling the ore from the mine to the depot. The price paid the Brece Mining Company for its ore delivered on board the cars at Leadville has not been ascertained, but probably does not exceed five dollars a ton.

EVENING AND MORNING STAR.—The acting manager has advertised for bids for leases for portions of the properties controlled by these companies. The grounds to be leased embrace the main and west workings of the Evening Star mine; and the main and lower Waterloo workings of the Morning Star Consolidation; also the dumps on these properties. The Morning Star has closed a three months' contract with the Grant Smelting Company for the output of its mines.

LITTLE CHIEF.—The net earnings for March amounted to \$3000.
MOYAMENSING-MAY QUEEN.—The compromise workings during March yielded 1500 tons of ore, averaging about twenty dollars to the ton. The product of the

mine this month will not be so large, the working force having been reduced to from fifteen to eighteen men.

NESTOR.—The building of the concentrating mill in Mosquito Gulch is making good headway. The mill is one of the largest of the kind in this section of the State.

PITKIN COUNTY.

The Aspen smelter is receiving about thirty tons of ore daily from the mines of the district. The Vallejo mine alone averages ten tons a day.

SILENT FRIEND.—The mine has been leased to Samuel I. Lyon & Co., who will, as soon as arrangements can be made, put a force on to do development-work. The mine is in bad shape, having been gutted last summer and fall of most of the mineral in sight, and it will require from thirty to sixty days' work before any considerable output can be made. Developments have not yet reached 150 feet in vertical depth, and upward of 200 tons of mineral have been shipped. The lessees have capital, and will arrange to operate the property on a large scale.

SUMMIT COUNTY.

MOUNTAINEER.—The owners are at work building a shaft and ore-house on that property. Machinery is to be placed in the mine, and a contract to sink to depth of 125 feet has been let.

ROBINSON CONSOLIDATED.—Mr. C. D. Moore, in charge, has leased the greater portion of the old workings in small tracts to the former employes of the company. The leases are for thirty days.

DAKOTA.

FATHER DE SMET.—For the week ended April 8th, the superintendent's report shows ore extracted from the first, second, and third levels, 1910 tons. Ore milled, 1960 tons. During the past ten days, from the present face of the Golden Gate south header, third level, a west cross-cut has been run 18 feet in length.

GARFIELD.—This company some time ago purchased the Great West mine, and has built a twenty-stamp mill for the treatment of the ore. The mill will begin operations very soon.

GUSTIN BELT.—The company has purchased the remaining half-interest in Mineral Claim No. 55, situated on Blacktail and in the mouth of Grayback Gulch. The tract contains seven acres, and is splendidly situated for a mill-site and for dumping purposes. The company has secured an abundance of water, and it is stated that the mine will be provided with ample reduction facilities.

MICHIGAN.

There is considerable excitement at Shelby, Oceana County, over discoveries of gold. Paying quantities were found on a bed of rock at a depth of eighty feet. The first was found in sand pumped out of a drive-well. The area of the deposit is a matter of conjecture.

CALUMET & HECLA.—No. 5 stamp, in the Calumet & Hecla dressing-works, with the Leavitt new head equipment, has gone into operation, and is daily crushing 200 tons of rock.

WEST CHAPIN.—Nothing of value has yet been found on this tract, though they are down 169 feet, and have drifted a distance of 180 feet. The showing is considered good, however, and work is going ahead steadily.

MONTANA.

LEWIS & CLARKE COUNTIES.

MONTANA COMPANY (LIMITED).—The new twenty-stamp mill at the Drum Lummon mine started up April 7th.

MEAGHER COUNTY.

The Queen of the Hills, Homestake, and O'Brien properties have been bonded for \$45,000 for a term of five months, the bond expiring on the 31st of August. The agreement is to expend \$5000 in developing the property. Preparations for work have already begun.

NEVADA.

ELKO COUNTY.

NAVAJO.—The usual progress has been made with the work in and about the mine. Five hundred and eight cars of unassorted ore were extracted during the week ended April 3d.

EUREKA COUNTY.

ALBION CONSOLIDATED.—The tributaries are regularly shipping ore to the Eureka Consolidated furnaces.

EUREKA CONSOLIDATED.—Two suits have been commenced by this company against Elizabeth D. Traylor, administratrix of the estate of W. W. Traylor, deceased. One is to recover \$3,480.50, for stock claimed to have been over-issued by P. Jacobus, while acting as agent for W. W. Traylor when he was secretary for the company. The other has been brought to obtain \$13,751 and interest, alleged to have been embezzled by Jacobus while acting for Traylor.

STOREY COUNTY—COMSTOCK LODGE.

A connection has been made with the combination shaft on the 2800 level of the Hale & Norcross. This connection brings the natural circulation of air down to the 2800 level, and will enable prospecting operations to be more economically carried on in the Chollar, Potosi, and Hale & Norcross. The aperture is enlarging to full regulation size. The drift is unusually large, and affords space for two car-tracks to be laid. Its height will also admit the passage of pipes, which may be suspended from the roof of the drift without interfering with the operations of the miners. In fact, the drift is one of the finest of the air-galleries in the middle mines.

NEW JERSEY.

The aggregate shipments of iron ore during the month of March were as follows over three railroads: Over the High Bridge Branch: Through to Phillipsburgh and points beyond, 13,209 tons; local on the branch, 1640 tons; total, 19,849 tons. Limestone to Chester furnace, 1064 tons. Over the Mount Hope Mineral Railroad, 11,385 tons. Over the Hibernia Mine Railroad, 6643 tons.

PENNSYLVANIA.

In the United States Circuit Court, at Philadelphia, April 15th, the ejectment suit of John D. McGill, of New Jersey, against Matthew Jordan, John A. Gardner, John B. Koontz, and John Kille for the possession of some 400 acres of iron ore land, situated in Cumberland County, resulted in a verdict for the plaintiff. The court reserved a legal point.

UTAH.

BOX ELDER COUNTY.

LEAD.—During the winter, much development-work was done at this mine; some first-class ore was shipped, but most of the time the heavy snows prevented operating the tramway, and the concentrating-mill was idle. The mill has begun its season's work under more favorable auspices than ever before. In the mine, large ore-bodies are in sight, and of better quality than those taken out last season.

SALT LAKE COUNTY.

Attachments are now making on the London Bank of Utah (Limited) by other depositors, and legal complications are beginning to arise. A number of mining companies are also interested.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, April 18.

The mining market continues to be very dull and uninteresting. The aggregate number of transactions was less than last week, although the dealings cover the business of six days, against five days a week since. There are but few items of interest to note. Iron Silver continues to decline and was quite weak. Horn-Silver rallied slightly from last week's prices, but was unsettled. Hall-Anderson was quiet and steady. The low-priced stocks record no material change in price, with the exception of Lacrosse, which suffered a slight decline from its recent strong prices. We give a complete summary of the market below. The total number of shares sold aggregates 61,865, as against 66,764 last week.

The Comstock shares were very quiet and sold at about steady prices. Consolidated Virginia was quiet and steady, selling from 24@25c. assessment paid, and at 5c. assessment unpaid. Sierra Nevada sold at irregular prices under a small business; it was quoted at \$1.75@2.20@2.05. Union Consolidated was quiet and steady, selling from \$2.25@2.15. Ophir sold assessment unpaid, and records one small transaction at 65c. Sutro Tunnel was quiet and steady at 13c.

The Bodie stocks were very moderately dealt in, but ruled at stronger prices. Bodie Consolidated was strong under a small business, selling from \$4.25@4.15. Standard was quiet and steady, selling from \$2@1.80. Bulwer sold at strong prices, under a moderate business; it was quoted from 70@85c.

The Leadville stocks were moderately dealt in at steady prices. Amie sold at 7c., with a small business. Chrysolite was dull but firm; it sold at \$1. Dunkin was quiet and steady at 23c. Breece was moderately dealt in at irregular prices; it sold from 22@29@26c. Iron Silver continues to decline, and ruled at weak prices, with a moderate business; it sold from \$1@90@94c. Leadville was a little weak, selling from 35@31c., with a small business. Little Chief was quiet and steady, selling from 50@48c. Climax sold at 4c.

The Tuscarora stocks were quiet and steady. Grand Prize sold at 25c., and Belle Isle at 32c. Navajo was quiet and steady, selling from \$2.50@2.75.

In the miscellaneous list, Alice sold at strong prices, with a moderate business; it was quoted from \$2.25@2.75. Eureka Consolidated was quiet and strong, selling from \$4.10@4. Father de Smet was strong, selling from \$2.55@3; the company has just declared a dividend. Green Mountain sold at \$2 with a small business. Hall-Anderson was moderately dealt in at steady prices; it sold from \$1.25@1.30. Horn-Silver was quiet at irregular prices, selling from \$7.25@6.88@7.13. Robinson Consolidated was quiet and steady at 19@20c. Stormont sold at 10c. Castle Creek was quiet and steady, selling from 20@22c.

Barcelona was very quiet at 14c. Caldonia was quiet and steady at 45c. Central Arizona sold at steady prices, with a small business; it was quoted from 17@20c. Decatur sold at 2c. throughout, and was fairly dealt in. Harlem was very quiet, and sold at 5c. Lacrosse suffered a slight decline under a moderate business; it sold from 16@14c. Oriental & Miller was moderately dealt in at irregular prices; it sold from 11@15@12c. Rappahannock was strong under a fair business, selling from 16@18c. Sonora Consolidated was fairly dealt in and was irregular; it sold from 7@5@6c.

MEETINGS.

The following companies will hold their annual meetings for the election of trustees at the times mentioned:

The Evening Star Mining Company, No. 53 Broadway, New York City, May 5th, from two to three o'clock P.M.

The Hibernia Consolidated Mining Company, No. 48 Exchange Place, Room 43, New York City, May 5th, at two o'clock P.M.

The Little Pittsburg Consolidated Mining Company, No. 45 William street, New York City, May 5th, at half-past one o'clock P.M.

The Morning Star Consolidated Mining Company,

No. 53 Broadway, New York City, May 5th, from two to three o'clock P.M.

The Pie Island Silver Mining Company, No. 19 Park Place, Room 46, New York City, April 23d, at twelve o'clock M.

The Reading Iron-Works, No. 259 South Fourth street, Philadelphia, Pa., May 21st, from three to four o'clock P.M. Meeting for the purpose of obtaining the consent of the stockholders to issue preferred stock of the company to the amount of \$550,000, the holders of which preferred stock shall be entitled to receive such dividends thereon as the Board of Directors of the corporation may prescribe, payable only out of the net earnings of the corporation.

The Stirling Mining Company, No. 53 Broadway, New York City, May 5th, from two to three o'clock P.M.

DIVIDENDS.

The Diamond Coal Land Company announces a quarterly dividend of one dollar a share, payable on demand.

The Father de Smet Consolidated Gold Mining Company, of Dakota, has declared dividend No. 32, of twenty cents a share, payable at the office of Laidlaw & Co., No. 14 Wall street, New York, on April 30th.

The Homestake Gold Mining Company, of Dakota, has declared its sixty-eighth dividend of \$25,000, payable at the office of the company in San Francisco, or by Messrs. Lounsbrey & Haggin, transfer-agents, No. 15 Broad street, New York. Total dividends to date, \$2,387,500.

The Plymouth Consolidated Mining Company, of California, has declared a dividend of fifty cents a share, payable immediately.

The Sierra Bella Mining Company, of New Mexico, has declared a dividend of fifteen cents a share, payable May 1st at the office of the company, 330 Walnut street, Philadelphia, Pa.

PIPE LINE CERTIFICATES.

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

On Saturday the market opened at 93c., and closed at 95½c., and on Monday morning it opened at 96c., selling up to 97½c., with great excitement. The reaction from this during the latter part of the day was 3 cents, closing 94½c., after having touched 94½c. This was due to premature reports from the Mills & McMullin well, that it was making a fine showing. On Tuesday, under the influence of this scare, the market broke to 93½c., closing at 94½c. On Wednesday, it opened at 94½c., rallying to 97½c., and closing at 97c., but selling later on the street at 97½c., and the same night in Oil City at 98c. The opening the next morning in Oil City was 99c., and it soon sold at \$1. This sudden flight of the market was due to news that the Macksburg reports were not reliable and to an extreme scarcity of certificates in all the oil markets, the bears having in some cases paid as high as from \$1 to \$2 a thousand for the use of oil certificates to make their deliveries. The market broke, however, to 97c. at the close. To-day, the market opened weak at 96½c., and so continued until near the close, selling down to 94½c., and closing at 97½c., bid last night.

The break to-day was due to a revival of reports that the Macksburg well (Mills & McMullin), was good for 150 barrels; but as it is boarded up and access to it is denied the public, the report is regarded by the best informed people as the means of breaking the market.

Refined oil is ½c lower to-day at 8½ cents, but is now ¼c. above the price one week ago, and the foreign demand is springing up. They are now behind in their purchases, and whatever Russia may do in the future, she can not compete with American refined oil now in the markets of Europe. The prospect is higher prices for both crude and refined.

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

April	Opening	Highest	Lowest	Closing	Sales
12	\$.93	\$0.95½	\$0.93	\$0.95½	8,312,000
14	.96	.97½	.94½	.94½	11,078,000
15	.94½	.94½	.93½	.94½	7,896,000
16	.94½	.97½	.94½	.97	9,962,000
17	.97½	1.00	.97	.97½	8,506,000
18	.96½	.97½	.94½	.97½	10,538,000
Total sales					56,290,000

SAN FRANCISCO MINING STOCK QUOTATIONS.
Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS.					
	April 11.	April 12.	April 14.	April 15.	April 16.	April 17.
Albion						
Alpha						
Alta	1½	1½	1¾	1¾	1¾	1¾
Argenta						
Bechtel						
Belcher	1		1½	1½	1½	1½
Belle Isle						
Best & Belcher	2¼	2¼	2¼	2¼	2	1¾
Bodie	4½	3¾	4½	3¾	4	3¾
Bullion						
Bulwer						
California	.05	.05				
Chollar	1½	1½	1¾	1¾	1¾	1¾
Con. Pacific		.35	.30			.35
Con. Virginia	.05		.25	.25	.25	.25
Crown Point		1¼	1½	1¼	1½	1½
Day	2				2	2
Elko Cons.						
Eureka Cons.			4½		4½	4½
Exchequer						
Gould & Curry	1½	1½	1½	1½	1½	1½
Grand Prize						
Hale & Norcross	1½	1½	1½		1½	1½
Independence						
Martin White						
Mexican	1½	1½	1½	1½	1½	1
Mono						
Mount Diablo						
Navajo	2½	2½	2½	2½	2½	2½
Northern Belle						
North Belle Isle						
Ophir	.55	.65	.65	.70	.65	.55
Overman						
Potosi	.55	.55	.60	.55	.55	.55
Savage		.40	.50	.45	.45	.40
Scorpion						
Sierra Nevada	1½	1½	2¼		2½	1¾
Silver King						
Tip Top						
Union Cons.	2	2½	2¼		2½	2
Utah	.90	.75		.90		.75
Wales Cons.						
Yellow Jacket	1¾	1¾	2	2		1¾

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

CASH ON HAND.			
Alta	\$13,904.17	Day	1,947.03
Alpha Con	8,953.33	Exchequer	4,900.32
Andes	2,925.72	Mexican	6,275.74
Argenta	1,641.43	Martin White	6,898.54
Belcher	17,740.72	Mono	13,892.11
Bulwer	3,692.11	Occidental	4,211.54
Best & Belcher	18,058.30	Sierra Nevada	49,899.63
Bodie Con	124,688.98	Savage	20,711.06
Benton Con	21,535.51	Standard	1,361.19
Crown Point	23,253.05	Summit	619.11
California	671.95	Tioga Con	1,224.34
Con. Virginia	8,461.13	Utah	1,140.02
INDEBTEDNESS.			
Lady Washington Con			4,265.48
Chollar			53.57
Grand Prize			35,884.75
Gould & Curry			8,569.99
Hale & Norcross			11,531.40
Ophir			10,315.64
Potosi			114.78

* Due Sutro Tunnel Company, \$10,920.
† Overdraft at Nevada Bank, \$5384.39.
‡ Bills payable, \$21,938.62.
Albion indebtedness exact amount not known; approximate, \$260,000.

Copper and Silver Stocks.

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

BOSTON, April 17.

The market the past week has shown a good degree of activity, especially in Calumet & Hecla, the passing of the May dividend having brought out a great deal of stock that has been held for investment heretofore, the owners of which do not feel willing to assume the risk for the future. The stock now becomes a speculative security, and as such subject to changing values, although no doubt some purchases are made at the present decline by parties who still have faith in the ability of the mine to pay a good percentage on the price at which it sells for now. Still, it has lost its prestige as an absolutely safe investment, and the confidence of a majority of investors has received a set-back which it will be hard to regain. The stock opened at \$185 on Saturday, and advanced rapidly under what appeared to be sustaining orders to \$200, at which price about 150 shares were taken. Since then, it has fluctuated between \$199 and \$190, the latter being the lowest price touched, with sales up to \$195, closing to-day at \$190@190½. Nearly 700 shares have changed hands, which is something remarkable for this stock Quincy recovered also from \$35, and sold up to \$38½, a single share selling at \$39, with later sales at \$38@37½. Very little stock has come out at the decline, which shows that the holders are disposed to retain their interest rather than sell at these prices. Franklin has been entirely neglected; \$9 is bid and none offered.

less than \$10. The annual meeting of the company was held yesterday, and the present officers were re-elected. Osceola declined from \$15@14½ on sales of about 150 shares. Atlantic sold at \$8, same as before. Huron sold at \$1½, a decline from \$1½. March 31st. The reports from the mine continue encouraging, and ordinarily would advance the price; but in the present condition of the market, has the opposite effect. Pewabic sold at \$1½, 50 shares only. Allouez sold at \$1½, and declined to \$1. The rest of the list unchanged. The ingot copper market remains unchanged, with small sales, consumers buying only sufficient to supply current wants.

In silver stocks, Bonanza sold at \$1¼. Harshaw, 50c. Catalpa, 35c. Silver Islet, 10c. At the Mining Board, there has been very little doing, and Bowman Silver, which was active last week, has relapsed into dullness again at 14@15c. Empire declined to 12½c. on the announcement of an assessment of ten cents a share, payable April 30th. The miscellaneous stocks are dull and heavy without special feature.

3 P.M.—At the Board this afternoon, Calumet & Hecla opened at \$192, declined on small sales to \$191, and was offered at that at the close—no bid. Franklin sold at \$9, and is wanted at that price, \$10 asked. Quincy was \$37 bid, \$39 asked—no sales. Pewabic, \$1¼ bid. Huron, \$1 bid. Atlantic, \$7½ bid. Allouez, \$1 bid.

BULLION MARKET.

NEW YORK, Friday Evening, April 18.

The indications of last week have been realized in the advance of this week.

DATE.	London.	N. Y.	DATE.	London.	N. Y.
	Pence.	Cents.		Pence.	Cents.
April 12	50 11-16	*	April 16	50¾	111¾
14	50 11-16	111½	17	50¾	111¾
15	50 11-16	111½	18	50¾	111¾

*111¼@111½.

BULLION PRODUCTION FOR 1884.

MINES.	States.	Month of March.		Year from Jan. 1st, 1884.
		\$	1884.	
*Alice, g. s.	Mont.	209,296	209,296	
*Belmont.	Mont.	8,081	8,081	
Bodie, g.	Cal.	26,293	88,976	
*Bonanza King, s.	Cal.	36,844	135,161	
*Boston & Montana, g.	Mont.	56,114	132,813	
*Chrysolite, s. L.	Colo.	16,023	32,278	
*Consolidated Bobtail, g.	Colo.	54,872	16,411	
*Contention, s. g.	Ariz.	195,164	195,164	
*Deadwood-Terra, g.	Dak.	40,409	128,703	
*Derbec Blue Gravel, g. s.	Colo.	19,688	19,688	
*Father de Smet, g.	Dak.	18,139	74,316	
Grand Prize, s.	Nev.	25,000	25,000	
*Hecla Cons., g. s. L.	Mont.	102,178	102,178	
*Homestake, g.	Dak.	99,682	301,053	
*Hope, s.	Mont.	2,547	17,980	
Horn-Silver, s. L.	Utah.	258,087	582,087	
*Iron Silver, s. L.	Colo.	125,882	125,882	
*Kentuck, g. s.	Nev.	3,606	11,639	
*Lexington, g. s.	Mont.	98,494	299,896	
*Little Pittsburg, s.	Colo.	7,169	25,134	
Moulton, s.	Mont.	123,000	123,000	
*Mount Diablo, s.	Nev.	24,820	24,820	
*Navajo, g. s.	Nev.	13,877	85,750	
*Ontario, s. L.	Utah.	197,727	536,205	
*Original, s. c.	Mont.	11,135	11,135	
*Oxford, g.	N. S.	3,102	10,262	
*Flymouth Consolidated, g.	Cal.	89,277	275,778	
*South Yuba, g.	Cal.	3,779	5,819	
*Syndicate, g. s.	Cal.	5,982	35,841	
*Tombstone, s. L.	Ariz.	122,756	122,756	
United Gregory, g.	Colo.	7,174	7,174	
Total amount of shipments to date.....\$3,829,256				

* Official + Assay value. † Not including value of lead. G. Gold; S. Silver; L. Lead; C. Copper.

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate of discount, and it remains at 2½ per cent. During the week, the bank lost £91,000 bullion, and the proportion of its reserve to its liabilities was raised from 45¼ to 47¼ per cent, against 37.7-16 per cent at this date last year. The weekly statement of the Bank of France shows gains of 72,000 francs gold, and of 213,000 francs silver.

The Treasury Department, April 17th, purchased 400,000 ounces of silver for delivery at the Philadelphia and New Orleans mints.

METALS.

NEW YORK, Friday Evening, April 18.

Copper.—The market is very dull and quiet, small lots of Lake being available at 14¼@14½c. It is stated that the quantities available in dealers' and manufacturers' hands are very small indeed; but on the other hand, manufacturers, learning of the sale of the large lot of Lake copper abroad, already referred to some weeks ago, at so low a figure, appear to hope and to urge that they, too, should be allowed to get their raw material cheap. It is difficult to see how they can be very urgent on this point, and indulge in arguments unfavorable to the copper mines, while they are themselves protected by a tariff of 35 per cent on manufactured goods.

Other brands of copper ore selling at 13¼@14¼c., according to quality.

English cables are more favorable, Chili Bars being quoted to-day in London £56 10s., while Best Selected remains stationary at £62.

Messrs. James & Shakspeare, of Liverpool, have issued the following statement concerning the statistical position of copper in England and France:

Imports.		Deliveries.	
Tons.	Tons.	Tons.	Tons.
—March 1 to 31—			
Fine foreign, chiefly Australian	643	637	London.
Chili Bars	3,138	3,138	
Chili Ingots	160	174	Liverpool
In ores and regulus	596	315	and Swansea.
American	856	897	
Spanish precipitate and sundries	2,510	2,333	
Totals—England	7,903	7,549	

American	145	180	France.
Chili bars, ingots, and Barilla	596	1,121	
Sundries	35	35	
Totals—England and France	8,679	8,885	

Imports.		Deliveries.	
Tons.	Tons.	Tons.	Tons.
—March 31. Feb. 29.			
Fine foreign, chiefly Australian	3,551	3,545	London.
Chili Bars	24,847	24,902	
Chili Ingots	39	53	Liverpool
In ores and regulus	904	623	and Swansea.
American	132	173	
Spanish precipitate and sundries	4,766	4,589	
Totals—England	34,239	33,885	
American	85	120	France.
Chili bars, ingots, and Barilla	2,185	2,710	
Sundries	35	35	
Totals—England and France	36,544	36,750	

Imports.		Deliveries.	
Tons.	Tons.	Tons.	Tons.
—Jan. 1 to March 31.			
England and France	1884.	1883.	1882.
Imports	23,014	20,781	18,017
Deliveries	26,313	17,796	16,607
12 months ended March 31.			
England and France	1384.	1883.	1882.
Imports	98,602	90,641	78,652
Deliveries	100,170	82,682	84,849

Messrs. James Lewis & Son report the following as the sales of furnace material during the month of March:

Tons.	Per cent.	Per unit.
15. Precip. English	20	Liverpool 11s 8d
110. Ore Battle Mountain	20	" 11s 1½d
180. " New Quebrada	15	" 11s 3d
87. Reg. Canadian	28	" 10s 7½d
113. Precip. Mason's	30	" 11s 0d
100. Ore Cape (Rich)	30	Swansea 11s 3d
230. " Cape (Poor)	30	" 11s 0d
130. Precip. Mason's	90	Liverpool 11s 0d
100. " Rio Tinto	90	" not fixed.
50. " English	25	" 11s 7½d
260. Ore Peruvian	25	Liverpool 11s 3d
135. " Montana	30	" 10s 1½d
500. Reg. Rio Tinto	30	" 10s 3d
170. Ore Italian	10	" 10s 6d
258. Precip. Mason's	10	" 10s 4½d
184. " Mason's	70	" 10s 4½d
200. " Rio Tinto	70	" 11s 3d
170. Ore Spanish	30	" 10s 6d
88. Precip. Mason's	30	" 10s 10½d
110. Reg. Chili	30	" 11s 3d
1100. Ore Australian	9 to 20	Swansea 10s 6d to 11s
300. " New Quebrada	15	Liverpool 11s 0d
20. Precip. Rio Tinto	90	" 11s 7½d
50. Ore Montana	30	" 10s 0d
100. " Battle Mountain	20	" 11s 0d
100. " Spain	30	" 10s 7½d
100. Reg. Spain	30	" 10s 10½d

Messrs. James Lewis & Son, of Liverpool, who have exceptional facilities for getting exact figures, have compiled the following table of imports of other

than Chili copper into Liverpool and Swansea during the first three months of the following years—in tons fine:

	1882.	1883.	1884.
From United States	100	787	2,796
Canada	66	108	160
Mexico	32	156	.....
Peru	656	198	173
River Plate	54	120	40
New Quebrada	504	876	1,084
Newfoundland	140	.....	.....
Spain	47	145	570
Portugal	.....	19	149
Italy	425	151	36
Norway	.....	.....	45
Cape of Good Hope	1,228	1,416	1,864
Australia	45	32	171
Sundries	81	122	59
Precipitate	2,676	3,038	2,873
	6,054	7,168	10,020

From all countries except Chili into London..... 3,445 1,962 2,409

We believe that the bulk of the material that goes to London is Australian fine copper.

Tin.—England cables Straits £83 15s. strong. Here we quote spot 18¼@18½c.

Lead.—The market has continued to show a declining tendency, and has been dull. Buyers are well supplied by recent purchases and look upon the metal unfavorably. We note sales during the week of 200 tons at 3.90c. and of 100 tons at 3.87½c. We are informed that offers have been made of 3.80@3.85c., for May and June delivery, but have been declined. Concessions under 3½c. would certainly have to be made to place round lots. We quote 3½c. nominally.

Messrs. John Wahl & Co., of St. Louis, telegraph to us to-day:

A dull and easier feeling has prevailed since we reported a week ago, the home trade being very light. Not much is done. Negotiations are pending, but it seems as though buyers and sellers can not agree. Refined lead is freely offered at 3.70c., but is not taken. Sales will not aggregate over 150 tons. Common lead is quoted 3.60@3.62½c., delivered at East St. Louis. Receipts during the week foot up to 600 tons.

Spelter.—The market is firm but dull at 4½c. for Common Domestic. The meetings of the Western smelters do not appear to have led to any tangible result. London cables £14 10s. for Silesian.

Antimony.—The market is unchanged. The following are the official returns of the exports and imports of metals in Germany:

Imports, Metric Tons.		1883.	1882.
Lead	.....	3,165	1,970
Copper	.....	11,938	10,779
Spelter	.....	4,475	4,395
Sheet-zinc	.....	91	148
Tin	.....	6,124	5,150
White lead and oxide of zinc	.....	2,892	2,556

Exports, Metric Tons.		1883.	1882.
Lead	.....	49,574	41,916
Copper	.....	11,908	7,809
Spelter	.....	55,011	56,478
Sheet-zinc	.....	16,505	14,270
Tin	.....	405	603
White lead and oxide of zinc	.....	15,876	13,277

IRON MARKET REVIEW.

NEW YORK, Friday Evening, April 18.

American Pig.—So far as foundry irons are concerned, there is no movement of any magnitude, and the market continues as dull as heretofore, though retaining its strength. Mill irons are more irregular, and are not strong.

We quote No. 1 Foundry at \$20@21; No. 2, \$19@19.50; and Gray Forge, \$17.50@18.50. There have been sales of Bessemer pig, which remains quiet for Foreign at \$20.50 ex ship, and 20 per cent Spiegel is quoted in round lots at \$28@29 ex ship, some small sales having been made. Ferro-manganese, 45 per cent, is worth \$45.

At the Metal Exchange, the following sales were reported: Monday, April 14th, 100 tons No. 1, April, \$19.12½; 100 tons No. 1, May, \$19; 200 tons Certificates (No. 2), September, \$18.37½; 100 tons No. 1, April, \$19.12½. Tuesday, April 15th, 200 tons Certificates (No. 2), May, \$18; 200 tons Certificates, Octo-

ber, \$18.37½; 200 tons No. 1, May, \$19; 100 tons No. 1, July, \$19; 100 tons Certificates (No. 2), December, \$18.50. Wednesday, April 16th, 100 tons Certificates, May, \$18; 100 tons Certificates, July, \$18½.

Scotch Pig.—There is no change whatever to note.

We quote ex ship and to arrive: Coltness, \$22.50 @ \$23; Langloan, \$22.25 @ \$22.50; Summerlee, \$21.50; Dalmellington, \$20.75; Gartsherrie, \$22 @ \$22.50; Eglinton, \$20.25; and Glengarnock, \$22 @ \$22.25.

At the Metal Exchange, the following cable quotations have been received: Coltness, 57s.; Langloan, 53s.; Summerlee, 51s.; Gartsherrie, 52s.; Glengarnock, at Ardrossan, 51s. 6d.; Dalmellington, 47s. 6d.; and Eglinton, 45s. Warrants, 42s. 5d.

Steel Rails.—There are negotiations pending, but so far as we can learn, nothing of any moment has been closed. Quotations remain \$33 @ \$33.50 at mill, but the business is regulated by the competition at points of delivery, the bulk of the orders, which naturally fall to the different mills as being within their own territory, having been disposed of.

Old Rails.—The market shows a declining tendency. We quote \$19 @ \$20.

Philadelphia. April 18.

[From our Special Correspondent.]

Pig-Iron.—Foundry irons are without a particle of change, but mill irons are unsettled by an effort upon the part of some large buyers to secure supplies of good brands at the prices which are paid for inferior. Several large consumers are anxious to get stocks, and a number of makers are very anxious to contract their summer output, but prices are nominal on both sides, and unsatisfactory. Forge irons are wanted under \$18. There is talk of Southern iron being placed here in large quantities, but nothing definite can be ascertained. Some lots of No. 1 Foundry have been sold at \$20. Special brands are quite firm, and makers report inquiries and orders sufficient to keep stocks down. There is no further increase in production.

Foreign Irons.—Foreign irons are without any life. A little Spiegeleisen is moving. Small lots of Bessemer Pig have been inquired for. Scotch iron is selling very slowly.

Muck-Bars.—A few small sales have been made at \$32.

Blooms.—Charcoal and anthracite blooms are quiet at old quotations.

Merchant Iron.—Very little has been done outside of the local retail trade, and the market is correspondingly weak and dull. There is a good deal of Western Pennsylvania iron offered in this market, and it is having a very bad effect. The average price is two cents for small lots, but sales have been closed at one to two tenths less. Common iron is under fair inquiry, and some mills are busy filling orders for the next thirty or sixty days. There is, however, a great deal of competition for the work that is placed.

Plate and Tank Iron.—Quotations are unchanged at 2 20c. for Plate; 2 20 @ 2 25c. for Tank; 2 75c. for Shell; 3 7c. for Flange; and 4 75 for Fire-Box.

Structural Iron.—Very few orders are coming to hand, and mills generally are short of work. Quotations are 2 20c. for Angles; 2 25c. for Bridge Plates; 2 75c. for Tees; and 3 50c. for Beams and Channels.

Steel Rails.—From best information obtainable, it seems that the steel rail companies can not hold prices at \$34, chiefly on account of the willingness of one or two concerns to take orders at less than this figure; besides this, there are very few inquiries floating around, and hence, makers who expect to be short of business for a month or two are willing to shade prices quite heavily, in order to secure business. The actual figures at which large orders would be taken can not be given. Fifteen hundred tons of standard rails were sold by a Western mill at \$35½. Very low prices have possibly been taken in some quarters; but the quotations given in some quarters are far from representing the real condition of the market.

Old Rails.—About 10,000 or 11,000 tons of old rails sold at from \$20 @ \$23, according to point of purchase and delivery.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, April 18.

Anthracite.

The event of the week has been the fact that the coal companies have held a meeting at which an agreement was reached to persist in the policy of restriction of the production whenever the state of the trade requires it. It has been settled that mining will be suspended for the entire first week in May, and three days in the last week of the same month. June probably will open with a week of half-time, and with an entire week of suspension later in the month, and it is likely that July, too, will witness nine idle days. A new and important feature is to leave the decision as to the future restriction to a vote representing more than one half of the production, and it is asserted that the Pennsylvania Railroad will act with the other companies. How important is the latter point, if true, will be noted by reference to the comparison of percentages of production that we print editorially.

This action can not help having its effect ultimately, though it is too much to expect to immediately relieve the apathy which has characterized the trade. It will come into play later on, when lake navigation opens. The East does not at present want any coal, and with the ample stocks now on hand will not show any anxiety. The weak spot continues to be the large individual operators, and no immediate improvement of prices is looked forward to by buyers.

This week, the bids for the contract to supply the Brooklyn Water-Works with 20,000 tons of anthracite, delivered at Hunter's Point, were opened, the following being the figures:

Whitney & Kemmerer, Plymouth vein coal	\$3.79
Delaware & Hudson Canal Company	4.00
Meeker & Co., Spring Brook coal	4.17
David Duncan, Philadelphia & Reading coal	3.98
J. K. Wells & Co., Scranton coal	3.95
Swaime Brothers, Lehigh Valley coal	4.14
F. A. Potts & Co., Plymouth Red Ash	4.25
F. A. Potts & Co., Wilkes-Barre coal	4.00

The contract was awarded to Messrs. F. A. Potts & Co., for Plymouth Red Ash coal, at \$4.25.

Mr. John H. Jones, official accountant, has published the following statement of the anthracite coal tonnage for the month of March, 1884, compared with the same period last year. This statement includes the entire production of anthracite coal, excepting that consumed by employes, and for steam and heating purposes about the mines:

	March, 1884.	March, 1883.	Difference.
Phila. & Read. RR.	610,689 09	536,488 00	I. 74,201 00
Cent. RR. of N. J.	.....	*366,061 05	D. 366,061 05
Lehigh Valley RR.	381,702 03	+509,060 17	D. 127,358 14
Del. Lack & W. RR.	342,172 03	371,131 16	D. 28,959 13
Del. & H. Canal Co.	212,620 00	+267,799 04	D. 55,179 04
Pennsylvania RR.	325,688 18	188,577 12	I. 137,111 06
Penna. Coal Co.	78,759 15	105,592 07	D. 26,832 12
N. Y., L. E. & W. RR.	29,830 11	30,800 17	D. 970 06
Total	1,981,462 19	2,375,512 07	D. 394,049 08

	For Year 1884.	For Year 1883.	Difference.
Phila. & Read. RR.	1,957,441 13	1,477,142 05	I. 480,299 08
Cent. RR. of N. J.	.....	850,873 18	D. 850,873 18
Lehigh Valley RR.	1,151,254 03	1,342,026 10	D. 190,772 07
Del. Lack & W. RR.	994,793 13	1,018,019 04	D. 23,225 11
Del. & H. Canal Co.	608,445 02	710,386 01	D. 101,940 19
Pennsylvania RR.	741,444 08	515,896 02	I. 225,548 06
Penna. Coal Co.	246,645 03	298,896 15	D. 52,251 12
N. Y., L. E. & W. RR.	73,697 15	76,010 09	D. 2,312 14
Total	5,773,721 17	6,389,251 04	D. 615,529 07

* Included in tonnage of the Philadelphia & Reading Railroad.

† This amount includes the production of the mines of the State Line & Sullivan Railroad Company, amounting to 8102 tons.

‡ In addition, there were 36,531 tons transported from mines by the Delaware & Hudson Canal Company, during March, which is included in the tonnage of other interests.

The stock of coal on hand at tide-water shipping points, March 31st, 1884, was 588,229 tons; on February 29th, 1884, 632,041 tons; decrease, 43,812 tons.

Bituminous.

The struggle for steamer contracts continues, but is now drawing to a close. Some of them have been taken at \$3.30, and there are rumors that the basis of some was \$3.10.

We notice that one of the Hudson River ferries is using bituminous coal.

Philadelphia.

April 18.

[From our Special Correspondent.]

Some of the newspapers seem to know more about the coal trade than the representatives of the leading companies in this city. It is announced that a meeting is to be held in New York to-morrow by the anthracite companies; but as the notification does not come from the companies, the meeting will not be very largely attended. The basis of the rumor seems to be some trade talk about a change of policy. There are always people ready to make policies for the companies and suggest what should be done. The rumor probably emanates from these sources. There is, of course, nothing going on in the anthracite region this week, except grumbling. The suspension is stimulating discontent, and this is freely expressed; but it is scarcely likely that anything more will come out of it than an attempted organization and an increase in the membership of the leading labor organization of this State. The miners recognize the fact that the operators are not responsible for the present condition of things, and believe that full-time will be allowed as soon as the market permits. There are no domestic sizes of any consequence in sight. The companies, anticipating the falling off in this demand, made no effort to carry heavy stocks. Buyers are piecing out the end of the season, as it is too soon to buy for fall requirements. Yard stocks are depleting slowly. Stocks at Port Richmond are stated to be about 100,000 tons to-day. A great many buyers who otherwise would be in the market placing heavy contracts are influenced by the active competition of bituminous coal and their doubt of the strength of the anthracite combination to withhold their orders for the present. Prices will have to settle down before a very large business can be done. A few large consumers, who placed contracts a month ago, have found prices drop on them, and others, finding the downward tendency still in force, are purchasing only for emergency requirements, and, from present appearances, this policy will be followed for some time to come. The line trade is inactive. Manufacturing demand in the Eastern portion of the State is indifferent. From advices received yesterday from the West, it looks as though a heavy demand would ultimately be presented from there. About the same statement applies to the New England markets. A good many buyers there are holding back for the reasons given. The Southern markets have not improved very much as yet, although, after a little while, they will probably become active, much more so than last year. The active competition of bituminous coal is likely to continue a disturbing factor for some time to come, or at least until bottom prices have been reached. The bituminous field, even with all the business that has been done, is not working more than two thirds time. This condition of things is anomalous, considering the fact that Western, Southern, and Eastern markets are comparatively bare of stocks. The long heads in the trade predict a spurt of activity as soon as the trade settles a few difficulties and finds out exactly how it stands. Bituminous operators themselves claim that every thing is dull, although it is known that they have closed large contracts, and a number of others are now in negotiation and likely to be closed any day or hour. There is a really senseless struggle for the business that is to be had. The wiser operators are holding off and letting those who are willing to sell coal at or below cost have the trade. The trade is reported by a number of large and small operators to be in a very unsatisfactory condition. Freights to Boston, \$1.10 @ \$1.20; to Providence, \$1 @ \$1.15.

Buffalo.

April 17.

[From our Special Correspondent.]

By telegraph, April 18: A report current concerning the opening of the Straits of Mackinaw is unfounded. A dispatch from Cheboygan states that there is no immediate prospect of an opening yet.

Trade continues very quiet, buyers awaiting the issuing of the spring schedule of prices for anthracite, and manufacturers not working full-time.

The committee will fix the price for anthracite coal next week, at its meeting in New York, on the 24th instant.

Stocks of anthracite and bituminous coal here are large; the yards are filled with cars.

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

Table with columns: NAME AND LOCATION OF COMPANY, HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE (April 12-18), SALES. Lists various mining companies like Alice Mon, Amie Con, etc.

NON-DIVIDEND-PAYING MINES.

Table with columns: NAME AND LOCATION OF COMPANY, HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE (April 12-18), SALES. Lists various mining companies like Alblon, American Flag, Barcelona, etc.

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 30,890. Non-dividend shares sold, 31,175.

BOSTON MINING STOCKS.

Table with columns: NAME AND LOCATION OF COMPANY, HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE (April 11-17), SALES. Lists various mining companies like Allouez, Amie, Atlantic, etc.

PHILADELPHIA MINING STOCKS.

Table with columns: NAME AND LOCATION OF COMPANY, HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE (April 11-17), SALES. Lists various mining companies like Amer. Cons, Argent, Arizona So, etc.

No quotations for this market have been received.

Vessels are now loading coal for upper Lake ports from our chutes.

The ice on Lake Erie extends from our harbor for a long distance, and the prospects for an early resumption of navigation are in the distant future.

A leading vessel-owner here said to-day that "we are looking for a brisk business in the coal-carrying trade this season. I was in Chicago lately, and found the yards almost entirely empty." It is said that the winter trade cleaned out the coal all around the lakes so that the season will open with a brisk demand.

The receipts of coal at this port by the Lake Shore & Michigan Southern Railroad for the past week were 624 tons; 444 tons for Buffalo, and 180 tons for other points.

Last Friday, all the available vessels at this port were chartered for coal at 75c. per gross ton to Milwaukee, Chicago, Green Bay; 60c. was the standing offer. It was a clever piece of business by an enterprising shipping-house in the employ of four shippers, and well done. The amount of coal contracted was 20,000 tons; the parties interested were Mr. E. L. Hedstrom, the Lackawanna Company, Langdon, Richardson & Co. and Albright & Co. The craft comprised eight propellers, and six or seven sail vessels.

The Welland Canal (Canada) will be opened April 28th. It is the intention to keep 12 feet of water at all times over the aqueduct during the season of navigation.

The news from the Straits of Mackinaw would indicate no immediate opening. Cold winds prevail during the day and frosts at night. Ice broken considerably in some portions. Gales or strong winds may disperse the fields of ice into the lakes Huron and Michigan at any time now.

Accounts from Sault Ste. Marie report ice rotting fast. The same news comes from Duluth and other ports at this end of Lake Superior. "The 25th of April will see clear water in this section," say the wise men.

The last news from Duluth, however, says that the ice in the lake at Duluth is as solid in appearance as at mid-winter, and had not made a move. From the tops of the highest hills no open water was visible. The outlook now is, that vessels from the lower lakes will not be able to pass through Lake Superior to that port before May 1st, or later.

A Duluth paper reports charters of coal by lake from Cleveland to Port Arthur at \$1.15 per gross ton.

The propeller D. D. Calvin and four barges have been chartered for coal from Charlotte, Lake Ontario, to Duluth on private terms; supposed to be \$1.35 per ton.

Three schooners are loaded at Erie for Chicago, and will doubtless start for that point on Saturday.

The Philadelphia & Reading Coal Company is preparing to ship a large amount of coal from Charlotte, Lake Ontario, this season. The stock there is already fair.

A Rochester newspaper says that the freight business of the Rochester division of the New York & Philadelphia Railroad is picking up at a lively rate. One day last week, 75 car-loads of coal were transferred to the Central Railroad here. Arrangements are perfected for the shipment of coal on the opening of navigation; boats are engaged, and the coal will be on hand. The arrivals of coal for local delivery amounts to many car-loads a day.

LATEST—NOON.—A dispatch received to-day from Escanaba states that all the ice has moved out of the bay, and that the Straits of Mackinaw are now open. Last year, the Straits opened April 28th; in 1882, on March 28th; and in 1881 on May 3d.

Boston. April 17.

[From our Special Correspondent.]

Finally there is something approaching life in the anthracite coal trade of this port. There is a feeling that, even if it is not necessary to stock up at this time, prices are sufficiently low to allow dealers to supply all immediate wants without risk. Orders are largely for cargo lots, apparently on that reasoning. The announcement of further suspension came in good time, and an improved trade will follow it. Prior to that, prices were a trifle weaker, with more cutting than during the previous week. Now a firmer feeling is looked for. Heretofore the market has been largely in buyer's favor both as to freights

and f. o. b. prices, except on free burning red ash coal of the Lykens Valley stamp. We quote New York Stove at \$4; Broken and Egg, \$3.65. Philadelphia Stove, \$3.80@3.90; Broken and Egg, \$3.40@3.50.

The soft coal market is pretty nearly at a standstill. Nearly every sizable contract has been taken by the watchful jobbers. With all their watchfulness, however, it seems that on e Cumberland concern had quietly placed, as far back as the middle of January, about 100,000 tons to a pool made up of the Providence Railroad, two local sugar refineries, and several mills, without its being made public until recently. Such pools have been successfully engineered before. It was doubtless thought that, in this year of close competition, one would not be attempted. It is stated, however, that, as the contracts were made early, very good figures were realized as compared with current rates. They are understood to have been below the market at the time they were made. This pooling plan was tried last year with ill success. How much more business has been done on the quiet remains to be discovered. It must be very little. Present business continues in cargo lots at about \$4 delivered.

Some Nova Scotia culm coal may now be had at the very low delivered price of \$2.80. The gas companies continue backward about ordering, and business in this line is quiet. Baltimore price is shaded to \$3.35; Philadelphia, \$3.50.

There is a continuance of a low range of rates on freights. There is an unsettled feeling in regard to them, and dealers at this time consider every freight as much of a bargain as the cargo itself. There is confident talk of lower rates to come from Philadelphia. We quote:

New York, 85c. @ \$1.10 per ton; Philadelphia, \$1.15 @ \$1.25; Baltimore, \$1.35 @ \$1.40; Georgetown, \$1.75; Newport News, \$1.25; Richmond, \$1.35; Bay of Fundy, \$1.50; Cape Breton, \$2.

There is a quite movement in retail trade at last week's figures. We quote:

White ash, furnace, and egg	\$5.50@5.75
stove and nut	5.75@6.00
Red ash, egg	6.00@6.25
stove	6.00@6.25
Lorberry, egg and stove	6.50@6.75
Franklin, egg and stove	7.25@7.50
Lehigh, furnace, egg, and stove	5.75@6.00
nut	6.00

Cleveland. April 16,

[From our Traveling Correspondent.]

The coal trade in this market is just now very quiet, the domestic trade having fallen off and lake shipments are as yet very limited and only to near-by ports. The prospects now are, that there will be an early opening of lake navigation, and that a large amount of coal will be shipped; but there is some question as to the profits being correspondingly large. The trouble with the coal trade, everywhere, seems to be, that producers and dealers are all too anxious to do business, and consequently margins are foolishly sacrificed to secure bulk of business. For example, Milwaukee handled probably not less than 75,000 tons more anthracite during the year ended April 1st, 1884, than in 1883, yet the dealers there all declare they made no money. The same is true of Chicago in the bituminous coal trade. The tonnage handled in the year ended April 1st was very largely in excess of the amount of that of the year previous. The increase for the first two months of 1884 is a little more than 36,000 tons. But still the coal men are not happy, and so long as contracts are entered into solely for the sake of getting or holding business, it would seem they ought not to blame any one but themselves. For example, it is currently reported that the contract to furnish the Chicago stock-yards, where about five cars a day are required, was recently taken by the Columbus & Hocking Coal and Iron Company, at \$3.15 per ton. This leaves 85c. a ton, less freight, and there is \$1.25 per car charges for switching to come out of that. The fixed or agreed price for Hocking Valley at Chicago is \$3.60 for car lots, with ten per cent off for large contracts. I mention this, not because it is exceptional with this company, but because it is a fair sample of the coal trade of the West. Here at this port, while coal is quoted at \$2.25 @ \$2.50 f. o. b., it is contracted for as low as \$1.90 on large orders. Lake freights are likely to open at about the same figure as last year—35 @ 50c. for Erie and Huron ports; 75c. @ \$1 for Lake Michigan points; and \$1 @ \$1.25 to Duluth and Green

Bay. Shippers claim these prices are not very firmly held, and hope to ship to Chicago and Milwaukee at 60 cents. The Pittsburg, Cleveland & Toledo Railroad has leased 850 feet frontage of dock on the river convenient to the Valley Railroad, over which it comes from Akron in entering the city, and will fit up with facilities for reshipment by lake of its coal and other freight, which adds another competitor for the tonnage of Pittsburg and Mahoning Valley freight to and from Cleveland.

STATISTICS OF COAL PRODUCTION

Comparative statement of the production of anthracite coal for the week ended April 12th, and year from January 1st:

Tons of 2240 lbs.	1884.		1883.	
	Week.	Year.	Week.	Year.
<i>Wyoming Region.</i>				
D. & H. Canal Co.	104,447	890,554	49,706	911,534
D. L. & W. RR. Co.	106,419	1,204,320	72,634	1,147,406
Penna. Coal Co.	39,178	281,519	19,377	310,169
L. V. RR. Co.	36,093	351,897	9,817	263,699
P. & N. Y. RR. Co.	5,581	52,645	3,105	52,533
C. RR. of N. J.	*	*	42,120	621,445
North & West Br. RR.	19,779	239,372	9,673	151,215
	311,427	3,010,198	206,432	3,458,031
<i>Lehigh Region.</i>				
L. V. RR. Co.	117,562	1,130,533	76,150	1,201,591
C. RR. of N. J.	*	*	36,472	546,044
S. H. & W. B. RR.	4,839	54,384	2,874	9,038
	122,398	1,184,917	115,496	1,756,673
<i>Schuylkill Region.</i>				
P. & R. RR. Co.	328,110	2,629,056	105,073	1,653,556
Shamokin & Lykens Val.	*	*	25,372	342,680
	328,110	2,629,056	130,445	1,996,236
<i>Sullivan Region.</i>				
St. Line & Sul. RR. Co.	1,811	21,936	212	16,001
Total	763,746	6,846,107	452,385	7,226,941
Increase				
Decrease		380,834		

* Included in tonnage of the Philadelphia & Reading Railroad.

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

Total same time in 1879	6,073,588 tons.
" " " 1880	5,942,209 "
" " " 1881	6,721,875 "
" " " 1882	6,710,348 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 94 tons, as compared with the corresponding period in 1883.

Belvidere-Delaware Railroad Report for the week ended April 12th:

	Week.	Year. 1884.	Year 1883.
Coal for shipment at Coal Port (Trenton)	2,568	6,218	10,940
Coal for shipment at South Amboy	21,963	169,180	231,415
Coal for distribution	17,970	228,343	231,461
Coal for company's use	3,418	53,056	45,299
Total	45,919	456,797	519,115
Increase			
Decrease		62,318	

Comparative Statement of the Production of Bituminous Coal for the week ended April 12th and year from January 1st:

Tons of 2000 pounds, unless otherwise designated.

	1884.		1883.	
	Week.	Year.	Week.	Year.
<i>Cumberland Region, Md.</i>				
Tons of 2240 lbs.	63,851	568,604	43,536	546,239
<i>Barclay Region, Pa.</i>				
Barclay RR., tons of 2240 lbs.	5,801	98,454	6,432	102,706
<i>Broad Top Region, Pa.</i>				
Huntington & Broad Top RR., of 2240 lbs.	4,689	56,034	2,926	63,386
<i>Clearfield Region, Pa.</i>				
Snow Shoe	5,232	72,346	4,289	74,734
Tyrone & Clearfield	61,944	788,391	56,662	798,981
<i>Alleghany Region, Pa.</i>				
Gallitzen & Mountain	3,939	117,159	7,788	154,868
<i>Pittsburg Region, Pa.</i>				
West Penn RR.	4,716	92,650	7,585	144,821
Southwest Penn. RR.	3,485	44,233	1,501	38,075
Pennsylvania RR.	7,217	78,321	9,995	156,144
<i>Westmoreland Region, Pa.</i>				
Pennsylvania RR.	5,330	330,139	26,326	399,963
<i>Monongahela Region, Pa.</i>				
Pennsylvania RR.	3,503	47,417		
Total	169,707	2,293,658	167,040	2,479,917
Decrease		186,259		

Comparative Statement of the Transportation of Coal over the Pennsylvania Railroad for the week ended April 12th, and year from January 1st:
Tons of 2000 pounds.

	1884.		1883.	
	Week.	Year.	Week.	Year.
Gallitzin & Mountain (Alleghany Region).....	2,629	37,969	2,653	35,721
West Penn. RR.....	77	23,711	1,432	29,881
Southwest Penn. RR.....	44,477	616,769	38,117	551,481
Penn. & Westmoreland Region, Pa. RR.....	3,557	57,571	4,777	68,779
Monongahela, Penn. RR.....	1,241	21,415	.....	.....
Pittsburg Region, Pa. RR.....	.....	120	23	274
Snow Shoe (Clearfield Region).....	730	7,654	486	4,612
Total.....	52,711	765,209	47,488	600,748
Increase.....	.....	74,461	.....	.....

RAIL AND CANAL FREIGHTS.

MICHIGAN CENTRAL RAILROAD.

Agreed through rates on freight received via a canal on the following articles: Bleaching salts, blooms, bridge iron, brimstone, car-axes, car-wheels, caustic soda, clay, coal, iron pipe, iron and steel scrap, jute butts, kainit, molding sand, old rails, paper stock, pig-iron, railroad iron, salt in bulk, soap stock, soda ash, spiegeleisen, steel rail ends, wire rods, and whitening in full car-loads, from Buffalo, N. Y., taking effect May 1st, 1884:

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Bellevue, O.; Fremont, O.....	1.45
Fostoria, O.....	1.00
Adrian, Mich.; Dundee, Mich.; Lima, O.; Tiffin, O.....	1.75
Ann Arbor, Mich.; Auburn, Ind.; Butler, Ind.; Defiance, O.; Fort Wayne, Ind.; Jackson, Mich.; Waterloo, Ind.; Ypsilanti, Mich.....	1.85
Albion, Mich.; Bay City, Mich.; Canal Dover, O.; Cellna, O.; Cincinnati, O.; Columbus, O.; Dayton, O.; Delaware, O.; Eaton Rapids, Mich.; East Saginaw, Mich.; Flint, Mich.; Holgate, O.; Holly, Mich.; Homer, Mich.; Indianapolis, Ind.; Lansing, Mich.; Massillon, O.; Saginaw, Mich.; Sidney, O.; Springfield, O.....	2.00
Allegan, Mich.; Anderson, Ind.; Battle Creek, Mich.; Benton Harbor, Mich.; Bloom, Ill.; Bluffton, Ind.; Cassopolis, Mich.; Charlotte, Mich.; Chicago, Ill.; Columbia City, Ind.; Denver, Ind.; Dowagiac, Mich.; Dyer, Ind.; Grand Haven, Mich.; Grand Junction, Mich.; Grand Rapids, Mich.; Hammond, Ind.; Holland, Mich.; Joliet, Ill.; Kalamazoo, Mich.; Kensington, Ill.; Lafayette, Ind.; Laporte, Ind.; Logansport, Ind.; Matteson, Ill.; Michigan City, Ind.; Muskegon, Mich.; Niles, Mich.; Piqua, O.; Porter, Ind.; South Bend, Ind.; Stilwell, Ind.; St. Joseph, Mich.; Three Rivers, Mich.; Troy, O.; Versailles, O.; Wabash, Ind.; Wasepi, Mich.....	2.25
Alton, Ill.; Athens, O.; Big Rapids, Mich.; Cambridge City, Ind.; Cambridge, O.; Chillicothe, O.; Circleville, O.; Connersville, Ind.; Crawfordsville, Ind.; Decatur, Ind.; Delphos, O.; East St. Louis, Ill.; Evansville, Ind.; Frankfort, Ind.; Jeffersonville, Ind.; Lancaster, O.; Ludington, Mich.; Madison, Ind.; Marion, Ind.; Marshall, Mich.; New Castle, Ind.; New Albany, Ind.; Noblesville, Ind.; Pekin, Ill.; Peoria, Ill.; Peru, Ind.; Portsmouth, O.; Richmond, Ind.; Rochester, Ind.; Rushville, Ind.; Sheldon, Ill.; Terre Haute, Ind.; Washington, C. H., O.; Waverly, O.; Xenia, O.; Louisville, O.....	\$2.50
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Louisville (proper), Ky.....	2.80
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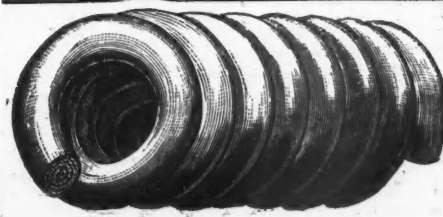
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