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THE most disastrous colliery explosion of recent times occurred on March 18th, at the Camphausen pit, near Saarbrück, in Rhenish Prussia. Out of 218 men in the pit, but seventeen escaped alive, and 201 are supposed to have perished. That such a terrible loss of life is possible argues, to those familiar with working fiery mines, a very defective ventilation. With large air-ways and abundant ventilation, it should not be possible in any mine for such an accumulation of fire-damp to occur as would cause such a terrible disaster. When such a catastrophe occurs through the neglect of the known requirements of efficient ventilation, it can not be called an accident.

MR. ARTHUR RIGG, in a paper read before the English Society of Engineers, gives his countrymen the following good advice. Our natural and well-known national modesty makes us hesitate in accepting, without some reservation, the compliment Mr. RIGG so courteously pays us :

"The idea of putting up every thing cheaply, not only saps the foundations of permanent success, but depreciates the quality of manufactured articles, and destroys honest dealing. Thus some of our goods are being driven out of foreign markets and replaced by the more honest American productions. The writer considers it the most genuine patriotism to tell his countrymen the truth, without disguise; believing that we can never lead the van of progress if we shut our eyes to what goes on in the world around. America is the best country for us to copy from, as it is inhabited by our own people; and there is more for an engineer to learn there than from any other place in the world. It welcomes every new invention, and the man of genius can hope for an early reward to his labor; while the engineer can freely obey the sound maxims—first, make sure of those general principles you intend to apply, then trust them implicitly; and finally, never be afraid to carry them out."

SOME years ago, the English papers announced the sale of the Terrible mine, in Colorado, to an English company, at a price far beyond the value of the property, although the mine was a good one. The vender was a Mr. W. A. HAMILL, of Colorado, who, as soon as he had received his money, discovered, as the report goes, that he owned older adjoining locations, through which he claimed a large part of the Terrible property, for which he had just been paid. Litigation followed, and by some means the whole property again fell under the control of HAMILL, who worked it at, it is said, a handsome profit in which, it is needless to say, the English stockholders had no part. Recently an Englishman, Mr. ARCHIBALD J. SMYTH, one of the original promoters, who is paraded in some of the London papers as "a man of courage," undertakes at his own expense to recover the property and get HAMILL the vampire out, and at the proper moment there appears on the scene a Major REED, who has some hold on HAMILL, and can get him to give up the mine to the Englishmen. Through his influence, HAMILL is induced to give up the property, in consideration, it is said, of \$450,000. The grateful stockholders vote the disinterested Mr. A. J. SMYTH a gratification in shares of stock, and his praises are in every one's mouth. As a sequel to this story, a well-informed correspondent, familiar with the persons and property, tells us that he would not give \$50,000 for the mine to-day, and that the Major REED who had a hold on HAMILL, through which he could force him to give up the property at the exceedingly low price of \$450,000, was in reality HAMILL's agent. Moreover, if the mine should ever again become valuable, HAMILL is still interested in adjoining claims through which he could again get control of the property, and repeat the old game.

WE have frequent inquiries concerning the adaptability of chlorination for the extraction of gold from certain ores. The common mistake we find is in assuming that, because this method is highly successful and for the best in some cases, it is applicable in all.

In the first place, it may be assumed that all gold must be in the metallic condition before it can be advantageously extracted from the ore by any process. The lead and copper gold-bearing ores are treated by smelting; but the ordinary free-milling ores yield their gold either by amalgamation with mercury or by chlorination, and the question as to which method is best adapted to any particular ore is one so frequently asked that a few general remarks may answer many inquiries.

If the ores contain sulphur or arsenic in any quantity, whether the gold itself be as metallic gold or as a sulphide or arsenide—a point still in dispute—they require calcination, to drive off the arsenic and sulphur as oxides, before the gold can be extracted closely either by amalgamation or chlorination; but even after roasting, the gold in many ores resists amalgamation, and but from 40 to 60 per cent can be thus obtained. Indeed, it is in rare cases only that as much as 80 per cent of the gold in any ore is obtained by amalgamation. On the other hand, with suitable ores, from 90 to 98 per cent of the gold can be saved by chlorination. The decision as to which process to adopt is not, however, to be decided so readily. Ores containing coarse gold are wholly unsuited to chlorination alone; the finer the gold, the better adapted it is to this method of treatment, and as a rule, the less perfectly can it be amalgamated; but there are cases in which it may be found advantageous to adopt amalgamation, even when the percentage saved is not large, because the expense of saving the additional obtainable gold may exceed its value.

There are not a few cases where it will pay to chlorinate an ore carry-

MR. GEORGE W. MAYNARD, mining engineer, will leave this city shortly on a professional trip to Montana.

MR. JOHN HAYS HAMMOND has returned to this city, after an absence of several months, from an extended professional trip in Arizona, Utah, and California.

THE coal miners' strike in the Pittsburg region continues, and a number of the pits have conceded the miners' demand for 3 cents a bushel. We have seen no satisfactory reason for the miners' refusal to accept the decision of their arbitrator, Mr. WEEKS, whose award was 2½ cents a bushel. The submission of disputes to arbitration must necessarily be made and the decision accepted in good faith if the old, brutal methods of settling differences between employers and employes by strikes and lock-outs are to be avoided. Certainly, the cause of arbitration, which is the cause of justice, is greatly injured by the present action of the Pittsburg miners, and if all history can be taken as a guide, the miners will themselves be the chief losers by this breach of good faith.

ing small coarse gold, and then amalgamate the tailings, or the concentrates from the tailings; the chlorination leaves the gold in the best possible condition for amalgamation, the expense of which is reduced to a minimum. Gold-bearing iron pyrites and gold-bearing mispickel (arsenical pyrites), when roasted, are usually admirably adapted to the chlorination process; and with ores of this class that carry say \$100 to the ton, there is usually no difficulty in saving from 95 to 99 per cent of the gold.

In this, as in every other metallurgical question, a thorough examination of the ores, and some simple practical tests in chlorinating and amalgamating, are necessary before deciding as to which process is most desirable. The cost of chlorine and of the precipitant for the gold are also questions to be considered. As already stated, the fact of success with one ore does not necessarily show that the process is adapted to another ore.

The cost of chlorination depends on the price of salt, manganese, or chloride of lime, and sulphuric acid, and in favored localities may not exceed \$2.50 a ton, labor and precipitating the gold included.

## CORRESPONDENCE.

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

## The Manhès Process at the Parrot Smelting-Works.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I note in the ENGINEERING AND MINING JOURNAL of March 14th, page 180, that the Manhès process at the Parrot Smelting-Works does not, thus far, seem to be an economical success. The fact that the company has discontinued running its new (Manhès) converters after a few weeks' trial, has naturally led to the belief that they have not been found as economical as the old method of smelting. This is not the case, the true circumstances being that two sets of converters are required to form a complete system. The ore is smelted raw in a blast-furnace, and yields a matte of from 40 to 45 per cent, which in the first set of converters is concentrated to about 75 per cent, the second set raising it from that point to blister copper of from 98.5 to 99 per cent. Owing to the great cost of the plant in this remote district, only a single set was erected in the first place, to test the economy of the process, which was so satisfactory that a second set was ordered by telegraph, and is rapidly approaching completion. How far the present low price of copper, and the apparently discouraging outlook for that metal, as well as the severe domestic afflictions in Mr. Farrel's family, may affect the immediate completion of the new plant is not known; but both the metallurgical and financial success of the Manhès method, and the decided economy brought about by the new works, are beyond any doubt. It is very possible that it may be considered better policy to contract production to the lowest possible limits, rather than greatly to increase the capacity and virtually waste the rich reserves of the Parrot mine during the present depressed condition of the metal market. While this can be easily done by merely limiting the number of furnaces in blast in the old works, the Manhès plant represents a certain fixed production, and can not be set in motion without increasing the output to a figure that may not seem advantageous under present conditions. Yours, G. M. G.

## The Position of Copper.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In my former statements in your columns of the condition of the copper market, I demonstrated the necessity of our mine-owners abandoning their projects of increasing the production of copper, or rather the necessity of reducing the production.

This course has not been pursued. As result, we see to-day Chili Bars quoted at \$45 15s., the lowest price on record. The English—in fact, the world's—market remains dull, notwithstanding that the statement of 33,000,000 pounds of copper held by the Mansfeld Works, given by the best authority in Germany last January, seems contradicted by a recent semi-official statement, giving the quantity as only about 4,000,000 pounds. It is very likely that during February a large quantity was disposed of.

Shipments to England during the month of March will be very heavy—larger than January and February shipments combined.

As may be seen by the reports for 1884 of the greater number of the copper mines, but little profit can be shown for 1884, though the average sales were made on a basis of from 12.80 to 13 cents per pound of fine copper. Our present price, here and elsewhere, moving between 11 and 10 cents, will certainly result in severe losses for the greater number of copper mine producers in 1885, and it is only a question of time and pride when they will have to shut down. This unavoidable measure, and a slight improvement in the trade, will doubtless contribute toward better prices.

What good can it do to copper miners to take out their valuable ores and work them at a loss? Why not wait until the revival of business and a subsequent rise in prices justify and compensate them?

For the present, there is no chance of recovery. Deliveries in England and France since February 1st are again less than last year, a decline of 750 tons—8,500,000 pounds of copper.

	Tons.	Tons.
Deliveries in January, 1884, were	8474;	in 1885, 8813
February, 1884, "	9394;	" " 5636
Visible supply, January 31st, 1885,	51,364	tons.
February 28th, 1885,	52,369	"

The influence of the recent failure of a large Baltimore concern bears also on the market, although perhaps without any good reason. I am told that this concern has hardly a stock of 1,000,000 pounds of copper unsold.

New York, March 13.

Yours truly,

S. RAUNHEIM.

## OFFICIAL STATEMENTS AND REPORTS.

## Sutro Tunnel Company, Comstock Lode, Nevada.

The annual report shows the receipts from royalty during the past year to have been \$125,617.81, being an increase of \$54,102.16 over receipts of the previous year. The receipts from sales swell the total receipts to \$144,456.67. This has enabled the company to pay \$43,230.60 on mortgage interest account, besides paying its current expenses. The disbursements were \$143,642.72. The only work done in the tunnels has been to keep them in repair. There is no statement of the amount of the company's indebtedness, or its fixed charges, interest, etc.

## Atlantic Mining Company, Michigan.

The following is the record of the most economical mining work in the Lake Superior copper mines, and certainly an instance of nearly the best, if not the very best, practice on record; the nature of the rock, rates of wages, etc., being considered. The production of mineral was 4,400,926 pounds, which yielded 71.88 per cent, or 3,163,585 pounds of refined copper. The shipments to market during the year amounted to 3,115,709 pounds, for which, estimating the amount on hand at the close of the year at 10.6 cents per pound, there has been realized an average price of 11.81 cents per pound.

The following is a summary of the year's business:

PRODUCTION.			
Copper sold, 2,247,340 pounds,	at 12.28 cents.....	\$275,884.33	
on hand, 868,369 pounds,	at 10.60 cents.....	92,047.11	
3,115,709 pounds, average 11.81 cents.....		\$367,931.44	
Copper at smelting-works December 31st, 1883,	300,387 pounds,	valued at 12 cents, net.....	\$36,046.44
Copper at smelting-works December 31st, 1884,	349,791 pounds,	valued at 9 cents, net.....	31,391.19
Net value of product of 1884.....		\$363,276.19	
COST.			
Working expenses at mine, as per clerk's tables.....		\$285,989.53	
Freight.....	\$12,271.02		
Smelting.....	36,865.56		
Expenses.....	6,073.56		
Brokerage.....	1,320.82		
Insurance.....	1,411.66		
Storage.....	190.66		
Interest.....	3.10	58,036.12	
		344,025.65	
Showing a mining profit in 1884 of.....		\$19,250.54	
Expended for addition to stamp mill, etc.....		14,215.21	
Leaving a net gain for the year of.....		\$5,035.33	
The surplus from 1883, after disposal of copper on hand and payment of dividend was.....		\$202,447.98	

Making the net surplus, December 31st, 1884, \$267,483.31, and out of which a dividend of fifty cents a share (\$20,000) was paid February 7th, 1885.

During the year, a fifth head of Ball's stamps, and 14 iron body jigs, etc., were constructed at the mill.

The cost of underground work was as follows: Sinking 83 feet, average, \$25 per foot; drifting 2954.5 feet, average, \$8.20 per foot; stoping 11,768 1/2 fathoms, average \$8.74 per fathom. These low figures were attained by the use of the machine rock-drills.

The mill has stamped and treated 209,510 tons of rock, at a cost of 38.95 cents a ton. The rock has yielded 21 pounds of mineral, or 15.1 pounds of refined copper per ton.

The cost per ton for treating the rock has increased, and is due to stamping through much finer screens than heretofore, thereby consuming more fuel and increasing the wear of metal. You will observe, however, that the yield of copper per ton of rock has also increased, which results from finer stamping and other improved methods at the mill and at the rock-house, which effect a more perfect separation, and the increased yield more than compensates for the slight increase in cost of stamping.

## SUMMARY OF RESULTS.

Rock stamped.....	209,510 tons.
Product of mineral.....	4,400,926 pounds.
Product of refined copper.....	3,163,585 pounds.
Yield of refined copper per cubic fathom of ground broken.....	250 pounds.
Yield of rock treated, 15.1 pounds copper per ton, or.....	755 per cent.
Gross value of product per ton of rock treated.....	\$1,7340
Cost per ton of mining, selecting, and breaking, including taxes and all surface expenses.....	8316
Cost per ton of transportation to mill.....	0440
Cost per ton of stamping and separating.....	3855
Cost per ton of running expenses at mine.....	13651
Cost per ton of freight, smelting, and marketing product, including New York office expenses.....	2770
Cost per ton of working expenses.....	16421
Total expenditure per ton of rock treated.....	17099
Net profit per ton of rock treated.....	0919

## Huron Copper Mining Company, Lake Superior.

This company has not made as good a record as the Atlantic, whose report is also given above.

The total production of mineral was 2,386,338 pounds from the milling of 66,313 tons of ore, and the yield in ingot was 1,927,660 pounds, or 80.78 per cent of the mineral and about 1.8 per cent of the ore milled. The following are the expenses of the company:

Mining expense, labor, etc.....	\$43,292.32
Sinking 340.4 feet shafts, and sinking 58.4 feet winzes.....	7,708.39
Drifting and cross-cutting 24,219 feet at \$12.56.....	29,456.16
Stoping 4761 fathoms at \$12.72.....	60,542.25
Supplies, labor, etc.....	193.69
Supplies and fuel used.....	17,906.26
Surface expense.....	8,174.97
Construction expense, one head Ball stamps, 14 jigs, etc.....	27,591.09
Stamping 66,313 tons, 70.85 cents.....	46,984.62
Tram-road expense, 7.56 cents per ton.....	5,015.62
Rock-house expense, breaking, selecting, etc., 66,313 tons.....	13,257.72
General expense at mine, office expense, etc.....	7,905.64
Or a total of.....	\$268,028.73
To which is to be added smelting, freight, insurance, etc., paid in Boston.....	44,643.26
Or a grand total of.....	\$312,671.99

CASH RECEIPTS AND EXPENDITURES FOR THE YEAR ENDED DECEMBER 31, 1884.

Cash on hand January 1st, 1884	\$5,894.91
Received from sale of copper, 1,725,213 pounds, at 13-877 cents	239,416.11
Received from sale of silver	148.67
Assessments	72,860.00
Sale of forfeited stock	900.90
Interest	590.01
Loans	365,533.25
	\$685,342.85

CONTRA.

Cash paid mine agent's drafts	\$275,743.86
Loans	350,989.49
Smelting, freight, copper charges, and brokerage	34,805.63
Interest, expense, taxes, insurance, etc.	11,520.16
Notes receivable	5,990.40
Cash on hand December 31st, 1884	6,293.31
	\$685,342.85

ASSETS AND LIABILITIES.

Assets.

Cash on hand January 1st, 1885	\$6,293.31
Copper on hand, 346,410 pounds, at 10-908 cents	37,786.46
Supplies at mine	50,560.10
Bills receivable	5,990.40
	\$100,630.27

Liabilities.

Due for loans, bills payable, etc.	\$119,272.80
Drafts outstanding	25,120.54
Smelting (November and December)	4,288.14
Freight (say 126,541 pounds), at \$12 per ton	759.25
Copper charges	1,012.75
Liabilities at mine	28,448.33
	\$178,901.81

Less assets, as above	100,630.27
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Balance liabilities, January 1st, 1885 \$78,271.54

The superintendent, Captain Johnson Vivian, closes his report as follows:

"The stopes throughout the mine, and particularly what is north of No. 6 shaft, are showing fairly well in all kinds of grades of mineral, and giving us a full supply of rock for the stamp-mill. If all continues as it now seems to promise, the present product can be kept up during the ensuing year. And with a little advance in the price of our product, a very fair profit will be realized. We hoisted 105,460 tons of rock, and stamped 66,313 tons. For 1885, our output will be about 140,000 tons, which is, after deducting the unproductive portion, about the capacity of our stamping-power."

Captains T. H. Odgers and J. Snell are the mine captains.

The report is by no means satisfactory, and a comparison of the cost of work with that of the Atlantic may suggest to those interested many inquiries. THE ENGINEERING AND MINING JOURNAL would be pleased to put on record more plainly the reasons why a 0-75 per cent ore pays at the Atlantic, and a 1-78 per cent ore scarcely covers expenses at the Franklin, and an ore of 1-80 runs far behind expenses at the Huron.

INTERESTING PRODUCTS OF SLIME CONCENTRATION.

Written for the Engineering and Mining Journal by Dr. E. D. Peters.

On starting up the Rittinger percussion-tables, in the new Parrot concentrator at Butte City, the attention of all present was attracted by a series of party-colored lines, bordering the extreme margin of the parabolic curve, formed by the concentrated ore. The extreme outer line, representing the product of the greatest specific gravity, was white, with metallic glance; next, came a narrow line of bright red; and then appeared the purplish band of bornite that forms the chief value of the ore. The explanation of this phenomenon, authenticated by subsequent chemical examination, is as follows: The white line represents the small quantity of metallic silver contained in the ore, and, could it be obtained in sufficient quantity for assay, of a richness of several thousand dollars per ton. The red band comes from the red oxide of copper found in very limited amounts in the upper levels of the mine. The entire phenomenon is interesting as illustrating the extreme delicacy of this method of separation, and the remarkable perfection with which these almost infinitesimally small quantities of different substances seem actually to step out from an overwhelming mass of pulp of only slightly varying specific gravity, and arrange themselves in lines according to the fixed laws that govern the art of mechanical concentration.

**The Manufacture of Soda in Germany.**—R. Hasenclever, in the *Moniteur Scientifique*, says: From 1862 to 1883, the production of sulphuric acid in Germany has increased from 22,311 tons to 157,961 tons, chiefly obtained from Siegen pyrites. Lump pyrites are burnt in kilns with movable grates, and smalls in Perret or Maletra kilns. The burnt ore from certain mines is afterward smelted for iron, but the Siegen ore retains too much sulphur to permit of its use in metallurgy. M. Hasenclever seeks to refute the views of Dr. Lunge on the inconvenience of zinc sulphide (blende) in the manufacture of sulphuric acid.

**M. Manhes's Alloy of Copper and Manganese.**—In the *Bulletin de la Société d'Encouragement pour l'Industrie Nationale*, M. Carnot, in a report presented by him on behalf of the Committee of Chemical Arts, shows that the cause of the corrosion of sheet-copper employed for the sheathing of ships is the presence of cuprous oxide, which, in contact with salt water, occasions the formation of soluble salts, even when the air is excluded. In order to reduce more completely the oxygen compounds present in the copper, he introduces a small quantity of metallic manganese, which completely reduces the cuprous oxide remaining in the metal, and becomes converted into a manganese silicate in contact with the sides and the sole of the furnace. If a few thousandths of manganese remain alloyed with the copper, they affect neither its malleability nor its resistance to the action of sea-water. The manganese is introduced in the form of cupro-manganese, an alloy containing 75 per cent of copper and 25 of manganese.

WOOD RIVER DISTRICT, IDAHO.

Correspondence of the Engineering and Mining Journal.

The interruption of operations at the Queen of the Hills and Minnie Moore mines, near Bellevue, has ceased, a number of miners having gone to work at \$3.50 a day, under the protection of an armed posse of deputy sheriffs.

The Minnie Moore was purchased last year by an English company, and during the summer and fall made large shipments of ore, but the grade is such that strict economy is necessary in conducting operations, hence the movement toward the reduction of miners' wages.

The Queen of the Hills, in the same neighborhood, produces the same quality of ore as the Minnie Moore, say from 70 to 90 ounces of silver and from 60 to 65 per cent of lead per ton. This mine is well opened, and has considerable ore-reserves in sight. Its yield, when working to full capacity, is from 400 to 500 tons a month. Both of these mines have concentrating mills.

The Mayflower mine, at Bullion, has produced, since its discovery four years ago, nearly \$1,000,000, fully one third of which, it is claimed, has been profit. It has a crushing and concentrating mill capacity of 35 tons per twenty-four hours, eschewing Cornish rolls, and depending exclusively upon the rock-breaker, adjusted to crush as fine as possible. Every other fully equipped mill on the river uses Cornish rolls in connection with Blake's or some other breaker. The ore-chute seems to be nearly exhausted, and the mine is prospecting for further discoveries.

The Bullion adjoins the Mayflower on the southwest, is extensively opened to a depth of about 500 feet, and has yielded about \$800,000 worth of ore since work began. The quality of the ore, like that of the Mayflower, is high grade, averaging 170 ounces of silver and 60 per cent of lead to the ton. It has a concentrating mill of from 40 to 50 tons capacity per twenty-four hours. A deep adit is driving this winter, to tap the mine below the present openings, which will materially lighten the expense of production, and admit the working of a large force the coming season on ground that might not otherwise yield much profit. The mine has good prospects, and in the hands of those who have learned its idiosyncrasies will doubtless make a profitable record.

In the same vicinity, but across the gulch, are the Idahoan and the Eureka, both on the same vein. The ore averages 75 ounces of silver and 65 per cent of lead to the ton. Each has a concentrating mill of about 40 tons capacity per twenty-four hours, and each ships about a car-load (12 tons) a day.

The O. K. is a shipper, and has been self-sustaining almost from the start. The Bates and Boyd group, on the course of the Idahoan and the Eureka, during the past year developed a very promising ore-chute.

The Narrow Gauge group, on the other side of the divide from Bullion, is a regular shipper, netting about \$1000 a month above expenses.

Going north from Hailey toward Ketchum, in Greenhorn Gulch, we come to the Imperial, a promising prospect that made shipments during the season averaging 60 ounces of silver and 60 per cent of lead to the ton.

On the opposite side of the valley, in East Fork, is the North Star mine, which has quite a complete concentrating mill. The ore is base and not high grade, but the mine has facilities for economical working that enable it to do as well as some that have much richer ore.

Next is the Baltimore & Victoria, a property extensively developed by tunnels, winzes, and stopes. There are large reserves of ore exposed of profitable grade. A concentrating mill is to be erected in the spring, which will place the mine among the foremost producers on Wood River.

The Elkhorn has been a profitable mine, netting its owners in the past three years \$280,000. It lies about three quarters of a mile northwest of the Baltimore & Victoria. Its bonanza has so far decreased that hunting for a new ore-body is the main work now in hand.

The Parker, situated a mile to the east of the Elkhorn, is one of the most profitable mines in this part of the country. It was discovered less than two years ago, and has paid \$100,000 in dividends in the past fifteen months. The quality of the ore is from \$200 to \$500 a ton. It has no concentrating mill, but they talk of putting up one the coming summer.

Opposite the Parker, across the ravine, is the Quaker City, which has shipped nearly ore enough to cover all its expenses. Its prospects are decidedly improving, the vein and ore becoming stronger. The ore averages 180 ounces of silver and 65 per cent of lead to the ton.

The West Fork mines are six miles above Ketchum, on Warm Springs Creek. Considerable ore has been shipped; 1000 tons, it was stated, were found in one body, but it was thought not to be in place. The main vein and ore-chute is prospected for with appearances lately that look quite encouraging.

The Buzzo mines are on the same range as the West Fork, about a mile to the southwest. These mines have been energetically worked a little over a year, and have produced about \$25,000 worth of ore. The quality averages 170 ounces of silver and 65 per cent of lead. They are doing considerable development-work, and it is said with good prospects. They have a concentrating mill run by water-power.

The Ontario, nine miles farther up Warm Springs Creek, produced during the past year about 700 tons of ore, and realized a snug profit above expenses. The outlook for the coming season is fair. A 50-ton concentrating mill is owned by the mine.

The Ophir, up Boulder Creek, is a promising young mine, coming into notice by reason of its valuable shipments of ore, which nets in the market about \$200 a ton.

There is not much doubt that the coming season will show larger shipments from Wood River than any season hitherto; and while some mines that have been prominent may fall to the rear, others will take their places. From the nature of the rock and vein formation, there are bound to be changes in some of the producing mines that will set them back in production; but many of these adverse changes may be regarded as but temporary, and persistence and skill can overcome them. W.

**The Prediction of Night-Frosts.**—Dr. C. Lang, in *Biedermann's Central-Blatt für Agrikultur-Chemie*, lays down the law that night-frosts are only to be feared when the dew-point lies below the freezing-point of water.

## THE COST OF MINING AND MILLING GOLD ORES IN NOVA SCOTIA.\*

By Willard Ide Pierce, New York City.

Considering the extent of the gold-fields of Nova Scotia, which occupy an area of from 6000 to 7000 square miles, a few words as to the cost of extracting and reducing the ores may prove of interest.

The veins are for the most part narrow, from 4 to 12 inches being the usual width, while a 2-foot vein is considered a large one; but they offer many advantages, inasmuch as the ore is easily treated, wages are low, and machinery and supplies can be transported by water to within from 1 to 15 miles of the different mining districts. The Salmon River vein is a notable exception to the above rule as to width. It ranges from 4 to 20 feet in width. The Hall-Anderson of Fifteen-Mile Stream (where there are several veins) is another, which has proved to be from 3 to 4 feet in width.

The ownership of all mining claims is retained by the crown, but persons wishing to work them can lease as many unoccupied areas as they please for twenty-one years, with option of renewal, on the payment of two dollars for each area, and a royalty of 2 per cent on all gold extracted. Each area consists of 150 feet along the lode and 250 feet across, upon which a certain amount of work must be done, which by recent law is reduced from one hundred to forty days' work for each area every year. Any person erecting in a district the first mill, having at least 8 stamps, and being at least ten miles from any other mill, is entitled to a lease of ten acres, free from entrance-payment and from royalty, for twenty-one years. A record must be kept and filed every quarter at the office of the Commissioner of Mines, of the total number of days' work done on the areas, and a monthly statement of the number of tons crushed, and the actual yield of gold.

Gold mining in Nova Scotia may be said to have commenced with the finding of a nugget of gold in a brook at Tangier in 1858. The following table, taken from the official report,† gives the total yield, with the number of tons of ore crushed since 1862, in which year statistics were first collected:

YEAR.	Total ounces of gold extracted.			Ore crushed. Tons.	Year per ton.		
	Oz.	Dwt.	Gr.		Oz.	Dwt.	Gr.
1862.....	7,275	..	..	6,473	1	2	11
1863.....	14,001	14	17	17,002	..	16	11
1864.....	20,022	18	13	21,474	..	18	16
1865.....	25,454	4	8	24,423	1	0	20
1866.....	25,204	13	2	32,161	..	15	2
1867.....	27,314	11	11	31,386	..	17	9
1868.....	20,541	6	10	32,262	..	12	17
1869.....	17,868	0	19	35,147	..	10	4
1870.....	19,866	5	5	30,879	..	12	21
1871.....	19,227	7	4	30,791	..	12	11
1872.....	13,094	17	6	17,093	..	15	7
1873.....	11,852	7	19	17,708	..	13	9
1874.....	9,140	13	9	13,844	..	13	5
1875.....	11,208	14	19	14,810	..	15	4
1876.....	12,038	13	18	15,490	..	15	13
1877.....	16,882	6	1	17,369	..	19	10
1878.....	12,577	1	22	17,990	..	13	23
1879.....	13,801	8	10	15,936	..	17	8
1880.....	13,234	0	4	14,037	..	18	20
1881.....	10,756	13	2	15,556	..	12	20
1882.....	14,107	3	20	22,081	..	12	18
1883.....	15,446	9	23	25,954	..	10	21
Total.....	350,916	13	2	470,776	0	14	22

As there is great similarity among the gold ores of Nova Scotia, and as the work of extracting and treating the ore in the different districts presents the same general features, one typical example may be given as representing the conditions of all. I select for this purpose the Oxford property, which has no special natural advantages tending to reduce the cost of working, but at which, on the other hand, all circumstances are utilized that favor more economical working, and as a result, perhaps, some distinct features are presented.

This property, on which work was begun in March, 1882, consists of 63 areas of 150 by 250 feet, situated in Lake Catcha District, 30 miles northeast from Halifax. On these areas, have been found a number of gold-bearing veins; but beyond ascertaining their comparative value, little active mining work has been done on any except the Mill and Coleman lodes. All the veins strike about east northeast and west southwest, and dip northward about 85 degrees. They are dislocated by a series of faults, the faulting fissures running north and south. The vein-matter is a hard, white quartz, inclosed in slate with walls of quartzite.

A peculiar break is found in the Coleman lode where the ends of the walls are broken as usual in faulting, but are not immediately discontinued. On the contrary, the walls and vein-matter continue around a curve for some little distance, and then suddenly end, the vein being found farther north, lying in its proper course.

The quartz carries, besides the gold, from 3 to 5 per cent of iron pyrites; but as the latter contains but little gold, no attempt is made to save it. The gold is found varying from coarse to very fine; but a great deal is in coarse grains or "sights" (from pieces weighing half an ounce each, down to shot-size), so that it is impossible to obtain from the ore directly a correct assay of it. The only way to determine the real average value of the ore is to add to the value of the bullion produced from a given number of tons the value of the tailings that are run off. The distribution of the gold in the veins is very irregular, a uniform yield being seldom continued for more than 100 feet in the vein. There are usually one or more zones of quartz richer than that surrounding it; and these zones do not seem to follow any general law, but lie at every angle, and are of varied length and width. The veins of quartz vary greatly in width, running from 2 inches to 4 feet.

The width of the quartz seems to have little effect on the walls, as they

retain their same relative positions, from 3 to 6 feet apart, whether the quartz seam is narrow or wide; only the slate, in the latter case, is very much pinched.

The cost of extracting a ton of ore varies greatly, according to the width of the quartz seam, as all matter is removed between the walls, the vein-rock and part of the slate being thrown on scaffolds that are formed about every 18 feet in depth.

The walls being solid, no other timbering is required, and the average cost for scaffolds set up, on walls 3 feet apart, is 32 cents per running foot.

Underground work is done by contract or days' work, wages for underground men being from \$1.25 to \$1.40, and for deck-men to attend to hoisting, emptying buckets, etc., \$1.25 per day, while the wages for laborers are from \$1 to \$1.20 a day.

The average cost of mining a ton of ore on a 12-inch quartz seam, walls 3 feet apart, is \$4.95, which includes raising the ore to the surface and pumping. On a 6-inch seam, the cost will be a little more than double, and on a 2-foot seam a little less than half. Of the cost on a 12-inch seam, the distance between the walls being the same.

The power for hoisting and pumping in the different shafts is all transmitted from the mill by means of wire or tarred hemp rope, and the cost, per ton of ore raised, for pumping and hoisting is:

Labor in hoisting—deck-man.....	\$0.40
Extra fuel used in mill.....	0.12
Wear and tear, etc.....	0.05
Total.....	\$0.57

The mill of the Oxford Company is a 10-stamp steam-mill and has been in operation since July, 1882. It is built over the Mill lode, one shaft of which opens within the mill, so that all ore placed in the bucket at the bottom of that shaft is hoisted directly to the breaker-floor of the mill without other handling.

The property and the immediate neighboring country are slightly undulating and in places swampy, and well wooded with soft wood (spruce and fir), and hard wood (beech, birch, and maple). The price per cord delivered at mill is, for soft wood, \$1.40; hard wood, \$2.10.

The ore from the different shafts is brought to the mill by car or cart, and, if by the latter, is dumped directly into a car at the foot of an incline to the mill. Thence the ore-car is hauled up by wire rope to the breaker-floor, where it dumps automatically. From here, the ore is passed through the breaker to the ore-bin, thence by chutes to self-feeders, where it is fed into the batteries.

The stamps are run at 60 drops a minute, and have a fall of 9 inches, crushing 1½ tons of hard rock, or 2 tons rock and slate per head every twenty-four hours. The stamps weigh 661 pounds, the weight being divided as follows: Stem, 280 pounds; shoe, 145 pounds; head, 148 pounds; tappet, 88 pounds.

The stem is 13 feet long and 2½ inches in diameter. The shoes are of chrome steel, and have given great satisfaction, the last set crushing 3300 tons. The dies are of the same material, and weigh 94 pounds each. From the mortars, the ore as crushed passes through iron wire screens of 40 meshes per inch, and all gold not caught by the plate inside of the mortar passes over copper plates, silver-plated, which are arranged in a series of steps, the first three of 3 inches each in length, the next 5½ feet, and the last 2½ feet long, with a fall of 1½ in 12. From here, the tailings run through launders out of the mill and to waste.

The greater part of the gold is caught inside of the mortars, the proportion ranging, according to the coarseness of the gold, from ½ to ⅓ of the whole amount. From 94 to 98 per cent of the gold in the ore is saved, the loss including the value of the sulphurets. In the 2½ years that the mill has been in operation, it has crushed 4754 tons at the average value of \$22.70 per ton. The gold is of a high degree of fineness, ranging from .945 to .966½, with an average of .953.

The cost of milling a ton of ore is as follows:

Labor—crushing and amalgamating.....	\$0.73
Fuel.....	0.32
Hauling to mill.....	0.05
Supplies—wear and tear.....	0.15
Total.....	\$1.28

The motive power is furnished by two engines of 35 and 12 nominal horse-power, which furnish all power for the mill, hoisting and pumping at the different shafts, hoisting ore-car from foot of incline to breaker-floor, pumping water from the lake for use in the mill, and running blacksmith's fan.

Power is transmitted from the mill by different methods, as is found most convenient, for the different workings. For hoisting and pumping on the eastern workings of the Coleman lode, the following method is employed:

On the main counter-shaft (in the mill), which revolves at the rate of 60 revolutions a minute, is placed a 2-foot bevel-gear wheel. Leading from this, and attached by a one-foot bevel-wheel, is an upright shaft 2½ inches in diameter, which extends about 2½ feet above the upper floor of the mill. This shaft is geared to make 120 revolutions a minute, and turns in guides placed in the middle and at the upper end. Just below the top guide, is keyed a 7-foot wooden sheave, which revolves horizontally, and is grooved to take a ¼-inch tarred hemp rope. Hemp rope is used here instead of wire rope, on account of its greater lightness and durability as here employed. By the use of sheaves, placed horizontally, the rope may be carried in any direction around the circle; and by increasing the width of the sheave, additional grooves may be made so that power can be transmitted in different directions at the same time. The rope leads on and off the sheaves over small guide-wheels, one foot in diameter, and is carried off to the point where it is desired to transfer the power for hoisting and pumping.

If it is desired to carry the power on beyond this point for additional working, the sheave around which the rope is passed has a second groove, around which a rope is passed, and it is carried to the second shaft where it is to be utilized. Near the shaft where the power is to be used, a suitable frame of heavy timber, set on bed-rock, and reaching from 18 to 20 feet above the surface, supports hoisting-gear, etc. The hoisting-gear, which is placed from 5 to 6 feet above the surface,

\* A paper read at the New York Meeting of the American Institute of Mining Engineers, February, 1885.

† Report of the Department of Mines, Nova Scotia, 1884.



TRIALS OF ZIRCONIA FOR USE IN ELECTRIC LIGHTS.

Written for the Engineering and Mining Journal by H. F. Dawes.

As the magnesia combs of Mr. Fahnehjelm are now attracting much attention for the utilization of water-gas in illumination, the following results of independent trials of zirconia for use in the electric light will be of interest. A number of trials were made, and though the results were not satisfactory as to its applicability for this use, they are interesting as showing its behavior in the electric current and when subjected to the voltaic arc.

It was represented that zirconia, when made into a pencil with a certain admixture of carbon, would become incandescent, and would give out a brilliant, steady, and white light. Messrs. Torrey & Eaton were consulted, and they manufactured the zirconia and pencils, and directed the tests.

A number of pencils were made, cylindrical in shape, of one quarter inch diameter, and one inch in length. Pure zirconia was used for some pencils, and others were made according to the formulae given: Zirconia, one part, and carbon five parts; zirconia, one part, and carbon seven parts; others, with but little carbon in the middle, and gradually increasing the amount until the ends were almost pure carbon. These were supported between brass holders (brass tubes sawn longitudinally and opened slightly), which were clamped in the carbon-holders of an arc light. Disconnection was made so that the current exerted no force on the positive holder, and it was supported so that its weight might not be borne by the pencil.

Some difficulty was experienced in fastening the pencils in the holders, as they would crumble when any force was used to push them in. They finally were rested between the holders, while the upper rod was fastened as remarked above. In the same circuit and near the lamp in which the trials were made, were three arc lights, in order that the value of the pencils, as light-producers, might be approximated without the use of the photometer. Those pencils containing carbon were tried first, and as the results were nearly uniform in all the trials, one description will suffice. The current strength was increased gradually, and was measured by an ammeter in circuit.

At first, a few sparks were seen at the holders, with a current strength of 15 ampères, which were quickly obscured by a reddish flame that enveloped the pencil, due probably to the combustion of the carbon at or near its surface. The flame subsided and brilliant sparks were shot out, lasting for about two minutes, when the flame ceased entirely. The pencil was now seen to be red-hot, and seamed and porous, the current strength at this time having been increased to 20 ampères. As it held this red heat without giving out light for several minutes, the strength was increased gradually to 40 ampères, with no result other than that it fell away and crumbled, until it dropped out of the holders. It was found, after the first trial, that the brass holders had been fused at the point of contact with the pencils. Platinum holders were then tried with similar results. When the current was first passed, a succession of sparks was seen at the junction of the pencil with the platinum, before the pencils flamed. A pure zirconia pencil was tried between these latter; but a current strength of 40 ampères could not be passed, and no greater was tried. In order to subject them, if possible, a longer time to the action of the current, two holes were drilled longitudinally in two copper-plated carbon pencils, and the zirconia pencils were held between them. But the results were the same: they crumbled and fell away, showing that this falling out was not entirely due to the fusing of the holders, as might have been supposed in the other cases. A final trial was made of a pure zirconia pencil, which was recessed so deeply as only to leave about an eighth of an inch between the carbons, and the arc was established. No greater light was given than in the neighboring arc lights, and subsequent examination showed the zirconia to be fused to a hard white enamel. In some of the first trials, two zirconia and carbon pencils were placed in contact, and it was found that they stuck slightly together. Not much importance, however, was attached to this, as it was thought that it might be due to some foreign substance between them, or to some impurities of the carbon mixed with them. But this last proved beyond a doubt its ultimate fusibility.

Talc was tried, after cutting it to the required shape and thoroughly baking it in a muffle. No current could be passed—that is, current of 40 ampères strength—and in presence of the arc it fused rapidly.

QUICKSILVER REDUCTION AT NEW ALMADEN.\*

By Professor Samuel B. Christy.

(Concluded from page 175.)

The normal capacity of this furnace is 36 tons, the same as that of No. 1. The furnace holds, when under working conditions, 51 tons of ore; a charge is, therefore, thirty-four hours in the furnace.

The routine of operations at this furnace is as follows: The aprons or shaking-tables under each of the three pairs of ore-chambers are operated at intervals of ten or fifteen minutes, so as to discharge from each one ton (by volume) every two hours. After the ore has descended in the various chambers, subsequent to discharging below, one ton of ore is added to each of the three ore-hoppers at intervals of forty minutes; that is, each hopper receives one ton every two hours. The firing and tramping of the spent ore goes on meanwhile as at the other furnaces.

The fuel required at this furnace is 2½ cords of wood per twenty-four hours, if that alone is used; but if coal is used, the amount of wood is reduced in proportion. The working force is:

Two men, at \$2.50 per 12-hour shift.  
One man, at \$1.25 per 12-hour shift.

The campaign for 1882 is shown in the accompanying table.  
Furnace No. 8.—This tierra furnace completes the list of the fine-ore furnaces. A drawing of this furnace has been already published by M. G. Rolland,† so that it need not be repeated here. This furnace is really

\* A paper read at the Philadelphia Meeting of the American Institute of Mining Engineers, September, 1884.

† La Métallurgie du Mercure en Californie, par M. G. Rolland. Société d'Encouragement, etc., 1878, p. 85, Figs. 7 and 8.

two separate furnaces, like No. 5, on a larger scale, united in one structure. The normal capacity of No. 8 is 24 tons per twenty-four hours. When full, it holds 32 tons; consequently, a charge stays in the furnace thirty-two hours.

The hoppers of each pair of chambers receive each a charge of 1000 pounds per hour, or the double furnace receives one ton per hour. The hoppers are charged alternately. The discharge is effected by the shaking-table, as in No. 3, by working it every ten or fifteen minutes.

Two cords of wood are burned per twenty-four hours, and the working force of the furnace is:

One man at \$2.50 per 12-hour shift.  
One man at \$1.25 per 12-hour shift.

The campaign for 1882 appears in the following table:

RÉSUMÉ OF GRANZITA AND TIERRA FURNACES (PRODUCTION AND COST).

FURNACES.	Number of months run in 1882.	Number of days run.	Granza screenings, tons.	Tierras and granzita, tons.	Total ore, tons.	Quicksilver (flasks).			
						Condenser.	Soot.	Total.	Per cent.
No. 1.....	7	215-00	425-75	Gr. 7,165-50	7,591-25	2,959	322	3,274	1-664
No. 2.....	9	275-00	240-00	Gr. 3,398-50	3,438-50	1,834	48	1,882	2-090
No. 3.....	11	334-00	.....	Tr. 12,022-00	12,022-00	4,238	141	4,379	1-390
No. 8.....	6	155-14	.....	Tr. 3,636-50	3,636-50	1,141	93	1,234	1-298
Totals.....	979	25	665-75	26,022-50	26,688-25	10,165	604	10,769	1-543
Average per ton of granzita and tierras.....									
						0-4035		1-543	

FURNACES.	Wood burned, cords.	Coal, etc., pounds.	Cost of fuel.	Cost of labor.	Total cost.
No. 1.....	344-750	149,040	\$2,669-71	\$2,186-78	\$4,856-49
No. 2.....	217-125	136,000	1,857-44	1,603-60	3,461-04
No. 3.....	523-958	326,000	4,493-23	4,175-00	8,668-23
No. 8.....	314-916	.....	1,868-59	1,177-50	3,046-09
Totals.....	1,400-749	611,040	\$10,888-97	\$9,142-88	\$20,031-85
Average per ton of Granzita and tierras.....	0-052	22-895	0-408	0-343	0-751

RÉSUMÉ OF COSTS PER TON, GRANZITA AND TIERRA FURNACES.

FURNACES.	Quicksilver (flasks).		Wood burned, cords.	Coal, etc., pounds.
	Total.	Per cent.		
Furnace No. 1,* capacity 36 tons per twenty-four hours.....	0-431	1-664	0-0455	19-633
Furnace No. 2,* capacity 12 tons per twenty-four hours.....	0-547	2-090	0-0631	39-551
Furnace No. 3, capacity 36 tons per twenty-four hours.....	0-459	.....	0-0440	27-117
Furnace No. 8, capacity 24 tons per twenty-four hours.....	0-339	1-298	0-0860	.....

FURNACES.	Cost of fuel.	Cost of labor.	Total cost.
Furnace No. 1,* capacity 36 tons per twenty-four hours..	\$0-3520	\$0-288	\$0-640
Furnace No. 2,* capacity 12 tons per twenty-four hours..	0-5401	0-466	1-006
Furnace No. 3, capacity 36 tons per twenty-four hours..	0-3740	0-347	0-721
Furnace No. 8, capacity 24 tons per twenty-four hours..	0-5140	0-323	0-837

The saving effected by the Hüttner and Scott furnaces may now be readily calculated. If they were not in use, the old intermittent furnaces being used in their stead, and the ore being made into adobes, we should have, per ton:

Cost of roasting intermittent furnace.....	\$1-368
Cost of making tierras and granzita into adobes.....	0-500
Cost of handling adobes.....	0-450
Total cost per ton.....	\$2-318
26,688-25 tons at \$2-318.....	\$61,863-264
Present actual cost in Hüttner and Scott furnaces.....	20,031-850
Annual saving.....	\$41,831-514

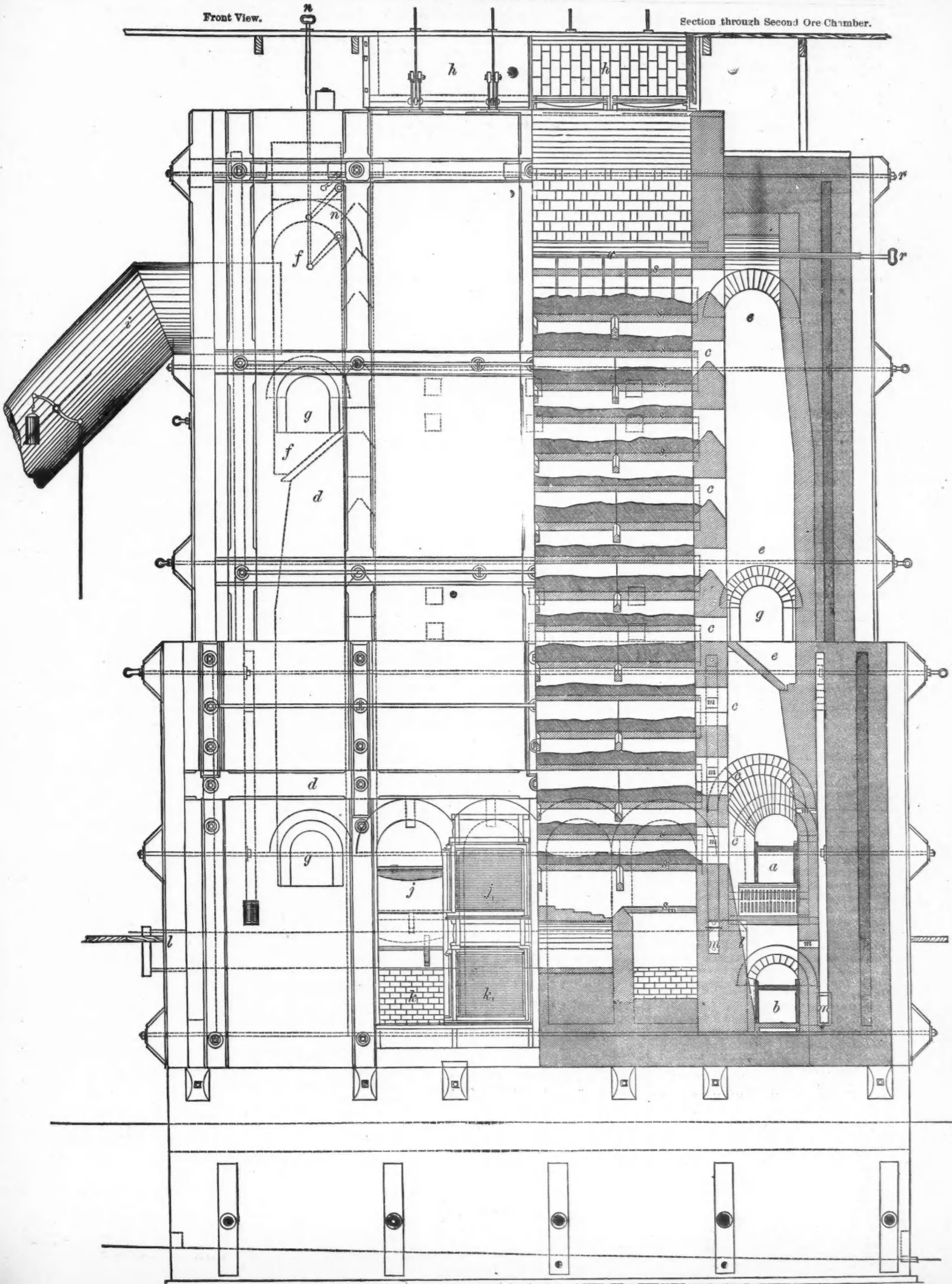
If, instead of treating these ores in the intermittent furnaces, the adobes were roasted in the monitors, we should have, per ton:

Cost of roasting in 7 and 9 furnaces.....	\$0-953
Making and handling adobes.....	0-950
Total cost per ton.....	\$1-903
26,688-25 tons at \$1-903.....	\$50,787-74
Present actual cost in Hüttner and Scott furnaces.....	20,031-85
Annual saving.....	\$30,755-89

Instead of making the granzita into adobes, this might be in part roasted directly in the coarse-ore furnaces, and the latter might be made to work

\* In working Nos. 1 and 2, the labor of tramping the ore from the chutes to the furnaces has been included. The low cost of working No. 1 is partly due to the fact that Nos. 1 and 2 are usually worked together. No. 2 was not worked to its full capacity. The advantage of increasing the capacity of these furnaces is evident from the table.

FRONT OF FURNACE.



faster than with rich *granza*. These modifications might slightly reduce the above saving; but the difference would be slight. In making this comparison, the interest on the furnace-plant has not been mentioned.

In concluding this account of the Hüttner and Scott furnaces, it may be said that they fulfill every requirement of a good roasting-furnace. They utilize the principle of opposed currents; they allow the ore to cool in the furnace itself before it is drawn, thus utilizing the heat and removing the last traces of quicksilver. The stirring of the ore is entirely automatic and very thorough; for each time the ore passes from one shelf to the next opposite one the ore, which lay at the bottom of the layer, next to the surface of the upper shelf, and out of contact with the air, is on the next lower shelf brought to the surface, where it is directly exposed to oxidation. This operation is repeated from twenty to thirty times, according to the number of shelves in the chamber. The feeding and discharge of ore and waste are effected with a minimum of labor and without the use of power. Add to this, that the whole operation is under perfect control, and may be modified at any time, according to the nature of the ore, without stopping the regular operation of the furnace; and also, that the repairs are mostly slight and inexpensive,\* and we have a very good showing for the furnace.

SUMMARY OF ALL THE FURNACE RECORDS.

1882. FURNACES.	Number of days run.	Granza, tons.	Terrero, tons.	Tierra and granzita, tons.	Total ore, tons.
Granzita and tierra .....	979·25	†665·75	.....	26,022·50	26,688·50
Granza .....	694·42	6,644·80	.....	.....	6,644·80
Intermittent .....	*138·08	2,259·30	297·60	183·65	2,740·55
	1,811·75	9,569·85	297·60	26,206·15	36,073·60
Per ton of ore .....					1

1882. FURNACES.	Quicksilver (flasks).				Wood, cords.
	Condens- ers.	Soot.	Total.	Per cent.	
Granzita and tierra .....	10,165	604	10,769	1·543	1,400·749
Granza .....	11,675	494	12,169	7·000	420·375
Intermittent .....	5,108	24	5,132	7·160	413·500
	26,948	1,122	28,070	2·976	2,234·624
Per ton of ore .....			0·980	2·976	0·619

1882. FURNACES.	Coal and Charcoal, pounds.	Cost of fuel.	Cost of labor.	Total cost.
Granzita and tierra .....	611,040·000	\$10,888·97	\$9,142·88	\$20,031·85
Granza .....	211,944·000	3,659·65	2,671·25	6,330·90
Intermittent .....	.....	2,425·87	1,324·50	3,750·37
	822,984·000	\$16,974·49	\$13,138·63	\$30,113·12
Per ton of ore .....	22·814	0·4705	0·3642	0·8347
The total cost of cleaning condensers and working soot from all furnaces was \$2509·85, or per ton of ore.....				0·6664
Total direct cost of working one ton of ore.....				0·9011

\* Firing time only.

† Granza screenings, that is, rich *granzita*.

The ores of New Almaden can not be regarded as difficult to roast, and the results obtained with this furnace might be thought not to apply to other ores. The fine ores at the Sulphur Banks quicksilver mine, however, present many difficulties. Thus, at times they contain alkaline borates, and so frit to a pasty mass; at other times, the lumps decrepitate in the furnace to a dust as fine as ashes; this, when red-hot, runs almost like water. After much difficulty with other furnaces, the Hüttner and Scott furnace was introduced there by Mr. Ferdinand Fiedler, and gave excellent results. It is not improbable that this furnace could be used with advantage in roasting fine ores of other metals. Those that are not too fusible could probably be treated in it with success.

The preceding summary gives the results of the year's run of all the furnaces for 1882.

During the year 1883, the furnaces were in operation as follows: No. 6 made 27 runs; Nos. 7 and 9 worked continuously 365 days; No. 1 ran 286 days; No. 2 ran 253 days; No. 3 ran 188 days; No. 8 worked 352, and was stopped only for lack of dumping-room. The production was even greater than for 1882, the total amount treated for 1883 being:

Granza .....	10,428·40 tons of 2000 pounds.
Terrero .....	185·35 " " "
Granzita and tierras .....	27,987·50 " " "
Total .....	38,581·25 tons of 2000 pounds.

The product of quicksilver for the year was 29,000 flasks at 76½ pounds, or a yield of 2·875 per cent.

Finally, in concluding the present paper, the best idea of the increased

\* The wear and tear on the tile-shelving would, at first sight, be thought considerable; but Mr. Scott, who has himself built and repaired the mason-work of these furnaces, assured me that with good tiles there is very little wear, except in the lower part of the furnace, where they are directly exposed to the full heat of the flames. These tiles gradually become brittle and crumble, so that they have to be replaced. The others suffer very little; in fact, some of them plainly show the stamp of the maker on the upper face after several years of constant use. The tiles in the *granzita* furnaces wear out sooner than those in the *tierra* furnaces.

It should be stated that these furnaces and all the devices peculiar to them are protected by letters patent.

efficiency of the new furnace plant may be gathered from the recent great increase in the amount of ore annually reduced. Thus, in the year from July, 1850, to July, 1851, there were reduced less than 2500 tons of ore, an amount less than one fifteenth that of 1883. From 1850 on, the quantity annually reduced increased, with some interruptions, until in 1876 it rose to nearly 17,000 tons. Since then, that is, during the seven years ending with 1883, this amount has been more than doubled. This great increase has been, of course, mainly due to the introduction of the Hüttner and Scott furnaces, which allowed the treatment of large quantities of low-grade ores that formerly could not be handled at a profit.

The percentage yield of the ores treated has gradually decreased from 36·74 per cent in 1850-51, to 2·875 per cent in 1883. This reduction in the content of the ore is, however, partly due to the great increase in the amount of low-grade ores now treated, although the richest ores now run only as high as 6 or 8 per cent, as against 36·74 per cent in 1850.

The greatest annual yield of quicksilver since records have been kept [that is, since 1850] occurred from 1861 to 1866, when the rich *Ardilla* and *Santa Rita labores* were worked. The highest annual yield of the mine now on record was in 1865, when it produced 47,194 flasks. The quicksilver product then declined till, in 1874, it had sunk to 9084 flasks, an annual yield, however, that has been exceeded by only three other mines in California. From 1874 to the present time, owing to constant improvements in the furnace plant, the annual yield has steadily increased, almost without interruption, till in 1883, it reached 29,000 flasks, the highest product since 1866.

#### THE EXTRACTION OF SULPHUR BY CHLORIDE OF CALCIUM IN SICILY.

In 1868, a method of extracting sulphur from its ore was patented in Italy by Déperais, in which the ore was plunged into a solution of chloride of calcium, heated from 10 to 20 degrees above the melting-point of sulphur. This has only been advantageously used since the price of chloride of calcium has been cheapened by its production in large quantities as waste in the ammonia-soda process of Solvay, and it now costs, including carriage, 90 francs a ton in Sicily. The method has been adopted by Messrs. C. Vincent de la Tour and Dubreuil at the mines of Tronica, Grotta Rossa Pernice, near Racalmuto and Crocca, at nine different points. The plant consists of two rectangular wrought-iron boilers, each of two cubic meters capacity, which are heated alternately by one fire-place, lignite coke or coal being used as fuel. As some varieties of the ore disintegrate in the chloride of calcium solution, and fall to powder, which, mixing with the sulphur, renders the latter impure, the boilers are provided with an inclined feeding-trough, protected by vertical iron gratings, formed of bars, 2 millimeters thick and 25 millimeters broad, spaced 3 millimeters apart. The molten sulphur passing through the grate collects in the trough, and is removed from time to time by opening a valve.

In working the process, the chloride of calcium solution, heated to 120 degrees, which is below its boiling-point, is run into the ore contained in one of the boilers, when the sulphur gradually melts out, collects, and is cast into molds. In about two hours' time, when lump ores are treated, half the solution is run over into the second boiler, while the other half is drawn off into a vessel at a lower level, whence it is pumped up to the second boiler.

After washing out the exhausted residues with water, to remove the adherent lye, the first boiler is refilled while the second is extracted, the loss by evaporation from the solution being made up by the wash-water from the residue of the first operation. The residues from the lump ore retain only from four to five per cent of sulphur, while the molten sulphur contains only from 0·001 to 0·002 per cent of foreign matters, while that of the calcaroni process contains from two to three per cent of impurities, and only half the sulphur in the ore is recovered. With ores of an average yield of thirty-three per cent, the cost of working per ton is estimated at 12·75 francs. A further advantage is, that the process may be worked all the year around, being entirely independent of atmospheric conditions, no sulphurous acid being found; while the calcaroni, on account of their deleterious influence upon vegetation, can only be worked during the first six months of the year.

**Peruvian Nitrate Combination.**—It appears that combinations are contagious. Here are the Peruvians, who have a guano ring that is (naturally) in bad odor. At a general meeting of the nitrate producers, held at Iquique, on the 6th of February, resolutions were unanimously adopted authorizing the directory to diminish production for the present, and until the stock in Europe is consumed, to 1,000,000 quintals yearly on all the coast, also authorizing the directory to declare the combination committee prorogued until December 31st, 1886, and declaring that during this period no producer subject to the convention shall contribute, directly or indirectly, to the formation of new establishments or augment the productive power of his machinery.

**Trinidad Asphaltum.**—A correspondent, writing to a Trinidad contemporary, calls the attention of the public of Trinidad to the unsatisfactory working of the Pitch Lake leases in relation to the government. It seems that, except five acres reserved by the crown, the whole of the lake is practically in the hands of three individuals, at an annual rental of only about £260. Last year, the exports were 4868 tons of boiled and 34,277 tons of raw asphalt, the duty on which was about £1100, the government thus receiving about £1360 only. The expense of digging and shipping is under 8s. or \$2 a ton; freight to Europe, 20s.; and to the United States, \$3; and selling price there from 40s. to 45s., and \$12 in Trinidad; leaving a certain profit of \$3 a ton, or say \$120,000 a year to be divided between a few individuals, not one of whom can be said to have any substantial stake in the island beyond what he thus gets out of it. This is checking the extension of the application of this very useful material.

\* Abstract of a paper in the *Berg- und Hüttenmännische Zeitung*, xliii., p. 277. From the Proceedings of the Institution of Civil Engineers of London, edited by James Forrest, Secretary.

† Calcaroni are kilns in which the liquation of the sulphur from the rock is effected by burning a portion of the ore.



PHOSPHATE DEPOSITS OF NORTH CAROLINA.

Written for the Engineering and Mining Journal by Arthur Winslow, E.S., of Raleigh, N. C.

The results of the preliminary explorations noticed in your issue of May 17th, 1884, determined the State Board of Agriculture to continue this good work in a more detailed manner. Developments were therefore started during the past summer under the direction of Dr. Charles W. Dabney, Jr., in Sampson and Duplin counties, near the line of the Wilmington & Weldon Railroad. Pits were dug according to a regular system within the phosphate areas, and from the dimensions of the pits and the weight of rock excavated, the tonnages per acre were calculated. The beds were proved to have very irregular boundaries and lie in what are termed "pockets." They are found along small streams, generally a few hundred feet down the stream from some marl-bed. They lie in the bottoms and extend up the adjoining slopes. Hence, their distribution is a peculiar one, and generally there is much concerning these beds and their origin that is obscure and that offers a fertile field of inquiry for the geologist. The pits were dug across the bottoms and up the inclines until the limit of accessible depth was reached, which was considered to be at ten feet below the surface. One hundred and twenty-five acres of land were thus thoroughly proved in different parts of Sampson and Duplin counties. This area is calculated to contain 50,864 tons of phosphate rock within ten feet of the surface, which gives an average of 407 tons to the acre. The average amount of phosphate of lime contained is about 41 per cent. The rock is free from iron and alumina, and the diluting material is sand. This phosphate is more readily acted upon by sulphuric acid than that of South Carolina, and it only requires three fourths as much to convert it into superphosphate.

In causing these explorations to be made, North Carolina has done what it is generally left to private enterprise to accomplish; but having thus outlined the area and laid bare the facts concerning this valuable rock, there is every probability that it will soon be mined on a commercial scale and will give rise to an industry profitable to the State and to the individual.

CERTAIN INTERESTING CRYSTALLINE ALLOYS.\*

By Richard Pearce, Denver, Colo.

In the treatment of auriferous copper containing bismuth, I have recently observed a small quantity of a grayish-white alloy, which on examination proved to be Bi containing in solution, as it were, a crystalline alloy of Bi and Au. This compound makes its appearance on the surface of the auriferous Cu in small globules as the latter cools.

These globules are rapidly attacked by nitric acid, and fine needle-shaped crystals of Bi and Au separate out. They are insoluble even in strong nitric acid.

On examination, the crystals were found to contain: Gold, 69.94 per cent; silver, 0.63 per cent; bismuth, 29.43 per cent (No. 1).

The residue is very fusible, and at a temperature considerably below its melting-point it oxidizes rapidly, changing from its original gray color to a greenish-yellow (No. 2). On melting in a crucible under flux, a bronze-colored alloy is formed that has a specific gravity 15.47—somewhat higher than the calculated specific gravity of a simple mixture of the two metals in the proportions named.

In following out my investigations by repeated examinations of this alloy formed at different times, I found that, in dissolving a miscellaneous lot of the alloy in nitric acid, some gold-yellow crystals were formed, which I succeeded in separating from the BiAu alloy by washing. These yellow crystals under the microscope showed distinct, regular, octahedral faces, and on examination they were found to be a crystalline alloy of Au and Ag in the proportion of 69 Au, 21 Ag (No. 3). The quantity was too small to admit of any very correct determinations of these crystals; but the peculiar feature was remarked that they contained Ag, while the BiAu crystals did not in any appreciable quantity.

My next experiment was to remelt some of the original Bi compound with Ag, so arranging that the Ag should exist in the melted alloy in the proportion of one atom of Au to one of Ag. The alloy was prepared by melting in a small crucible under a layer of borax, and then allowing the crucible, with its contents, to cool very slowly. This was done by placing the small crucible inside a larger crucible that had been previously made red-hot, and allowing the whole thing to stand until cold. The small crucible was then broken and the button of alloy detached. This alloy was found to be very brittle and crystalline. It was broken into lumps and treated in a flask with dilute nitric acid—one of acid to three of water. I found, after all the Bi had been attacked by the acid, that nothing was left behind but a beautiful crystalline alloy of Au and Ag (No. 4). There was an entire absence of any BiAu compound, which was found in former experiments. The solution of nitrate of Bi showed no trace of Ag. These crystals were found to contain: Gold, 62.164 per cent; silver, 35.486 per cent; Cu and Bi, 2.35 per cent. Further boiling of the crystals with strong nitric acid gave (No. 5): Gold, 65.21; silver, 33.19; copper, 1.60.

Alloys of gold and silver in all proportions may be obtained in this way, depending on the amount of Ag used and also on the strength of nitric acid employed in the separation of the Bi. The largest and best formed crystals are, however, those in which the Au and Ag exist in the ratio of their atomic weights. Repeated boiling with strong nitric acid will, however, remove a portion of the Ag, without in any way damaging the crystals or effecting any very marked change in the color. In a number of experiments that I have made with the alloys of Au and Ag, the lowest percentage of Au resulting from treatment with HNO<sub>3</sub> was 58.51 (No. 6), and the highest 94.15 (No. 7).

ALLOYS OF GOLD AND COPPER.

Crystals of an alloy of Au and Cu may be obtained precisely in the same way by substituting Cu for Ag. The form of crystals is the same, that of the regular octahedron, but they are much smaller. A crop of crystals was obtained having the composition 61.52 Au and 38.48 Cu

(No. 8). On treating these crystals with strong nitric acid and boiling for some time until there was no further action, a large percentage of the Cu was dissolved out, and a product was obtained a little darker in color, containing 93.49 Au and 6.51 Cu (No. 9).

Crystals were also obtained containing all three metals in the proportion: Gold, 60.16; silver, 21.21; copper, 18.63 (No. 10).

These experiments indicate that Au will not combine with Bi if Ag or Cu are present in sufficient quantity. The crystals of Au and Bi are in fine needle-shaped forms, the system of crystallization not determined; but possibly rhombohedral (the crystalline form of Bi).

Au, Ag, and Cu crystallize out together from a solution of these metals in Bi; the mother liquor, if I may use the expression, containing no Ag or Cu unless these metals are present in excess of what is required to form alloys that will resist the action of dilute nitric acid.

The following experiment was made with the view of determining the solvent action of Bi, melted at a low temperature, on the crystals of alloy of Au and Ag formed by the process that I have described:

An alloy was made by melting Au and Ag in about their atomic proportions with Bi, and allowing to cool slowly. The alloy was then heated in a small iron ladle until it became liquid, care being taken not to increase the temperature much above the melting-point. The liquid portion was then poured off and the residue of crystals drained until a pasty mass was obtained. The temperature was then slightly increased, and a further quantity of molten Bi poured off. The percentage of each product was as follows: 56 per cent of the total weight was poured off at the first melting at a low temperature; 19 per cent after a slightly increased temperature; the rest, 25 per cent (the pasty mass), re-treating with dilute nitric acid, gave a crop of good crystals, which were found to contain: Gold, 59.06; silver, 37.21 (No. 11); Cu and Bi (by diff.), 3.73. Treated with strong nitric acid, their composition became: Gold, 68.53; silver, 27.54; copper, 3.93. I found in this experiment that the pasty residue in the ladle contained only about 62 per cent of the total gold, the remainder being carried off by the liquated Bi.

The ratios of the gold and silver in these three products were as follows:

		(Approximately.)	
First liquation	Au 74.16	Ag 25.84	Au <sub>2</sub> Ag
Second liquation	Au 65.35	Ag 34.65	AuAg
Pasty residue	Au 71.33	Ag 28.67	Au <sub>4</sub> Ag

In all these alloys of Au, Ag, and Cu, the only crystalline form observed was that of the regular octahedron without any modifications.\*

ALLOYS OF BISMUTH AND PLATINUM.

Experiments were made to see how far it was possible to prepare in a similar way crystalline alloys of platinum and bismuth.

Pt and Bi were melted together and allowed to cool slowly in the usual way. The brittle alloy was treated first with dilute nitric acid and then with strong acid. A black crystalline powder was obtained, which, under the microscope, showed some few crystals, form not determined.

A second experiment was made with the addition of Cu to a similar mixture as before. A highly crystalline, jet-black residue was obtained, which, on examination, proved to be binoxide of platinum.

Crystalline alloys are obtained in the same way as with Au; but these compounds, unlike those containing Au, are decomposed by nitric acid; the metals Bi and Cu that entered into the composition of the alloy being entirely replaced by oxygen, and this without destroying the structure of the crystal, as will be seen by examination (No. 12). The black crystals became red-hot in a current of hydrogen, water being condensed on the sides of the tube, a grayish-white powder of Pt being left behind (No. 13). A loss of weight was sustained in this experiment equal to 13.75 per cent, which is very near the amount of oxygen required by the formula PtO<sub>2</sub>. On heating in a tube, it gives off O, a grayish-white powder of Pt remaining.

The black crystals can be ground easily in a mortar without showing the slightest evidence of metallic particles. Alcohol is readily oxidized by this compound. On heating the crystals, a trace of reddish-brown gas is given off, probably due to a small quantity of occluded nitric oxide.

If it were possible to attack the Bi by some acid that is not oxidizing, we should unquestionably obtain crystals of the alloy of Pt and Bi, or Pt and Cu, or perhaps Pt, Bi, and Cu; but on using nitric acid as the solvent, we have to be content with pseudomorphs of PtO<sub>2</sub> after the alloy.

In order to avoid the use of nitric acid, an experiment was made by substituting Zn for Bi, in the hope that crystals would be formed that could be separated by dissolving out the Zn with H<sub>2</sub>SO<sub>4</sub>. A black powder was obtained in this way, showing, however, no evidence of crystallization. On treating the black powder with nitric acid, Cu was dissolved to the extent of 20 per cent, and a grayish-black residue was obtained, which, when dried, possessed highly oxidizing properties (No. 14). It instantly ignited a drop of alcohol and exploded a mixture of hydrogen and air. What the exact nature of this substance is, I have not determined; but it differs materially from the crystalline black substance prepared from the Bi alloy. From the loss sustained on ignition (less than one half required for PtO<sub>2</sub>), it would appear to be finely divided platinum intimately mixed with PtO<sub>2</sub>. Its oxidizing properties are, however, far more energetic than were shown by the previous compound.

These experiments that I have drawn attention to may be regarded as being of a preliminary character. They offer, however, a field for further investigation that would, in all probability, lead to some interesting facts connected with the composition of alloys.

**A Measure of the Heat of Combustion of Various Carbons.**—At the meeting of the Academy of Sciences, a paper was read by M. Berthelot describing experiments made in collaboration with M. Vieille for obtaining a measure of the heat of combustion of various carbons. A calorimetric bomb was employed in which was inclosed compressed oxygen in quantity three times that which is necessary to effect combustion in air. In the bomb or shell, the combustion is complete, and lasts but two or three minutes, and gives rise to no carbonic oxide. The measure of heat thus obtained is without error.

\* A paper read at the New York Meeting of the American Institute of Mining Engineers, February, 1885.

\* The Bi used for most of these alloys was somewhat impure, containing notably a little copper.

## BOOKS RECEIVED.

[In sending books for notice, will publishers, for their own sake and for that of book-buyers, give the retail price!]

*Plaster and Plastering.* Mortars and Cements, How to Make, and How to Use. Being a Complete Guide for the Plasterer, etc. To which is appended an Illustrated Glossary of Terms used in Plastering, etc. By Frederick T. Hodgson. New York: The Industrial Publication Company. 1883. 12mo, pages vi+103. Frontispiece and two Plates, and numerous Wood-Cuts.

*The Student's Illustrated Guide to Practical Draughting.* A Series of Practical Instructions for Machinists, Mechanics, and Students at Engineering Establishments and Technical Institutes. By T. P. Pemberton. New York: T. P. Pemberton, 142 Greenwich street. 12mo, pages 112 and 67 Wood-Cuts. \$1.

*The Air Breathe and Ventilation.* By Henry A. Mott, Jr., Ph.D., E.M., F.C.S., etc. Mott Series, No. 2. New York: John Wiley & Sons. 1883. 16mo, pages 81 and 26 Plates. (No Index or Contents.) \$1.

*A New System of Laying Out Railway Turn-Outs Instantly by Inspection from Tables.* By Jacob M. Clark. New York: D. Van Nostrand. 1884. 16mo, pages 38 and 3 folding Plates. \$1.

*Saw Filing: a Practical Treatise, in Popular Form.* By Robert Grimshaw. With many Illustrations. New York: John Wiley & Sons. 1883. 16mo, pages 77 and 81 Wood-Cuts. \$1.

*Wrought-Iron and Steel in Construction.* Convenient Rules, Formulae, and Tables for the Strength of Wrought-Iron Shapes used as Beams, Struts, Shafts, etc., manufactured by the Pencoyd Iron-Works. New York: John Wiley & Sons. 1884. 12mo, pages vi+192 (including Index), Frontispiece, and 24 full-page Plates. Morocco flaps. \$2.

*The Architect's and Builder's Pocket-Book of Mensuration, Geometry, Geometrical Problems, Trigonometrical Formulas and Tables, Strength and Stability of Foundations, Walls, Buttresses, Piers, Arches, Posts, Ties, Beams, Girders, Trusses, Floors, Roofs, etc.* In addition to which is a Great Amount of Condensed Information: Statistics and Tables Relating to Carpentry, Masonry, Drainage, Painting and Glazing, Plumbing, Plastering, Roofing, Heating and Ventilation, Weights of Materials, Capacity and Dimensions of Noted Churches, Theaters, Domes, Towers, Spires, etc. With a Great Variety of Miscellaneous Information. By Frank Eugene Kidder, C.E., Consulting Architect, Boston. Illustrated with 408 Engravings, mostly from Original Designs. New York: John Wiley & Sons. 1885. Oblong 12mo, pages xiii+586 (including Index) and Frontispiece. Morocco flaps. \$3.50.

*The Fireman's Guide.* A Hand-Book on the Care of Boilers. By Teknofföreningen T. L., Stockholm. Translated from the Third Edition, and Revised by Karl Dahlstrom, M.E. London and New York: E. & F. N. Spon. 1885. 16mo, pages iv+[1]+26+[2]. 50 cents.

*Curve-Tracing in Cartesian Co-ordinates.* By William Woolsey Johnson, Professor of Mathematics at the United States Naval Academy. New York: John Wiley & Sons. 1884. 12mo, pages vi+86. \$1.

*A Treatise on Practical and Theoretical Mine Ventilation.* By Eugene B. Wilson, Instructor in Drifton Industrial School for Miners and Mechanics. New York: John Wiley & Sons. 1884. Sq. 12mo, pages vii+141 (including Index). \$1.25.

*Stationary Steam-Engines: Especially as adapted to Electric Lighting Purposes.* By Robert H. Thurston, A.M., C.E. New York: John Wiley & Sons. 1884. 8vo, pages 177, and 59 Illustrations, many of them full-page, and some of them folding Plates. (No Index.) \$2.

*The Journal of the Iron and Steel Institute.* 1884. London: E. & F. N. Spon. Octavo. No. 1. Pages x+1-342 (including 2 pages of Bibliography).—No. 2. Pages xii+343-746+lxv. (Index.)

*The Designing of Ordinary Highway Bridges.* By J. A. L. Waddell, C.E., B.A.Sc., M.A.E., Professor of Civil Engineering in the University of Tokio, Japan. New York: John Wiley & Sons. 1884. 8vo, pages xi+344 (including Index), 42 folding Tables, and 7 folding Plates. \$4.

*Tables of the Trade and Navigation of the Dominion of Canada, for the Fiscal Year ended 30th June, 1883.* Compiled from Official Returns. Printed by Order of Parliament. Ottawa. 1883. 8vo, pages lxxvi+[2]+917 (including Index).

*A Treatise on Steam Boiler Incrustation and Methods for Preventing Corrosion and the Formation of Scale, Including Methods, etc., etc.* By Charles Thomas Davis. Illustrated by Sixty-five Engravings. Washington, D. C.: Industrial Publishing Company. 1884. 8vo, pages xv+[?xiii]+141 (including Index).

*Illustrated Catalogue of the Poole & Hunt Leffel Double Turbine Water-Wheel, Manufactured by Poole & Hunt, Engineers and Machinists, Baltimore, Md., U. S. A.* 1883. 12mo, pages 72, 23 full-page Plates, and 29 small Wood-Cuts.

*Tables for Calculating the Cubic Contents of Excavations and Embankments, by Improved Method of Diagonals and Side Triangles.* By John R. Hudson, C.E. New York: John Wiley & Sons. 1884. 8vo, pages iv+37. 75 cents.

*Cottages, or Hints on Economical Building, Containing Twenty-four Plates of Medium and Low-Cost Houses, Contributed by Different New York Architects. Together with Descriptive Letter-Press, Giving Practical Suggestions for Cottage Building.* Compiled and Edited by A. W. Brunner, Architect. To which is added a Chapter on the Water Supply, Drainage, Sewerage, Heating and Ventilation, and other Sanitary Questions Relating to Country Houses. By William Paul Gerhard, C.E. New York: William T. Comstock. 1884. 8vo, pages iv+54 and Frontispiece. \$1.

*Iron and Steel Manufacturers of Great Britain, and Brand Book of British Iron and Steel: a Complete Guide to the Iron, Steel, Tin Plate, Galvanized Iron and Tube Trades.* Compiled by Herbert W. Griffiths, Editor of the "London Iron Trade Exchange." Price, ten shillings. London. [December, 1883.] 8vo, pages 109.

*Annual Report of the Director of the Mint to the Secretary of the Treasury for the Fiscal Year ended June 30, 1884.* Washington. 1884. 8vo, pages 120.

**Water as a Solvent of Mercuric Oxide.**—At ordinary temperatures, M. E. Bourgoïn finds that a liter of water dissolves about four centigrams of mercuric iodide, and that the quantity dissolved increases with the temperature of the water.

**Solders for Aluminium.**—Aluminium may be soldered by means of solders of tin and zinc, or of tin, bismuth, and aluminium. Those of tin and aluminium are to be preferred. According to the working that the soldered pieces have to undergo, the solders must have different compositions. If the metal is to be molded, an alloy of 45 parts of tin and 10 parts of aluminium should be used, which is malleable enough to withstand the hammering. Pieces that are not to be further worked are easily soldered with an alloy of tin and a less quantity of aluminium. The process is the same as in soldering tin plate, or it can be effected still better with the flame.

**A New Refractory Brick.**—A French engineer, says the *Gaceta Industrial*, has introduced a refractory brick of pure graphite, by perfectly agglomerating the powder of that substance. It is well known that graphite is nearly infusible at the highest temperatures that can be produced, and this new class of bricks will doubtless prove very serviceable in metallurgy, where the want of linings that are wholly infusible has long been felt.

**An Ancient Tunnel.**—A tunnel, measuring about 5000 feet in length, and constructed at least nine centuries before the Christian era, has just been discovered by the governor of the island of Samos. Herodotus mentions this tunnel, which served for providing the old seaport with drinking-water. It is completely preserved, and contains water-tubes of about 25 centimeters in diameter, each one provided with a lateral aperture for cleansing purposes. The tunnel is not quite straight, but bent in the middle: this is hardly to be wondered at, as the ancient engineers hardly possessed measuring instruments of such precision as those constructed nowadays.

**The Auriferous Sands of Assam.**—Although it has hitherto been known that the sands of the Assam rivers are auriferous, the general experience has been that the yield of gold is very small. Hopes of increased productiveness, however, have of late been raised by the reported discovery of some rich washings on the Subansiri River. The published analysis of some samples of the average washings from Subansiri sands showed a yield of no less than 52 oz. 11 dwt. 20 gr. per ton! It appears to be a fairly well-established fact that the Subansiri sands have generally given the best yields among the many rivers of the Lakhimpour District, which itself is one of the most favored of the auriferous regions in Assam. According to Mr. W. King, of the Geological Survey of India, there is little doubt that improved methods of running such sands through cradles should make the output better than it ever has been under the crude manipulation of the native washer. Of course, every one knows this must have been from concentrated pannings, and is no indication of the average yield, and there are no data that would indicate that these gravels are likely to yield important additions to the declining supply of the world's gold.

**Another Alpine Railroad.**—The Arlberg Railroad is scarcely opened for traffic when a new project for piercing another chain of the Alps is brought forward. The scheme applies to the Luckmanier, which, situated between the Upper Rhine valley and the basin of the Lake of Tessin or Langensee, is not expected to offer any serious engineering difficulties. The railroad would have to cross only one water-shed, that of the Luckmanier (or, more correctly, the Greina), without having to surmount, as in the case of other Alpine railroads, secondary watersheds. The length of railroad proposed to be constructed, and joining Chur and Biasca, would be 61 miles. Its cost is estimated at between £4,000,000 and £4,500,000, of which between £3,000,000 and £3,500,000 would have to be expended upon the construction of a tunnel (13 miles long) between Surheim, near Dissentis, and Olivone, near Biasca. The countries most interested in the construction of the railroad are, next to Switzerland, Bavaria and Central and Eastern Germany and Italy. It is urged in favor of the project that the St. Gothard Railroad has not answered the expectations formed of it, and could never do so, not having been constructed as a means of cheap communication and for heavy traffic, which, we suppose, the promoters of the new scheme intend their railroad to be.

**Wages in Great Britain.**—Professor Levi has just completed a report that compares the condition of the working classes at present with that in 1867 and 1879, when he made similar inquiries. In 1867, there were in the United Kingdom 11,000,000 persons earning wages, against 12,200,000 in 1884, and while each earned £38 per annum seventeen years ago, he is now able to obtain £42 14s. In England and Wales, the average wages were £47 3s.; in Scotland, £41 1s.; and in Ireland, only £23 16s.; but everywhere there has been a steady increase. It may be stated that Professor Levi includes among the working classes those engaged in professional pursuits; but strange to say, he finds the average earnings of such persons to be £40 last year, against £33 in 1867; while those engaged in industrial operations earned £46 10s., against £40, and the agricultural people get £34 14s., against £31 2s. Another fact brought out by Professor Levi is, that the earnings of males under twenty years of age has decreased since 1867, doubtless by reason of the restrictions brought about by the education department, and there is also a noticeably improved demand for skilled labor. Taking the average number of workers per family at 2.17, it is found that the income of the great mass of the laboring classes of the United Kingdom averages as much as 32s. a week per family.

**The Oxide of Barium Process for Purifying Drinking-Water.**—Among the different applications of oxygen obtained by MM. Brin, of Passy, by their anhydrous oxide of barium process, is its use for rendering drinking-water pure, a thing very necessary if Parisians are to drink water at all. They take filtered water and mix with it oxygen gas. A cylinder capable of supporting a pressure of 300 pounds to the square inch is used. Under this pressure, a certain quantity of oxygen is dissolved in the water; the water is then put into bottles or siphons. The oxygen destroys all organic matter, and the result is an absolutely pure water, very light and tonic; the faculty prescribe it for many diseases of the digestive and urinary organs. In MM. Brin's works, are two large reverberatory furnaces filled with retorts 2 m. 80 c. long, and 16 c. in diameter, which are in constant use. These contain the oxide of barium, which absorbs the oxygen at one temperature, and gives it up at a higher. The atmospheric air is first drawn through a vessel containing quicklime, which absorbs all the carbonic acid and moisture. It is then drawn into the retorts heated at 500 degrees; the barium absorbs the oxygen, and the nitrogen is drawn off to a gas-holder to be converted into ammonia, etc. When the barium has absorbed all the oxygen it can take up, the supply of air is closed; the retorts are then heated to 800 degrees Cent., and a communication opened to a vacuum-chamber; the barium then exhales the pure oxygen, which is pumped into a gas-holder.

## FURNACE, MILL, AND FACTORY.

The creditors of William Thomson & Co., hardware merchants, at Toronto, Ontario, Can., who failed recently with liabilities of \$250,000, unanimously agreed to accept 60 cents on the dollar. The business of the firm will be resumed.

W. H. McCurdy & Co., one of the largest iron firms of Northern Ohio, have asked the creditors for an extension. They were embarrassed by the recent failure of the Cleveland Bridge and Car Company.

There are at present in and around Pittsburg, Pa., 424 puddling-furnaces on double and 230 furnaces on single turn, with 240 furnaces standing idle. This number does not include the old Eagle Mill at Saw-Mill Run, and the old Manchester Steel and Iron-Works, better known as the Old Rail Mill. The former has been idle nearly three and the latter two years. Both of these have 43 furnaces.

The Electric Power Company, of New York, has been formed, with a capital of \$600,000, for the purpose of transmitting and distributing power by electricity, under a license from the Daft Company. A plant of 100 horse-power will soon be in operation.

The Daft Electric Light Company has shipped to Baltimore a fifty horse-power dynamo, which will be used for generating power for running cars for the Baltimore & Hamden horse-car line, about two and a half miles in length.

The Vesuvius Iron-Works, at Sharpsburg, Pa., have started up, using natural gas for the first time.

The Mississippi Car and Engine-Works, at Muskegon, Michigan, made an assignment March 18th. Liabilities, \$80,000; assets, \$150,000. It is expected the works will resume in about three months with increased capital.

Parke, Lacy & Co., of Salt Lake City, Utah, have received orders for two 15 horse-power hoisting-engines and 800 feet of wire rope for the Moulton mine, Montana. Some small machinery has been shipped to the Parker mine, Ketchum, Idaho. The firm has also furnished a 15 horse-power Westinghouse engine for the Sandy sampling-mill.

The Bessemer Steel-Works at Pueblo, Colo., are running in full blast, and the working force is augmented daily. A new set of rolls is making to fit on the housings of the bar mill for making twelve and twenty-pound steel rails. The guide-mill is now ready for work. The cast-iron water-pipe foundry is in full blast, turning out six or seven different sizes of water-pipe.

The general depression in business has caused the Nichols & Langworthy Machine Company, Hope Valley, Rhode Island, which manufactures boilers, engines, and printing-presses, to shut down its entire works for two weeks.

Nearly a year ago, leading iron manufacturers of Eastern Pennsylvania and New York formed a pool of \$100,000 for the purpose of experimenting with the Henderson method of making steel. It was to have taken the place of the Bessemer process. It is now announced that experiments have proved that the process is not successful, and it has been abandoned.

A press dispatch, dated Troy, March 19th, says that the amended complaint in the case of I. Townsend Burden against James A. Burden, John L. Arts, and William Irwin of Troy, Richard Irwin, Jr., of New York, and the Burden Iron Company was filed to-day. It is alleged that the transfer of one share of stock recently to each of the Irwins was without consideration, and was effected to enable the said Burden to retain the entire control of the Burden Iron Company, to the exclusion of the plaintiff. It is also alleged that the increase in the number of trustees was illegal. A division of the Woodside mansions, stables, and grounds is asked for on the ground that they are not properly part of the company's capital, or necessary to the business. It is charged that the defendant, Burden, threatens to put the plaintiff out of his residence, and place the same and adjoining grounds under his own exclusive control. The division of a farm of 200 acres was asked for on the same ground. The case will probably be noticed for trial during the May Circuit.

D. R. Sherry & Co.'s foundry and machine-shops, in North Aurora, Ill., were burned March 17th.

The machine-shop and foundry of Benjamin Summers, at Petersburg, Pa., was burned March 17th.

William Hasenzahl, of Cincinnati, has shipped one of his prospecting-drills to a firm at Silver City, New Mexico, and another to the Chanute Coal and Mining

Company, of Chanute, Kansas. The latter is of the large size, bringing a core  $2\frac{1}{4}$  inches in diameter and fitted to go to a depth of 500 feet.

The Cincinnati Corrugating Company, manufacturers of superior corrugated and standing seam crimped sheet metal, has just issued a catalogue that will be of special interest to architects, contractors, etc. Descriptions and illustrations are given of the use of corrugated iron in various ways, and, being the largest manufacturers of these goods, the company is able to ship promptly on receipt of orders.

## RAILROAD NEWS.

The statement that the Marquette & Western road has been sold to the Marquette, Houghton & Ontonagon Railroad is denied; but the road has been leased under a working arrangement in such a manner as to unite the interests of the Marquette & Western, Marquette, Houghton & Ontonagon, and the Detroit, Mackinac & Marquette.

It is stated that the Chicago, Burlington & Quincy Railroad Company will probably construct a line from Denver to Ogden, to compete with the Union Pacific Railroad.

In 1875, the Baltimore & Ohio Railroad Company entered into a contract with William A. Brydon to deliver to the company 150 tons of coal a day, at \$1.15 a ton, for three years. Shortly after the delivery began, the company complained that the coal was inferior to the quality contracted for, and gave notice to Brydon that it would receive no more. Brydon brought suit for \$75,000 damages. After a trial of twenty-eight days, the case was given to the jury in the Superior Court at Baltimore, March 19th, with instruction to return a sealed verdict March 20th if they should agree. Brydon alleged on the trial that a fall in the price of coal was the cause of the dissatisfaction on the part of the railroad company, and not the quality of the coal, as the defendant contended.

A sweeping reduction in freight rates from the East to Chattanooga, Tenn., was made March 19th by the Cincinnati Southern Railroad. The rates were reduced 20 per cent two weeks ago by agreement. It is thought some of the lines violated the rules of the agreement, which caused the Cincinnati Southern people to declare war. The original rate on first-class freight from New York to Chattanooga was \$1.14. It was reduced to 95 cents, and now the Cincinnati Southern cuts it to 40 cents. The Western & Atlantic Railroad met the cut. It is thought all the Southern lines will become involved in the fight.

It is rumored that Mr. G. de B. Keim will resign as President of the Reading Railroad, and that Mr. Robert H. Sayre will succeed him.

A railroad is to be built in Montana, between the cities of Butte and Bozeman.

## LABOR AND WAGES.

After running several months on short time, the local managers of the Colorado Coal and Iron Company's works, at Bessemer, announce a reduction in the wages of blast-furnace men from five to fifteen per cent, to take effect April 1st. This, in effect, will make wages about equal to the Pittsburg scale.

The miners employed by the Ellsworth Coal Company, at Danville, Ill., have decided to strike for a restoration of the price of mining to 80 cents a ton.

At a meeting of the principal brick manufacturers of Trenton, New Jersey, it was decided to reduce wages 10 per cent, and to advance the price of brick from 10 to 15 per cent, and thus enable the manufacturers to continue business.

A reduction of 10 per cent is announced in the wages of the employés of the St. Charles and Henry Clay furnaces at Columbia, Pa.

The striking coal miners at the Leavenworth mine, Kansas, have petitioned the Legislature of that State to prohibit the penitentiary mines from selling coal lower than the Leavenworth mine. There has been a cut of a half-cent a bushel at the Leavenworth mine, caused by a reduction in the price of convict coal.

The anthracite coal miners of Pennsylvania are organizing, and it is feared a strike will soon be inaugurated because of low wages.

Carroll D. Wright, Commissioner of Labor Statistics, has written a letter to the Secretary of the Interior, suggesting an investigation into the causes of industrial depressions in this country and Europe. The Secretary has indorsed the plan of the Commissioner.

An important decision has been made in Washington,

by Judge Brewer. He held that railroad employés working on a road in the hands of a United States receiver, if their wages are reduced, can cite the manager to show cause, and the Court has power to sustain them.

The old miners of the Hocking Valley District, Ohio, held a delegate meeting at Straitsville, March 18th, at which the strike was declared off. This ends the labor troubles of the Hocking Valley after several months' struggle. The strike has been abortive, and was practically ended some time ago. President Greene, of the Hocking Valley Railroad, stated: "Our road has been bringing out over 400 cars a day for some time. Our average last year was only about that number. The strike has cost us upward of \$850,000. It has been worth all of that to settle the fact that we control our own property. The fight we have made has been solely for that principle, and the establishment of it in our case will be a valuable result for the whole country."

Secretary Flannery, of the Coal Miners' Association has issued a call for a convention of railroad miners, to be held in Pittsburg, March 21st, for the purpose of encouraging the strikers and arranging for future protection. The strike is still in an unsettled and quiet condition. At the miners' general office, it is reported that more than one third the railroad miners have returned to work at the advance demanded. The operators, however, state that there is nothing new in the situation, and that they will hold out for the old price.

The River Coal Exchange met on the 18th inst. in Pittsburg, and reaffirmed its decision not to pay the rate demanded by the strikers.

Thousands of colliers in the southwest of Yorkshire, England, have been informed that a 10 per cent reduction will be made in their wages.

Henry A. Newman, of Missouri, has been appointed a special agent of the Labor Bureau. Mr. Newman was formerly Chief of the Missouri Bureau of Labor Statistics.

## COAL TRADE NOTES.

## CANADA.

## PROVINCE OF NOVA SCOTIA.

The arbitration on the claims of Robert Bellon, 10 1/2 half-interest in the International coal mine, at Cape Breton, has resulted against Bellon.

At a meeting of the shareholders of the Vale Coal and Iron Manufacturing Company, held at Montreal last week, the old board of directors was re-elected.

The directors of the Cumberland Coal and Railroad Company lately made a proposition to the members of Pioneer lodge of miners to the effect that if the inhabitants of Spring Hill would guarantee 7 per cent yearly on \$6000, the company would bring water into Spring Hill and lead it to all the houses on the principal streets. The offer is regarded as most advantageous, and will likely be accepted.

## KANSAS.

Coal of a bituminous character has been discovered at Omo, Jewell County. A shaft has been sunk and mining begun.

## MEXICO.

The discovery of coal in the very heart of Mexico is reported. The newly discovered coal-field lies four miles east of Jimulco, within the State of Coahuila. Already it is known that the deposit extends within one mile of the Central Railroad. The vein is three feet in thickness, and apparently free from foreign substances, with indications that it covers a large area. The coal is declared to be of a superior grade, bituminous in quality, and somewhat brittle.

## OHIO.

The State Line Coal Company, at East Palestine, produced 18,000 tons of coal in February.

The Troy mine, at New Straitsville, is still on fire. No. 7 mine is in working order. No. 9 mine is on fire and damped to prevent ventilation. So far, no steps have been taken for the extinguishment of it. Plummer Hill or No. 35 mine has been abandoned to the fire. The condition of No. 33 mine is not known, but the fire is supposed to be out, or nearly so. No. 3 mine will be ready for operation when the Bristol tunnel is repaired.

W. P. Rend's mine works but little better than before the reduction was accepted.

## PENNSYLVANIA.

## ANTHRACITE.

Mine Inspector Gay has been unanimously re-elected Mine Inspector for the Pottsville District. This is Mr.

Gay's third term. William Stein, of Girardville, has been elected Mine Inspector of the Upper District.

The suit of ex-Congressman L. D. Shoemaker against Congressman Everhart, of West Chester, was called at Wilkes-Barre, March 12th, before Judge Rice, without a jury. The action is brought under the following circumstances: In 1815, Andrew Mock was the owner of eighty acres of land with coal in Plains township. On a portion of this land, comprising forty acres, a coal-bed was opened. Mock conveyed half of this bed or body of coal to a man named Courtwright. Subsequently, Mr. Shoemaker became the owner of the whole 80 acres, with a reservation of half the coal-bed on the 40 acres. He now claims all the coal under the 80 acres excepting the half of the mine opened in 1815, which was originally an opening into a small seam. On the other hand, the defendant claims, by virtue of the conveyance, one half the coal under the whole 80 acres. The suit involves \$250,000.

Work on the east side of Buck Mountain Colliery has been resumed.

#### BITUMINOUS.

Some of the mines in the No. 4 District are starting to work better than they have been in the past, with fair and brighter prospects; but several mines in the district are still doing but little work.

The Port Royal Coal Company, at Port Royal, has entered into an agreement with its men by which they will have work the year round. Fifty-five cents is the price agreed upon. The company is erecting six blocks of houses, to accommodate twelve families.

#### COKE.

The suit of J. O. Williams, of Smithton, against the Waverley Coal and Coke Company for taking in part of an acre of coal under the premises and taking with it two good springs, was compromised before going to a trial, the company paying him \$550.

James Cochran, the large coke operator, sold for \$72,000 to Capt. C. S. Brown, of Pittsburg, a half-interest in a tract of coal land, containing 340 acres, situated on the Dickinson Run branch of the Pittsburg, McKeesport & Youghiogheny Railroad. The gentlemen have formed a partnership and intend building immediately on this property 200 coke-ovens. Work has begun.

A Smithton church has obtained a judgment for \$450, which was liquidated at \$235, for damages caused by the smoke of the ovens of the Waverley Coal and Coke Company. The company now proposes again to use its ovens, which will result, it is said, in another suit unless a compromise is made.

It is said that the workmen of the Westmoreland Coal and Coke Company have stopped work, on account of non-payment of wages, two months' wages being due.

The ovens of the Cumberland & Elk Lick Coal Company, in the Salisbury region, have been fired, and the manufacture of coke begun.

#### NATURAL GAS.

The sub-committee of councils appointed to look into the natural gas question was to report this week. It will report in favor of having a very large pipe for the conveyance of the gas. The danger is attributed to carrying a high pressure in small pipes. The committee will present an ordinance embodying this plan.

Natural gas has been introduced as fuel into the Waltham and Mechanics engine-houses, Pittsburg. The gas is furnished free by the Carpenter Natural Gas Company. The connections are with the high-pressure pipes, and were made at the expense of the city.

The natural gas bill presented in the House by Mr. Lafferty, of Pittsburg, March 11th, aims more at a prevention of the waste of natural gas than any thing else. All wells must be cased to a depth beyond all water strata safety-valves must be put in at the well and throughout the pipe lines; and all pipe must stand a test of 1000 pounds to the square inch. No pipe is to be less than eight inches in diameter in trunk lines, or weigh less than 28 pounds to the foot.

The Wildwood Natural Gas Company, which has been sinking a well in the Mormon Valley, East End, has struck gas at a depth of 1700 feet. The flow has been steadily increasing. The company has leased 3000 acres of land, and proposes to sink several additional wells.

#### OIL.

A large oil refinery is to be built at Titusville by a stock company of independent refiners. The works are to be built on the flats east of the city. An eight-

inch pipe line is to be laid from the Clarendon, Tiona, and Stoneham oil-fields to supply the new concern with oil independent of the Standard. There is also a project under way to extend the tide-water line from Bradford to Titusville.

### GENERAL MINING NEWS.

#### ALASKA.

The steamer Earnest, of the Coast Survey, has been transferred to the Navy Department for the use of Lieutenant Stoney in his exploring expedition in Alaska. A steam launch is building for the expedition at San Francisco. Lieutenant Stoney expects to leave for Alaska on May 1st. The exploration will be continued throughout the summer along the river that was explored for a distance of 200 or 300 miles last summer.

#### ARIZONA.

##### PIMA COUNTY.

The copper claims in Alum Gulch, sold one year ago to Mr. A. P. Mitchell, of New York, have just been purchased by Mr. G. W. Carr.

CLEVELAND.—This mine, formerly the O. K., situated near the Alta, was re-located on January 1st, by Messrs. Powers, Penyer, Davis, and Harrington. There is a well-defined ledge of high-grade ore, and a tunnel is driving.

UNCLE GEORGE.—This mine, near the old Trench mine, was recently sold to Messrs. Cook, Darrow, Norton, and Meyers, of Denver, for twenty-two thousand dollars. The purchasers are working the mine.

##### PINAL COUNTY.

RAY.—A large body of quartzite ore has been discovered in the cross-cut of the 200-foot level, assaying \$30 in gold and \$5 in silver per ton, and a small percentage in copper. It is the first gold ever found in this mine.

##### YAVAPAI COUNTY.

PRESCOTT.—It is reported that the company has no indebtedness, and that the amount of capital stock is two million dollars divided into two hundred thousand shares, all of which stock has been issued for the purchase of the property.

#### CALIFORNIA.

##### MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—Since starting the mill, 96 tons of ore have been crushed. Some delay was caused by the freezing and bursting of water-pipes. At the mine, there is no change to note.

CONSOLIDATED PACIFIC.—The stringers and bunches of quartz reported last week are more numerous and more promising as the men get north. The vein has also been increasing in width, and is now the full width. The vein-matter encountered has changed materially. All the indications are favorable for cutting that vein very soon. In cross-cut to cut No. 2, the men are cutting excellent feeders. The rock, however, is very hard and progress very slow. The assays are satisfactory.

STANDARD CONSOLIDATED.—During the week ended March 9th, 494 tons of ore were crushed and 520 ounces of crude bullion received.

##### PLUMAS COUNTY.

ANO.—Fifteen stamps of the Kettle mill are running on ore from this mine.

GENESEE.—Arrangements will probably be made early this season to place machinery on this property with which to sink a shaft, and further prospect the mine. It is also probable that the mill will be thoroughly overhauled and repaired, and put in operation.

GREEN MOUNTAIN.—The 60-stamp mill has been running steadily for some months. Within the mine, the work is pushed, and the developments, as well as the results from the ore at present milled, are satisfactory.

PLUMAS-EUREKA.—The mine is said to be in good condition. A shipment of bullion of \$60,000 has just been made.

PREMIUM No. 2.—A settlement has not yet been arrived at in regard to the injunction placed on those working this mine.

#### CANADA.

##### PROVINCE OF NOVA SCOTIA.

OXFORD.—The bullion produced since January 1st amounts to only \$987. The mill has not been running, but will probably resume operations April 1st.

#### COLORADO.

##### CHAFFEE COUNTY.

MARY MURPHY.—The weekly shipments amount to

about 180 tons. The tramway is working satisfactorily.

##### CUSTER COUNTY.

BULL-DOMINGO.—Mr. Lent will soon begin sinking on the main shaft, which is now more than 500 feet deep, to increase the depth to 1500 feet.

##### HINSDALE COUNTY.

ARGENTA FALLS.—The wages of the men have been paid up to January 1st. Further payments will soon be made. Work at the Belle of the West mine is progressing favorably.

MULLIN TUNNEL COMPANY.—The company has been organized with a capital stock of \$100,000. The principal business of the company will be carried on in Hinsdale County, and the principal business office will be at Gunnison City. The incorporators are London Mullin, Joel K. Mullin, and Anselmo B. Smith.

##### LAKE COUNTY.

The Leadville Herald has the following:

ADAMS.—The property is shipping fifty tons of ore daily.

AMERICAN.—The property is worked under lease by Mr. Chanute and others. The machinery has been sold by the county treasurer for unpaid taxes.

DUNKIN.—The lease on the south end of this mine on Fryer Hill, has been awarded to Dr. McCuen, of Leadville. Work has begun and the workings will be thoroughly explored.

LITTLE PITTSBURG.—Work has been temporarily suspended.

NEW PITTSBURG.—The lessees working from the Daisy shaft have a fine face of heavy lead ore that promises to develop into a large body.

ROBERT E. LEE.—The mine is producing considerable high-grade ore and a large amount of iron. The result of the operations for the month of February was so satisfactory that it is not likely any sub-lease will be made on the property.

ST. LOUIS.—The lease on this mine, on Breece Hill, has been abandoned by the lessees, the ore being of so low grade as not to justify them in continuing work.

WOLFE TONE.—Work goes on satisfactorily, and considerable ore is produced and new ground opened up.

##### OURAY COUNTY.

NATIONAL BELLE.—Some soft carbonates of a good grade are produced. Shipments have been resumed. The workmen are running the south tunnel, which is in about 185 feet. When this tunnel is completed, the mine will be in shape to increase the output largely.

##### PARK COUNTY.

LAST CHANCE.—A large body of rich ore has been struck. It was encountered fifty feet from the mouth of the main tunnel.

##### PITKIN COUNTY.

The new furnace at the Aspen smelter works so well with Mr. Devereaux's patent improvements that, when the old furnace is removed to the level of the new one, it will be reconstructed on the new plan.

According to reports, a syndicate of capitalists has been formed in Denver for the purpose of bonding and developing properties on Aspen Mountain. It has already obtained leases upon the Iron, Hoskins, and Late Acquisition, and will begin work soon.

ASPEN.—Work has been resumed. The ore is mostly taken from the old workings where the late lessees were. The ore is shipped to the smelting-works at Pueblo.

EMMA.—According to local papers, the mine is daily becoming more burdened with complications. On top of the other troubles between the present claimants, suit has been filed in the District Court by Andrew Kirkpatrick against Archie C. Fisk, Porter Plumb, Henry Webber, J. B. Wheeler, Clinton Markell, S. M. Gillespie, and A. W. Rucker, for a one-third undivided interest in the Emma mine, and also asking a restraining order to be issued to prevent the mining and disposition of the ore, and also to compel the defendants to make a complete statement regarding the receipts and expenditures, and restore to the plaintiff his share of profits. Andrew Kirkpatrick, in his complaint, avers an arrangement was made with Archie C. Fisk, as co-owner, by which the latter was to complete the work necessary to procure a patent, to the amount of \$250, and to procure such patent; and in order to secure Fisk for his (Kirkpatrick's) share of the outlay, he gave Fisk a note, secured by a trust deed upon his interest, to run for nine months. He now charges that Fisk failed in his part of the contract in not procuring the patent, but upon the expiration of the time of the notice and trust deed, he foreclosed and sold his interest by Porter Plumb the trustee. E. R. Holden,

of Leadville, was appointed receiver of the Emma mine, at Aspen, March 6th. The appointment seems to be satisfactory to all concerned.

**FARWELL.**—All of the property that the company controls in Independence District has been leased. The property consists of a number of gold leads from which much valuable ore has been extracted. On the first of April, the lessees also assume control, for one year, of the fifty-stamp mill.

#### SUMMIT COUNTY.

**STAR MOUNTAIN.**—The incorporators are George A. Douglass, William D. Harrison, William W. Whedon, E. B. Lewis, Harvey D. Bennett, Thomas Stalker, Clarence G. Taylor, Samuel H. Adams, and E. G. Stiles. The capital stock is \$1,500,000. The company has been organized under the laws of Michigan. The principal office will be in Breckenridge. E. G. Stiles is appointed resident agent.

#### DAKOTA.

##### LAWRENCE COUNTY.

**FATHER DE SMET.**—The superintendent writes, under date of March 1st, that ore is yet running low, but will make a fair showing for the past month, considering its shortness and the difficulty experienced on account of bad weather. The open cut ore-bodies do not show any improvement as yet in the quality of ore produced, and the results for a while may run low, although we may cut better ore there any time, and bring the average up. The weather has moderated somewhat. The report for the week ended March 8th shows ores extracted from first, second, and third levels, 2000 tons. We have started an east cross-cut, fourth level, on south end line.

#### MEXICO.

The sixty-ton smelter erected at Chihuahua for the purpose of working over the slag-piles is said to have proved a failure, as was expected by those conversant with the material to be used. It is thought that the plant, which is a useful one, will be utilized in the reduction of ores from the very small mines near. The two new copper smelters on the Torreon property, twenty miles north of the city, are working well.

The directors of the North Mexican Silver Mining Company have accepted the tender of Messrs. Fraser & Chalmers for their new lixiviating mill. Every thing has been arranged for it to be running on the 1st of August next.

The first elevated tramway ever erected in Central or Southern Mexico is building at Guanajuato. The line runs from the Valenciana mine to the Hacienda de San Matias, a distance of 1440 meters, having an average fall or gradient of 1 in 8, and is absolutely straight. This fall will enable the tramway to run by gravity, an important item in the operating expenses.

A correspondent of the Mexican *Financier* writes from Tlalpujahua as follows:

The Concepcion group of mines has been in bonanza for over two months, and recently the owners have been shipping forty tons of selected ore a week to Germany. The main body, which is ten feet wide, averages \$75 a ton. The mines are worked in the old-fashioned way; but the owners are now organizing a joint-stock company, and expect to dispose of thirty per cent of the stock in the City of Mexico. In the event of raising the desired capital, they will put up a large mill as soon as possible, so as to save the expense of shipping ores to Germany. This mine, which has four claims in all, could have been bought a year ago for \$100,000, but to-day it is valued by the owners at \$250,000.

Messrs. Seward, West, and Mackay have contracted with the owners of the Borda mines for the purchase of an interest, the arrangement being that the money put in by them shall be invested in machinery for the development of the mines. The Comanja group of four claims has been bought by Colorado parties. These claims lie to the west of the Concepcion group. The American company, La Nacional, is working day and night in its tunnel of La Casa, which will cut the Temascalcales gold veins where the ore averages \$200 a ton.

The Muerto group of two claims, owned by Henry E. Dennie, is also rich in gold and silver ores; but he has no mill to work the ores. The Sirena group on the Comanja veins is producing good ore, which is still treated by the arrastra process. The owners are about to bring a ten-stamp mill to be worked by water-power. The Coloradillas and Santa Rosa mines, which are on the same vein as the Concepcion, are to be transferred to an American company, to be worked for fifty per cent of the products.

The Ocampo group, on the El Oro veins, is producing

gold ore that pays about five dollars clear after deducting milling and mining expenses. These mines can produce 250 tons a day. The Virgenes vein is also yielding ore averaging \$50 a ton, and the vein is 16 feet wide.

At Tlalpujahua, ores are treated by amalgamation. The continuance of the bonanza in La Dificultad mine, Real del Monte, is proved by the high prices maintained on its shares. Recently, it is said, a stockholder refused an offer of \$3850 for a single *bono* or share.

Work has been stopped in several of the Real del Monte Company's mines, on account of an alleged loss of \$9000 weekly.

A company has been organized in Villa Lerdo, composed of rich business men of the Laguna country, to work several mines in Mapimi.

#### MICHIGAN.

##### COPPER MINES.

**COPPER FALLS.**—In order to lessen general mining costs, the management intends to construct a narrow-gauge railroad from Eagle Harbor to its stamp-mill (something over two miles), for the purpose of transporting coal fuel for steam purposes and other freight.

**PENINSULA.**—It is reported that a strong appeal has been made to the stockholders to give a dollar a share on the capital stock of the corporation, the money to be used in the payment of the debts of the mine.

##### IRON MINES.

A bill is to be introduced in Lansing fixing the royalty on iron ores at 40 cents a ton.

#### MONTANA.

##### JEFFERSON COUNTY.

**HELENA MINING AND REDUCTION COMPANY.**—Mr. D. C. Corbin writes that the bullion product for March will be larger than for January or February. The winter has been unusually severe, and the output has been reduced in consequence. We have been retiring a large portion of our bonded debt—about three quarters of it—and expect soon to resume the payment of regular quarterly dividends.

##### MOROCCO.

The Secretary of State has been informed by the United States Consul at Tangier of the offer by the Moorish government of an antimony mine to public tender, to be worked, the mineral to be exported. The mine is situated in the district of Algeria, near the Mediterranean, about five hours from Tehuan and eleven hours from Tangier. The conditions of its concession are, that the mineral must be shipped from one of the two neighboring ports, which are especially suited for export and import, such as Tehuan and Tangier, and for a term of ten years. Competition is open to all foreign powers, and the concession will be given to the highest bidder, with whom a contract will be made, or the government may decide not to accept any bid and explore the mine on its own account. If, in the course of the exploration, another mineral should be discovered, it can neither be extracted nor shipped, except by virtue of a new contract, and no claim whatever will be entertained from the contractor in the event of his renouncing the enterprise before the expiration of the term of ten years. The mineral, it is also stipulated, shall be carried by mules or horses not by railroad, and not less than 2000 tons a year shall be extracted. The shipments can be made only from one of the ports designated for exportation, and the government will not be responsible to the contractor for losses or damages. If the contractor should erect any buildings for the benefit of the work, in order to shelter the workmen or machinery, such buildings shall become the sultan's property in the event of the mineral changing, or at the expiration of the contract, and no indemnity will be given to the contractor. The latter will bear the expenses of administrators and soldiers that may be sent to guard the persons and property. All subjects of the sultan who may be employed in this exploration will remain under the jurisdiction of the local authorities, and no one will have the right to protect them. Each contractor shall deposit a sum of money by way of guarantee in the hands of the Maghsin, and this amount shall be deducted from the last payment. Competition is closed five months from January 8th, 1885.

#### NEVADA.

##### EUREKA COUNTY.

**EUREKA CONSOLIDATED.**—The ore-deposits on the second and third levels are yielding well, and on the seventh and twelfth levels the deposits are unusually promising and flattering.

**RUBY HILL TUNNEL AND MINING COMPANY.**—This tunnel is driven for the purpose of prospecting the following properties of the company: The Wolverine, Jones & Kyle, Nondescript, Tip Top, Ma Ma, Mary Ann, Bottom Claim, Little Mack, Silver Brick, New Claim, Try Square, Cosmos, Compromise, North Tyndal, Tyndal, Plumed Knight, Van Buren Perry, and Jeff. The company has also secured a title to an eligible mill-site at the mouth of the tunnel. The tunnel was begun some two years ago, during which time the header, 5 by 6 feet, has been advanced 860 feet. The entire work has been done by contract, and the cost of doing the work has been raised by one-cent assessments.

##### STOREY COUNTY—COMSTOCK LODGE.

**CONSOLIDATED CALIFORNIA & VIRGINIA.**—On the 1750 level, 216 tons of ore have been extracted during the week ended March 7th. The average assay value of this ore is \$15.22 per ton. Shipped to the Morgan mill, 564 tons 1780 pounds of ore of the average assay value, as per samples from the railroad cars, \$16.22 per ton. Ore extracted under the Jones contract, 344 cars (310 tons). The average assay value of this ore, as per samples taken from the cars, is \$28.09 per ton. Shipped to Eureka mill under this contract, 299 tons 1330 pounds of ore, the average assay value of which, per samples taken from the railroad cars, was \$28.11 per ton.

**HALE & NORCROSS.**—The following Board of Directors was elected at the recent annual meeting: H. M. Levy, A. Borland, G. W. Grayson, J. B. Russell, W. H. King, M. Hoeflich, and E. B. Holmes. The Board of Directors elected the following officers: H. M. Levy, President; J. F. Lightner, Secretary; E. B. Holmes, Secretary *pro tem.*; and Robert Keating, Superintendent. A resolution was offered that the directors of the company be authorized to enter into any leases with any parties to lease that part or portion of the mine from the Suro Tunnel level upward. Many idle miners might wish to lease or enter into tribute contract to work parts of the mine on the upper levels, and as the company might not be inclined to pay \$4 a day, the standard wages, this resolution would enable it to have ground explored, without any outlay, for such periods as they might think wise.

#### NEW MEXICO.

##### GRANT COUNTY.

The new smelter at Silver City blew in March 2d, and ore for future treatment is rapidly piling up. Every thing has worked smoothly and satisfactorily.

The Risdon Iron-Works, of San Francisco, are contemplating the erection of large works in the Mogollons, for the treatment of ores from the camps in that district.

#### NEW YORK.

For several months, a company has been boring for petroleum near Phelps. A few days ago, a vein of salt about twenty feet in thickness was struck. An analysis of the brine from the vein has been made at the Syracuse Salt-Works, and twelve ounces of brine have been found to produce three and a half ounces of pure salt. A company of wealthy citizens of Phelps and of Clifton Springs is forming, in order to develop the mine. Two more wells will be sunk and a large salt-manufacture built. Salt men of Syracuse who have examined the well at Clifton state that they believe the newly found vein is the same as that which supplies the Syracuse and Warsaw salt-works.

#### NORTH CAROLINA.

**SILVER VALLEY VS. BALTIMORE.**—The hearing on the motion to dissolve the preliminary injunction here, tofore granted in the suit of the Silver Valley Mining Company against the Baltimore Gold and Silver Mining and Smelting Company of Baltimore City, and Joseph Wilkins, John M. Denison, and Rufus W. Applegarth, trustees, in the United States Circuit Court, was concluded March 17th, and the matter taken under advisement by Judge Bond. The object of the suit is to prevent the sale of the Silver Valley Mining Company's property in North Carolina under a mortgage, which the complainant alleges was unauthorized and fraudulent.

#### UTAH.

##### SALT LAKE COUNTY.

**ASHLAND.**—A strike of six feet of carbonate ore has been made in the west ground of this mine in Bingham.

**HANAUER.**—The smelter started up on the 11th inst., after a suspension of two months, caused by the bur-

ing of the old works. The new smelter is of increased capacity.

VALLEJO.—This company, whose works were destroyed by the late snow-slide in Alta, has begun to make repairs.

ORE MARKETS.

DENVER.

For the silver and gold in ores, from 90 to 95 per cent of the New York quotation (gold being counted at \$20 an ounce).

For the lead in ores, 15 to 30 cents per unit. For the copper in ores, from \$1 to \$1.30 per unit. Smelting charges from \$8 to \$20.

CLEVELAND.

No. 1 specular and magnetic Bessemer ores, per ton, \$5.75.

No. 1 specular (non-Bessemer) ores, per ton, \$5. Bessemer hematites, \$4.25@\$5. Non-Bessemer hematites, \$3.75@\$4.

CHATTANOOGA.

Fifty per cent red fossil per ton, \$1.60@\$1.85. Brown hematite, \$2.25@\$2.50, delivered at furnace.

FINANCIAL.

Mining Stocks.

NEW YORK, Friday Evening, March 20.

The following officers, to hold office until June, 1886, were elected at a meeting of the Consolidated Stock and Petroleum Exchange, March 16th: President, Charles G. Wilson; Vice-Presidents, Frank Tack and S. F. Strong; Treasurer, John Stanton; Chairman, A. W. Peters; Arbitration Committee, Platt B. Crosby, W. E. Fiske, H. I. Judson, S. T. Hubbard, Jr., W. L. Jacques, E. S. Munroe, and W. H. Matteson.

Dullness in the mining market has reigned supreme. The transactions this week show a decrease of 12,035 shares, as compared with last week. The total transactions have amounted to 57,107 shares.

A circular has again been issued to the stockholders of the State Line gold mining companies Nos. 1 & 4 and 2 & 3, stating that they have the privilege of exchanging four shares of old stock for one share of new on payment of thirty cents a share of new stock. This offer will remain open until April 3d. A similar circular was issued in October. Apparently, the stockholders do not care to avail themselves of this opportunity, as experience has been too bitter a pill. We refer our readers to our issue of October 24th, 1884. We there gave a review of the marvelous fluctuations of this stock.

The good reports received from the mines of the Standard Consolidated excite considerable interest. The company has leased the other half of the Bulwer mill, and will now run the whole mill, which will increase bullion production. The monthly expenses amount to about \$15,000. The price has been firm at from \$1.10@\$1.25, 3750 shares changing hands. No dealings in Bodie Consolidated are reported. Bulwer Consolidated has shown a large business and an upward tendency in price; the transactions amounted to 3225 shares, at from 27@40c. Consolidated Pacific has been lower, opening at 99c. and closing at 88c., with sales of 3000 shares. Plymouth Consolidated has maintained its own at from \$16.25@ \$16.38; the dealings have been unusually small, only amounting to 430 shares. Gold Stripe has been active, selling at 4c., with sales of 4400 shares. A lot of 50 shares of Quicksilver Common sold at \$3.

Sutro Tunnel continues to show a large business, with unchanged prices; 17,150 shares were sold at from 13@14c. A short review of the company's annual report is published in another column.

Consolidated California & Virginia shows still lower prices, opening at 40c. and closing at 36c.; the sales amounted to 7467 shares. Hale & Norcross shows sales of only 600 shares, at from \$5.25@\$5.75, closing at \$5.25. Chollar and Savage sold at from \$2@\$2.05. Eureka Consolidated has taken a sudden jump from \$3.50 to \$4, with sales of only 930 shares. It has been reported that some very good ore has recently been struck in the mine. Various small transactions were made in a number of other Nevada stocks.

Iron Silver has been the prominent feature of the Colorado stocks, selling at from \$1@\$1.15, sales amounting to 1625 shares. Little Chief and Amie were active; each shows sales of 1000 shares, the former at from 22@23c., and the latter at 4c. Lead-

ville ranged from 22@23c., and Robinson Consolidated was 30c.

The price of Horn-Silver has again been lower. During the past week, it opened at \$2.50, went as low as \$2.05, and closed at \$2.30. The transactions amounted to 4105 shares. A few sales of Ontario were made at from \$17.50@\$17.63. The company has just declared its 105th dividend of \$75,000, making total dividends to date \$6,275,000—a magnificent record.

Homestake and Father de Smet have announced their usual monthly dividends. The total amount paid to date by the Homestake is \$2,687,500; Father de Smet's, \$980,000. The stocks of both companies received but little attention during the week. Of Homestake, 85 shares were sold at from \$10.38@ \$10.50, and 125 shares of Father de Smet at \$5.88.

A complete summary of the market is given elsewhere.

MEETINGS.

The annual meetings of the following companies for the election of trustees and the transaction of business will be held at the times mentioned:

Colorado Coal and Iron Company, Colorado Springs, Colorado, April 6th, at twelve o'clock m.

Consumers' Coal Company, No. 640 Sixth avenue, New York City, April 4th, at twelve o'clock m.

Westmoreland Coal Company, No. 224 South Third street, Philadelphia, Pa., April 1st, at twelve o'clock m.

DIVIDENDS.

Father de Smet Mining Company, of Dakota, has declared a dividend (No. 43) of twenty cents a share, payable March 31st.

Homestake Mining Company, of Dakota, has declared a dividend (No. 79) of twenty-five cents a share, or \$31,250, payable at the transfer-agency of Messrs. Lounsbury & Co., No. 15 Broad street, March 25th. Total dividends to date, \$2,687,500.

Moulton Mining Company, of Montana, has declared a dividend (No. 5) of 7½ cents a share, or \$30,000, payable at the office of J. M. Moore & Co., transfer-agents, No. 78 Broadway, New York City, on and after April 6th.

Ontario Silver Mining Company, of Utah, has declared a dividend (No. 105) of \$75,000, payable March 31st. Total dividends to date, \$6,275,000.

PIPE LINE CERTIFICATES.

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

Last Saturday, Monday, and Tuesday, the market was dull and fluctuations were limited between 77½c. lowest and 79½c. highest. The trade was waiting to hear from the Markham well, located three quarters of a mile east of the Mushrush, which was the farthest east of all the producers in the Thorn Creek field. The market on Wednesday forenoon sold down to 78c., but about one o'clock definite news was received that the Markham well was open and a virtual failure. This caused an instantaneous movement upward, and the close was excited at 82½c. bid. It was not long after the opening Thursday morning that the market touched 83½c. Thereafter selling broke it to 81½c., closing on a rally at 82c. To-day it opened firm, but heavy realizing and rumors of other wells broke the market to 80½c., closing at 80½c. The production of the entire field in January was about 55,500 barrels; in February, 54,000. The old fields are gradually declining in production, and the outlook is bullish from a statistical point of view. Consumption during the past six months has been considerably in excess of production. The Quick bill, prohibiting, in Pennsylvania, speculation in petroleum on the margin plan, passed the second reading by a majority, March 18th, in the State Legislature at Harrisburg.

The following table gives the quotations and sales at the Consolidated Stock and Petroleum Exchange:

Table with columns: Opening, Highest, Lowest, Closing, Sales. Rows for March 14, 16, 17, 18, 19, 20 and Total sales.

Boston Copper and Silver Stocks.

[From our Special Correspondent.]

BOSTON, March 19.

There has been a little more activity in copper stocks the past week, but sales continue light, and prices are a shade lower. Calumet & Hecla declined

from \$158@\$155, owing to a lot of stock being pressed for sale. This out of the way, the market rallied to \$156 on small lots, and closed at \$155 bid, \$156 asked. Quincy opened quite strong at \$29½ on a sale of 50 shares, and advanced on small sales to \$29½; but later, it weakened, and sold to-day at \$28½, which was, however, bid for it at the close to-day, and none offered. A small lot of Franklin sold at \$6½, and is quite firmly held at about these figures. Osceola declined to \$8, at which price 60 shares were sold, the same being bid for it without bringing out more stock.

In silver stocks, there is very little doing at either of the Boards, and the outlook for business in this direction is not very encouraging. Bowman Silver, which is the principal stock dealt in at the Mining Exchange, does not exhibit much activity, and the price has gradually declined to 13@14c. Catalpa is steady at about 20c., and so is Dunkin, at the same figure. "Cusi," \$1½ bid, \$1¼ asked. Consolidated Pacific, dull, with occasional sales at 90@92½c. Miscellaneous stocks dull, and but little change to note in quotations.

3 P.M.—The only transaction this afternoon in copper stocks was a sale of Osceola at \$8. Calumet & Hecla, \$155 bid, \$156 asked. Franklin, \$8 bid, \$8½ asked. Osceola, \$7½ bid, \$8 asked. Quincy offered at \$29, no bid.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

Table with columns: NAME OF COMPANY, CLOSING QUOTATIONS (March 13, 14, 16, 17, 18, 19). Lists various mining companies and their price ranges.

METALS.

NEW YORK, Friday Evening, March 20.

The general feeling in the metal market can not be said to improve much, if any. Some months ago, it was the uncertainty as to the new government policy and the numerous changes that were upsetting things and unhinging values. Now every one is certain we are going to have a stable, prudent administration of the nation's affairs under President Cleveland, and most of the Democrats appear to think very few changes will be made in offices; but business does not revive, and a reason must be given for it, so they say the economies that President Cleveland is introducing, or is going to introduce in the government, and the fact that he is making very few changes in offices, have a depressing effect upon the markets. The foundation of dull markets, or, rather, low prices—for consumption is going on on a fairly large scale in every article—is the fact that in most of our staple products our capacity to produce has grown more rapidly than consumption, and now greatly exceeds our home consumption, while we have not yet made any serious attempt to open foreign markets to our manufactures. What

then, is the prospect for the manufacturer? Certainly not very bright.

**Copper.**—This metal continues to attract the greatest share of attention. The beauty of our Calumet & Hecla manner of selling Lake copper based on the price of Chili Bars in London with £4 added, is becoming every day more evident, and is bringing down on its intelligent originator the "Irish blessings" of the trade. Since the price of Chili Bars between the 10th and 25th of the month makes the price for Lake Copper, it was but natural that so easily controlled a product should show low prices for that period. Week by week, we have been recording a deeper depth for Chili Bar prices. Last week, at £45 15s, we had hoped the bottom was reached, and, indeed, during the week a slight recovery was recorded. Yesterday, the price again receded to £45 15s., and at close of business to-day cables to the Metal Exchange record the price £45 7s. 6d.

As a still greater aggravation, we learn from London that the British government has purchased 15,000 tons of Lake copper at £59, or about £8½ more than our producers get for it under their precious agreement. Best Selected, £51.

This market is rather quiet, though stocks are light. We quote Lake at 11c., Orford, 10½@10¾c., according to quality. Holders firm.

The failure of Messrs. Pope, Cole & Co. has been attributed to a number of different causes, even to speculation in Chili Bars, but there is no evidence of this. The following statement appears to darken rather than enlighten the subject:

The failure of Messrs. Pope, Cole & Co., of Baltimore, one of the oldest and certainly the largest copper-refining works in the country, appears to be due largely to three causes: The decline in the price of the metal; the advancing of heavy sums to the Old Dominion Copper Company of Arizona; and the withdrawal of very heavy sums—it is said over \$50,000—during the past three or four years as profits by the special partners, of whom Mr. Garrett, of the Baltimore & Ohio Railroad, was one. The refining of copper has been a very lucrative business, the price charged for refining the ordinary black or blister copper of the West being \$20@25 per net ton, while the actual cost, with the cheap and excellent fuel at Baltimore, or rather Canton, where the works are located, is stated to range from \$7.50@9, assuming that the works were as carefully and economically managed as they were given credit for. At Detroit, where the bulk of the Lake copper is refined, the charge is about \$11 per ton, in spite of the fact that the "mineral" as it comes from the stamps rarely carries more than 80 per cent of the metal, and on an average nearer 72 or 73 per cent, while the Arizona Bars range from 93 to 97 per cent fine. The charges on Western mattes, whether argentiferous or not, are even heavier. The failure of Messrs. Pope, Cole & Co. must not, therefore, be attributed to ruinous prices for refining copper.

We have received a dispatch from the Mansfield Works, stating that their stock of copper is 3,900,000 pounds, instead of 33,000,000 pounds, as mentioned in a letter of Mr. Raunheim, in our issue of February 28th. Mr. Raunheim refers to this in a letter in another column of this issue.

**Lead.**—The market is very quiet, with sales of 300 to 400 tons at 3·70c. An effort was made during the past week to get up a combination, but, as usual, while each of the parties interested was endeavoring to get the others to make the price 4 cents and stick to it, he was himself doing his utmost to sell at 3·70c. The old story over again. Cables to-day quote Soft Spanish at the usual figure of £10 10s.

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

Fair demand. Sales for the week sum up from 850 tons to 1000 tons Refined lead at 3·50c., this month and April; 130 tons Soft Missouri lead at 3·50c., delivered at buyers' works; 150 tons Chemical lead at 3·50c., delivered at East St. Louis. Market quiet at close.

Messrs. Everett & Post, of Chicago, telegraph to us as follows to-day:

There is no change of any description in our market. There is a somewhat better feeling, due to growing inquiry. Sales for the week sum up over 900 tons, at 3·50c. There is a general disposition to buy for April and May, and some refiners are now willing to sell ahead.

**Tin.**—The London market has fluctuated wildly, the price going up to £79@79 10s., 3 months, and to-

day is quoted Spot £78 2s. 6d cash, and 3 months, £79. Here, the prices are 17·30@17·50c. Sales were recorded at the Metal Exchange as follows:

March 14th, 10 tons, April, '1735; March 16th, 10 tons, March, '1760; March 16th, 10 tons, April, '1750; March 16th, 10 tons, May, '1740; March 16th, 10 tons, June, '1735; March 20th, 10 tons, May, '1735; March 20th, 10 tons, March, '1740.

The sales of tin recorded at the Exchange for the year to March 14th, 1885, were 2660 tons.

**Spelter.**—Market quiet, and very little doing at unchanged price. We quote 4·25@4·50c. for Domestic; Silesian, 4·75, nominal.

**Nickel.**—We note a very beautiful new use for nickel. It is rolled in sheets alone or with sheet-iron, and covers the latter with a sheet of about five per cent of the thickness of the iron—much more durable than any electro-plating could possibly be. Nickel is worth about 68 cents a pound in this market, and this new use will probably greatly increase the demand for it. The process is known as the Fleitmann patent.

**BULLION MARKET.**

NEW YORK, Friday Evening, March 20.

DATE.	LONDON.		N. Y.		
	Pence.	Cents.	Pence.	Cents.	
Mch. 14	49	106¾	Mch. 18	49 ¼	107
16	49 1-16	106¾	19	49 3-16	107 ¼
17	49 1-16	106¾	20	49 3-16	107

**Foreign Bank Statements.**—The governors of the Bank of England, at their regular weekly meeting, reduced the bank's minimum rate of discount from 4 per cent to 3½ per cent. During the week, the bank gained £708,585 bullion; and the proportion of its reserve to its liabilities was increased from 47 to 49, against 47½ per cent at this date last year. March 19th, the bank gained £50,000 bullion on balance. The weekly statement of the Bank of France shows a gain of 4,547,000 francs gold and a gain of 6,514,000 francs silver.

**BULLION PRODUCTION FOR 1885.**

MINES.	States.	Month of February.	Year from Jan. 1st, 1885.	
			1885.	1884.
* Adams, s. L.	Colo...	31,000	70,600	94,020
* Alice, g. s.	Mont...	10,003	10,003	10,003
* Belmont	Nev...		35,121	66,399
* Boston & Montana, g.	Mont...	18,025	35,941	35,941
* Christy, s	Utah...		4,771	36,300
* Chrysolite, s	Colo...	19,141	36,300	6,501
* Colorado Central, s.	Colo...		15,226	2,266
* Consolidated Bobtail, g.	Cal...		27,395	63,870
* Derby Blue Gravel, g. s.	N. S.	864	25,150	139,600
* Essex, g. s.	Nev...		29,303	43,448
* Eureka Consolidated, s. L.	Dak...		25,150	458,905
* Father de Smet, g.	Nev...		78,700	176,500
* Grand Prize, s.	Mont...	24,925	23,500	62,045
* Granite Mountain, s.	Mont...		357	112,301
* Head Center & Tranquility.	Ariz...		64,203	121,915
* Hecla Consolidated, g. s. L. C.	Mont...		26,924	26,924
* Helena, g. s. L. C.	Mont...	91,500	25,632	82,894
* Hope, s	Mont...	17,600	1,829	9,594
* Iron Silver, s. L.	Colo...		2,118	2,118
* Kentuck, s.	N. S.		987	166,697
* Lexington, g. s.	N. S.		80,975	14,201
* Moulton, s. g.	Cal...		7,092	400
* Mount Diablo, s	Nev...		133,600	58,399
* Navajo, s.	Nev...		13,129	25,679
* New Pittsburg, s.	Colo...		259,002	107,106
* North Belle Isle, s.	Nev...			1,690,012
* Oxford, g	N. S.			
* Plymouth Consolidated, g.	Cal...			
* Rooks, g.	Vt...			
* South Yuba, g.	Cal...			
* Standard Consolidated, g.	Cal...			
* Stormont, s.	Utah...			
* Tombstone, g. s. L.	Ariz...			

\* Official. G., gold; S., silver; L., lead; C., copper. Silver valued by the different companies from \$1@1.29-29 per ounce: gold, \$20.67. † Net. ‡ Not including value of lead and copper. — No shipments during month mentioned.

**IRON MARKET REVIEW.**

NEW YORK, Friday Evening, March 20.

There is apparently no change for the better in the iron market here. Prices remain \$16@17@18 for the standard grades of Lehigh. We note sales of about 1000 tons of Thomas \$17@18 for No. 2 and No. 1 X Foundry. This company has blown out one of its furnaces, leaving six in blast.

The Metal Exchange records sales of a few hundred tons, August and September deliveries, at \$17. The

total sales of pig-iron recorded at the Exchange for the year ended March 14th amounted to 4900 tons.

**Scotch Pig.**—But about 500 tons have arrived during the week. There are but the usual small lots sold. Prices remain unchanged at \$19@21.50, according to brand. Cables to-day quote in Glasgow from 53s. 9d for Coltness to 42s. 6d. for Eglinton. Scotch Warrants, 41s. 3d.; No. 3 Middlesborough, 34s.

**Philadelphia.** March 20.

[From our Special Correspondent.]

The whole situation in the iron trade this week may be summed up in fewer words than usual. The volume of business has not increased as was expected, and there is no improvement in prices. Buyers of all kinds are purchasing from hand to mouth, not waiting for lower prices, and are not willing to buy ahead. A good many more orders are coming to hand in wagon-shops, tool-shops, boiler and engine-works, and all the long list of manufacturing establishments that buy merchant bar, sheet-iron, plate-iron, and steel, but the general improvement has not yet come along.

**Pig-Iron.**—It is impossible to report any sales that indicate a change or a possibility of a change. Every thing is run on a low basis. There were inquiries a few days ago for large lots of foundry and forge iron, but up to to-day no exceptionally large transactions can be reported. Some brokers report a good demand for standard irons. The reason of the moderate demand is, that mill-owners are not booking many orders, and that the possibility of lower prices is still entertained. No. 1 Foundry is \$17.50@18.50. The better grades are firm, and common grades light. No. 2 Iron is in very indifferent request at \$16.50, and Standard No. 2 at \$17. Southern iron is offered at \$15, and there is more or less on the way, or waiting favorable opportunities for shipment. The mill-owners of Eastern Pennsylvania see no reason for buying much iron just at present, and hence the furnace companies are barely able to get their banks cleared, but are all more or less confident of better business further along.

**Foreign Irons.**—Spiegel is without any change in price. Bessemer Pig is nominally \$19@20. Scotch Pig is in moderate request.

**Blooms.**—A few small sales are reported. **Muck-Bars.**—Small sales are made at \$27.

**Merchant Iron.**—A moderate business is done at \$1.65@1.75 for Refined. Some sells in a small way at \$1.80. Common iron is under better inquiry in interior mills for bar and other purposes at about \$1.50. Several bar-iron makers from the interior were here this week, and report things rather flat.

**Nails.**—Nail mills are still turning out large quantities of nails, and only in one or two cases is there any appearance of an accumulation of stocks. There is no change in card rates.

**Plate and Tank-Iron.**—Manufacturers report slightly better demand. Plates are 2 cents; Shell \$2.50; Flange, \$3.50.

**Sheet-Iron.**—A number of small sales were made yesterday and to-day, but there is no particular movement.

**Wrought-Iron Pipe.**—The mills are pretty full, and negotiations are pending for summer deliveries. Discounts are unchanged.

**Steel Rails.**—Small orders are booked at \$27.50 and \$28.

**Old Rails.**—Sales of small lots are reported at \$18 and \$18.50.

**Scrap Iron.**—There is more activity in scrap, and prices are again declining 25@75 cents a ton.

**Louisville.** March 19.

[Reported by GEORGE H. HULL & Co.]

The market for pig-iron during the last week has been dull and very few sales have been made. Prices continue without change. We quote for cash in round lots as below:

FIG-IRON.

Southern Coke, No. 1, Foundry	\$16.50@	\$17.50
" No. 2 "	15.50@	16.50
Hanging Rock Coke, No. 1, Foundry	16.00@	17.00
" Charcoal, No. 1, Foundry	21.00@	21.50
Southern Charcoal, No. 1, Foundry	18.00@	19.00
Silver Gray, different grades	15.00@	16.00
Southern Coke, No. 1 Mill, Neutral	13.75@	14.50
" No. 2 "	13.25@	13.50
" No. 1 " Cold-Short	13.00@	13.50
" Charcoal, No. 1, Mill	16.00@	17.00
White and Mottled, different grades	12.00@	13.00
Southern Car-Wheel, Standard Brands	25.00@	26.00
" " Other	20.00@	22.00
Hanging Rock, Cold-Blast	24.00@	25.00
" " Warm-Blast	20.00@	21.00

**Pittsburg.**

The Metal Exchange in New York has received to-day the following list of sales for the week:

2000 tons Gray Forge Lake ore.....	\$15.00	4 mos.
750 " " ore.....	15.00	cash.
200 " " Native ore.....	15.25	4 mos.
200 " " White ".....	14.00	cash.
50 " Foundry, No. 1.....	18.50	"
50 " " 2.....	16.00	"
100 " No. 1 Charcoal.....	23.00	"

**COAL TRADE REVIEW.**

NEW YORK, Friday Evening, March 20.

**Anthracite.**

Production for the week, 564,647 tons; from January 1st, 4,301,471 tons, a decrease of 240,250 tons as compared with last year.

The continued cold weather keeps up the consumption of domestic coals and greatly strengthens the market. Not only has the market taken the March quota, 1,800,000 tons thus far, but stocks continue to be reduced, and there is every prospect of a fair trade during the rest of the month. The April quota will be 2,400,000 tons, and unless the demand from markets still closed with ice should absorb a considerable amount, the lessened domestic consumption may make it difficult to place the full amount. The Western markets are looked to to take a large amount of coal as soon as lake navigation opens.

The Pennsylvania Coal Company will not name spring prices until the Hudson River is open to Albany, which is not expected before the 25th to 28th inst. Before that time, and possibly before we go to press, the Reading Company's Philadelphia prices will probably be issued. These will indicate the rates to be asked by all the companies.

The Pennsylvania Coal Company is selling Stove coal on the basis of \$3.90 f. o. b., and as it has lost much valuable trade through the competition of bituminous coal, it is but reasonable to look for some reduction in the new circular.

We are informed that good Stove coal is obtainable at \$3.85 per ton, but consider \$4 a fairer quotable price. Chestnut coal ranges from \$3.20@3.75, according to quality and the condition of order-books. The higher price, of course, is in cases where parties are practically out of the market. Broken and Egg range from \$3.10@3.20. Pea is quoted at \$2.10@2.50, with about \$2.25 as a fair average.

The Reading Company will complete its quota to-day, and most of the other companies are running slack. From present appearances, it looks as though April would open with very small stocks in the hands of the companies. Messrs. Coxe Brothers & Co.'s Derringer colliery will start early next month. Its capacity will be from 1500 to 1800 tons a day. Its shipments will be made over the Pennsylvania Railroad, and will not be restricted by the combination.

**Bituminous.**

Production for the week, 171,922 tons, and from January 1st, 1,642,370, an increase of 33,670 tons over last year.

This coal has been rather quiet during the past week, though some large orders have been booked. The Maryland Coal Company is said to have secured the Pacific Mills contract at about pool rates, \$3.50. It is rumored that the Reading Company offered Anthracite Broken Coal at the same price, and Pea Coal at about \$2.75@2.80 per ton—figures that, even allowing a summer freight, would leave the price of anthracite here very much below present prices. This is, therefore, a very important straw in indicating the direction of the anthracite current in more ways than one. The Pacific Mills have used bituminous coal during the past year, and their preference for it at the same or even a higher price than anthracite is very significant, both as to the future of anthracite as a steam fuel here in the East, and as to the low prices it must reach to hold this important market. Cumberland and Clearfield coals can be mined at say 60 cents a ton, as against about \$1.35 a ton, a fair average cost of anthracite at the mines, not including royalty. The actual cost of transportation from the bituminous mines to tide-water may be put at \$1.25, while the actual average cost of transporting anthracite from the Reading mines to Philadelphia may be put at 30 cents a ton. From the other anthracite districts the transportation would be greater, so that the actual cost of bituminous and anthracite coals at tide-water or in the tide-water markets will be nearly equal; and as a steam fuel it is cer-

tain that bituminous coal will be preferred by many consumers, and anthracite manufacturing sizes can never at the best command a higher price than say Cumberland and Clearfield coals. Our anthracite combinations of the future will therefore have the difficulties experienced in the past in regulating prices increased by having to keep the soft coals in line also. It is true, the cost of mining anthracite offers greater possibility of diminution than that of bituminous coal; but the prospect for very large profits are not encouraging; but that the trade will become altogether unprofitable is also out of the question.

Even the pool prices moderate, as they are shaded in many cases. It is said that the Portland & Rochester Railroad contract for from 15,000 to 20,000 tons has been taken by the Consolidation Coal Company, at less than \$3.45, while the New Central and Atlantic companies are said to have shaded the prices at Providence.

The Lehigh Valley Coal Company (Lehigh Valley Railroad) takes possession of the Snow-Shoe bituminous mines on the 1st of May, and this will give another source of supply outside of the pool.

The Grand Trunk contracts for about half a million tons of soft coal drew a large number of coal men to Montreal on the 18th inst. The following telegram from Montreal gives all that is known on the subject to the present writing:

This being the first contract of any magnitude of the year, the prices established here govern the sale of soft coal for the season. Two million tons of coal reach the Suspension and International bridges annually; and for the purpose of maintaining prices, the combination have made an agreement embodying substantially the following conditions: Erie, Rochester & Pittsburg, and Buffalo, New York & Philadelphia railroads agree to transport the coal of producers adjacent to their several lines at a rate hereafter to be fixed by commissioners to be appointed for that purpose. The commissioners so designated shall regulate the "output" as well as the prices of soft coal, imposing a penalty of crippling freight rates to bidders at prices under those so established by them. The commissioners named, and who are in attendance here, are Samuel Hines, Scranton, Pa., George H. Lewis, and Ensign Bennett, Buffalo. It has been learned that the prices fixed by the commissioners are as follows: On cars at International Bridge, Lump, \$2.40; Lump and Nut, \$2.35; Run of Mine, \$2.25; this, less freight rate. From \$1.20 to \$1.40 will be the price of soft coal at the collieries at Portland, Me. At ship's side, the rate will be \$3.40. The Grand Trunk bids will be opened to-morrow, and the contract let. The announcement that Bell, Lewis & Yates, of Buffalo, would hereafter control the shipment over the Erie, as well as the Rochester & Pittsburg, in connection with the Rochester mines, occasioned some surprise and gave assurance that the combination would be effective.

It is reported that the Grand Trunk contracts for coal will be on the basis of about \$2.20 per net ton of Screened Lump at International Bridge, Buffalo, Messrs. Bell, Lewis & Yates taking the lion's share of the contracts, as usual.

**Philadelphia.** March 20.

[From our Special Correspondent.]

This week is more destitute of news than it has been for months in anthracite trade circles. Every body is waiting for prices and rates due to-morrow, but the indications are to-night, that they will be delayed a day or two. But this has not arrested the transaction of business. Several firms have sold several cargoes apiece, discounting to-morrow's action. There will be plenty of business as soon as a decision is arrived at. Cooper's Point is active, and quite a fleet of vessels is in a state of readiness. The harbor is in good condition, though not altogether clear on account of the ice-making weather. A few vessels are getting up from outside points, and only an occasional cargo gets out. Freights will be low this season, but steady. Egg is abundant at Port Richmond, but stove is rather scarce there and in the city yards. The cold weather has helped the local and line trade along very well, and these interests will enter on the spring trade with practically no stock. The Lehigh region has closed down for the month, and the Schuylkill region will wind up on Friday or Saturday. It might be mentioned that information has been received here of the perfecting of coal miners' organizations under the leadership

of the Knights of Labor. The miners are working in harmony in both regions, but without any very definite object, in view of the improbability of full work for the year. The reports to-day from New England markets are encouraging. The manufacturing demand there will be large. No further cutting is reported this week, but it would not be safe to predict steady and firm prices after the season opens. Western buyers and Southern buyers will place heavy orders in a few days. Some parties working Southern coal properties are endeavoring to secure such railroad rates as will enable them to bring through soft coal into or near tide-water ports. A few days more will end the present stagnant trade condition.

An effort is making to hold a meeting of bituminous operators on the 20th, to prepare to meet the Pennsylvania Railroad Company in its fight against an anti-discrimination bill that will prevent or control discrimination. Great interest is felt in this movement. The Pennsylvania people secured a postponement of the hearing before the committee until April 7th, in order that their lawyers and freight agents might dig out some driving technicality that would enable them to circumvent the provisions of the constitution of the State of Pennsylvania adopted by the people in 1874. The coal operators all over the State were never more thoroughly aroused, and mean, if possible, to compel the Pennsylvania Railroad Company to recognize that it is not above the constitution and people, but subservient to both. A strong delegation representing the bituminous interests will go before the committee to meet and refute the evasive and untenable arguments of the Pennsylvania Railroad officials. The production of the Clearfield region for last week was 67,468 tons; corresponding week last year, 59,816 tons; excess this year, 7652 tons. For the season, 604,079 tons; corresponding time last year, 547,204 tons; excess this year, 56,875 tons.

**Buffalo.** March 19.

[From our Special Correspondent.]

In the absence of any local items of importance, the following summary of observations relative to the opening of navigation on the lakes this year will be of interest. There is but little chance of vessels moving before May (probably the middle of that month), as the severe weather has closed the lakes, harbors, and rivers most effectually. When will the Straits of Mackinaw be open? The mercury up there has been down "out of sight," all the winter, and the ice probably as thick as the water is deep! A weather-beaten mariner says: "This will be a five months' season, and there will have to be tall hustling to do all the work there is to be done before the jig is up. June, July, August, September, and October are about all we can count on for the Lake Superior trade. I am certain no boat will be through the Straits before May 15th, and June 1st is my day for the opening of navigation on Lake Superior. This is the most backward season since 1857, as far as I can recollect." This, of course, is speculation, but it shows the feeling existing.

We are sure, by several indications, of a prolonged embargo to commerce. There is more ice now in the lakes than ever before known, and instead of its beginning to thaw, as we might reasonably expect about St. Patrick's Day, fresh ice has been made daily for the past three weeks. In Lake Superior, the ice, many feet thick, extends miles from shore. Lake Michigan is frozen over from one end to the other, and from side to side. The narrowest parts of Lake Erie, if not the whole, is coated with a thick and solid shroud, and Lake Ontario is much in the same condition. The question is, When will these immense masses of ice be thawed and made so porous that they will sink and leave the surface unobstructed? At this port, after the ice breaks up above and drifts down with the current into Niagara River, it is very likely that many cubic miles of it will be packed in our bay and harbor mouths *en route*. When the break-up begins, vast fields of ice, driven by the westerly winds that are prevalent in April, will pile it up in the Straits of Mackinaw until that narrow outlet will be completely choked, and many days of warm weather will be required to rot away the congealed mass.

In view of the late opening of navigation, coal carriers as well as shippers predict a good business and prices when season opens, but no prices are named. The cold winter has proved a Godsend, to Western dealers especially. Since my last letter, the weather



NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.						SALES.	NAME AND LOCATION OF COMPANY.	HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE.						SALES.						
	March 14.		March 16.		March 17.				March 18.		March 19.		March 20.			March 14.	March 16.	March 17.	March 18.	March 19.	March 20.
	H.	L.	H.	L.	H.	L.			H.	L.	H.	L.	H.	L.							
Alice, Mon.	1.80																		200		
Amie Con., Co.	1.04																		1,000		
Argentina																					
Basistg, Co.																					
Belle Isle, Ne.	.90																		45		
Bodie Cons., Ca.																					
Breece, Co.																					
Bulwer, Ca.	.97	.33	.33	.33	.98	.35	.39	.37	.40	.38									3,225		
California, Ne.																					
Cal. & Hecla, Mich.																					
Castle Creek																					
Chollar		2.05	2.00																500		
Chrysolite, Co.																					
Cons. Cal. & Va., Ne.		.40	.39			.41		.39	.38	.39	.36								7,407		
Cons. Va., Ne.																					
Dunkin, Co.																					
Eureka Cons., Ne.	3.85	3.75	3.80	3.50	3.50		3.60		4.00	3.95	5.63								930		
Father de Smet, Dk.	5.88						5.88												125		
Findley, Ga.			.04					.04											4,400		
Gold Stripe, Ca.																					
Gould & Curry, Ne.																			100		
Grand Prize, Ne.																					
Green Mountain, Ca.																					
Hale & Norcross, Ne.							5.38	5.25	5.75		5.25								600		
Hall-Anderson, N. S.																					
Honestake, Dk.	10.50		10.50	10.35																	
Horn-Silver, Ut.	2.50	2.25	2.35	2.30	2.55	2.05	2.30	2.25	2.45	2.40	2.35	2.70							4,105		
Independence, Ne.																					
Iron Silver, Co.		1.05	1.00	1.10	1.05	1.15	1.10	1.15											1,625		
Leadville C., Co.	.40	.40	.35																85		
Little Chief, Co.	.23	.23			.22														1,000		
Little Pittsburg, Co.																					
Martin White, Ne.																					
Moulton																					
Navajo, Ne.		1.05				1.05													600		
Northern Belle																					
North Belle Isle, Ne.				.20																	
Ontario, Ut.		17.63	17.50				17.63	17.50											105		
Ophir																					
Plymouth		16.33	16.25	16.25															430		
Quicksilver Pref., Ca.																					
Robinson Cons., Co.	.30								3.00		.30								200		
Savage, Ne.	2.00						2.10												500		
Sierra Nevada, Ne.	.61	.65																	500		
Silver King, Ar.	4.15	4.10																	175		
Spring Valley, Ca.																					
Standard, Co.	1.20	1.15	1.20			1.20	1.10	1.25	1.20	1.20									3,750		
Stormont, Ut.																					
Tip Top, Ar.																					
Yellow Jacket																					
Albion			.10	.09															1,200		
Alta																			300		
Barcelona, G.													.35								
Bechtel Con., G.																					
Belvidere																					
Best & Picher, G. S.																					
Big Pittsburg, S. L.																					
Bradshaw, S.																					
Bull-Domingo, S. L.																					
Cal., B. H., G.									1.00	.95	.90								650		
Central Arizona, S.	.22								.22		.22		.20		.16				1,750		
Climax, Co.																					
Colorado Central																					
Cons. Imperial														.50	.38						
Con. Pacific	.99	.95	.97	.95	.93														3,000		
Dalhousie																					
Decatur																					
Durango, G.																					
Eastern Oregon																					
Joodshaw, G.																					
North Standard, G.																					
St. Horn-Silver, S. L.																					
Orin't'l & Miller, S.																			100		
Rappahannock, G.																			300		
Red Elephant, S.																					
Ruby, of Arizona																					
Silver Cliff, S.																					
Sonora Con.																					
South Bodie, G.																					
South Bulwer, G.																					
South Hite																					
South Pacific																					
State Line, 1 & 3, S.																					
" Nos. 2 & 3, S.																					
Sutro Tunnel	.13		.13		.14	.13	.14	.13	.13	.13									17,150		
Taylor Plumas																					
Tloa																					
Unadilla, S.																					
Union Cons., G. S.													.45						100		

Tables giving dividends and assessments will be printed the first week of each month. Dividend shares sold, 32,157. Non-dividend shares sold, 24,950.

has continued very severe—on Tuesday, seven A.M., degrees below zero.

An exchange states that "it is said that the Lehigh Valley Railroad Company will put on a strong line of propellers from Fair Haven to Chicago and Duluth, and will build several grain elevators at Fair Haven. By this arrangement, of course, the propellers will take coal and merchandise up the lakes and bring back grain, thus being sure of freight both ways." My word for it, there is no foundation for this report. The company is well satisfied with its Buffalo terminus and facilities, and no change is contemplated.

A few additional items relative to the meeting of the bituminous coal interests have leaked out since my last letter. The three railroad companies and the shippers have signed an agreement, whereby the pool will regulate the output as well as prices, and if the railroads live up to the terms, the shippers are bound to maintain rates. The penalty for cutting prices is, that cars will be refused to shippers found so doing. The railroads are to pay one half the commission's expenses.

One of our city papers thus reports the proceedings at this meeting: "The various railroad companies carrying competitive bituminous coal into Buffalo held a meeting for the purpose of entering into an agreement to regulate the sale of coal passing over their respective lines, thereby preventing the competition through underselling that is now pursued. It was decided that each company select a commissioner to represent it in a board, and this board is to select an arbitrator, the members to represent the whole of the bituminous coal production. The board shall fix the prices at which all bituminous coal shall be sold, and producers must not undersell. All grievances are to be submitted to the board. Each company is to deposit a certain amount of money, which is to be forfeited in case they do not live up to the agreement. The following commissioners were appointed: Buffalo, New York & Philadelphia, Col. Ensign Bennett; Rochester & Pittsburg, G. H. Lewis; Erie, Samuel Hines. The Lake Shore decided not to appoint a commissioner, but will co-operate. Most of the coal men are at present in Montreal, looking after the Grand Trunk contract. On their return, the arbitrator will be appointed."

Messrs. Bell, Lewis & Yates denied that they had taken the agency of the Daugus mines owned by the

New York, Lake Erie & Western Railroad last week. Since then, the statement has been reasserted and not contradicted, hence it is accepted as true.

Boston. March 19.  
[From our Special Correspondent.]

Trade is rather quiet with the anthracite agents. Dealers have already got in their orders for coal that the present active trade demands, and are now waiting for it to come along. If the March allotment is adhered to, as all agree it should be, spring trade must open well. It is understood that the companies will make only slight changes in opening prices, probably not more than a net reduction of from 10 to 15 cents, making stove coal at New York \$3.85@3.90. In pursu

Comparative statement of the production of anthracite coal for the week ended March 14th, and year from January 1st :

Table with columns: TONS OF 2240 LBS., 1885. (Week, Year), 1884. (Week, Year). Rows include D. & H. Canal Co., L. & W. RR. Co., Penna. Coal Co., etc.

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.

Summary table showing Total same time in 1880, 1881, 1882, 1883 with corresponding tonnage values.

The increase in shipments of Cumberland Coal over the Cumberland & Pennsylvania Railroad and branches amounts to 13,163 tons, as compared with the corresponding period of 1884.

Comparative Statement of the Production of Bituminous Coal for the week ended March 14th and year from January 1st :

Table with columns: Tons of 2000 pounds, 1885. (Week, Year), 1884. (Week, Year). Rows include Cumberland Region, Md., Barclay Region, Pa., etc.

Comparative Statement of the Transportation of Coke over the Pennsylvania Railroad for the week ended March 14th, and year from January 1st :

Table with columns: Tons of 2000 pounds, 1885. (Week, Year), 1884. (Week, Year). Rows include Gallitzin & Mountain (Alleghany) Region, West Penn. RR., etc.

FREIGHTS.

Coastwise Freights.

Per ton of 2240 lbs.

Representing the latest actual charters to March 20th.

Table listing ports (Alexandria, Annapolis, Albany, etc.) and freight rates from Philadelphia and Baltimore.

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

DIVIDENDS.

OFFICE ONTARIO SILVER MINING COMPANY, MILLS BUILDING, 15 BROAD STREET,

NEW YORK, March 20, 1885.

DIVIDEND NO. 105.

The regular monthly dividend of FIFTY CENTS per share has been declared for February, payable at the office of the company, San Francisco, or at the Transfer-Agency, New York, on the 31st inst.

Transfer-books close on the 25th. LOUNSBERY & CO., Transfer-Agents.

HOMESTAKE MINING COMPANY, MILLS BUILDING, 15 BROAD STREET.

NEW YORK, March 17, 1885.

DIVIDEND NO. 70.

The regular monthly dividend—TWENTY-FIVE CENTS per share—has been declared for February, payable at the Office of the Company, San Francisco, or at the Transfer-Agency in New York, on 25th instant.

Transfer-books close on 20th. LOUNSBERY & CO., Transfer-Agents.

OFFICE OF THE MOULTON MINING COMPANY,

BUTTE CITY, MONT., March 18, 1885.

DIVIDEND NO. 5.

Dividend No. 5 of Thirty Thousand (\$30,000) Dollars, being 7 1/2 cents per share, will be payable at the office of JOHN M. MOORE & CO., Transfer-Agents, No. 78 Broadway, New York, on and after April 6th.

Transfer-books close April 1st. W. A. CLARK, President.

A PRACTICAL CIVIL ENGINEER (AGE 26), conversant with English, German, French, and some Spanish; competent in drafting, surveying, chemical analysis, and assaying, wants a position anywhere in the United States or Mexico.

MAPS.

ARIZONA AND NEW MEXICO.—This map shows all the Township Surveys, Private Land Claims, Post-Offices, and Settlements. It also exhibits the Explorations of other Government and Private Expeditions, including the facts developed by the Surveys for the Routes of Projected Railroads, etc., 1881. Scale, one inch to thirty-three miles.

COLORADO.—Cannon's Map of the Mineral Belt of Colorado. Taken from the Records of the Surveyor-General's Office, and other reliable Official Sources. Showing, in colors, the Mineral Belt, Gold Districts, Silver Districts, Coal Districts, County Lines, and Boundaries of Land Districts. There are also given the Capital, County Seats, Township Lines, Railroads, and Projected Railroads.

COLORADO.—Topographical and Township Map of the State. Compiled from U. S. Government Surveys and other authentic sources, by Louis Nell, Civil Engineer. By means of symbols, the following mass of facts is graphically shown: Railroads in operation; Railroads chartered or in progress; Wagon-roads; Wagon-roads proposed; Trails; Drainage dry during the greater part of the season; County-seats; Post-offices; Villages; Townships subdivided; Townships surveyed in outlines; Contour-lines, with vertical intervals of 1000 feet; Altitudes in feet above sea level, by barometer observations and by spirit-levels; Private grants; Military reservations; Indian reservations ceded to the U. S. Government; Arable land, with irrigation. Tables of Areas of Counties; Astronomical Positions; Arable Land. Scale, 1 inch = 10 1/2 miles. Size, 31x40 inches. Pocket form. \$1.50 on thick paper.

IDAHO.—The Wood River Region of Central Idaho, giving the first correct Geography of that recently explored and remarkable Belt of Discoveries of Gold and Silver Mines on the tributary streams of the WOOD and LITTLE WOOD Rivers, on the Upper Waters of the SALMON RIVER, among the SAWTOOTH MOUNTAINS, and on the Forks of the BOISE RIVER; embracing the Mount Estes and Custer Mines on the north and the Oregon Short Line Railroad on the south. Prepared by Frank J. Scott. Scale, 5 miles to the inch. Size, 15 x 26 inches. In paper pocket. Price, \$1.

MEXICO.—Map of Mexico. Showing Railroads, Broad Gauge and Narrow-Gauge, Constructed; and Railroads, Broad-Gauge and Narrow-Gauge, Proposed. This very large and finely-engraved Map, constructed originally by the government for official purposes, contains all the information obtainable by it, and shows minutely the towns and villages of the entire country. Scale: 26 2/3 Mexican Leagues to the degree, and 69 1/6 English Miles to the degree; also, Kilometrical Scale. 1881. Size, 53x41 inches. Printed in colors. Pocket form, \$5.

NEW SECTIONAL AND MINERAL MAP OF UTAH.—Pocket form. Compiled from the latest U. S. Government Surveys and other authentic sources, exhibiting the Sections, Fractional Sections, Counties, Cities, Towns, Settlements, MINING DISTRICTS, Railroads, and other internal improvements. Scale, one inch to eight miles. Colored. 1884. \$3.75.

SAN JUAN MINING REGION (COLO.).—Kibbe's Geographical and Geological Map of the San Juan Mining Region. 1881. Shows county lines, wagon-roads stage routes, trails, railroads, cities and towns with post-offices, camps with post-offices, reduction-works, mountain peaks, continental divide. Also (by colors), eruptive rocks, Carboniferous, Cretaceous, Jura Trias. Elevations above sea-level. Scale, one half inch to the mile. 22 x 27 inches. Includes, on same sheet, a reduced Map of the State of Colorado. Printed in colors, with board covers. \$1.50.

SAN JUAN MINING REGION (COLO.).—Stockder's Map of San Juan Mining Region, compiled from U. S. Surveys and other Authentic Sources. 1881. Shows county boundaries, district boundaries, wagon-roads, trails over mountain passes from river basin to river basin, continental divide, timber-line (11,000 to 11,500 feet above sea-level), etc. Scale, 1 inch to the mile, or 1 = 63,360. 28 x 38 inches. Pocket form, stiff paper cover, \$1.50; or as a wall map, \$1.50.

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

THE SCIENTIFIC PUBLISHING CO.,

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