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WILL some of our readers inform us as to the present condition of the ozokerite or mineral wax deposits in Utah? There is a demand for this mineral.

RICHARD H. RICKARD, a prominent mining engineer, and one of the organizers and the treasurer of the Mining Exchange in this city, died at Stamford, Conn., on the 14th inst. Mr. RICKARD was largely interested in Lake Superior and in Colorado mines.

The Hecla Consolidated Mining Company, of Glendale, Montana, is one of our most profitable mines, although it is not heard of as much as some that do not make as good returns. The company has its head office in Indianapolis, Ind., and we notice the name of Vice-President HENDRICKS in the Board of Directors. In another column, will be found extracts from the annual report of Mr. H. KNIPPENBERG, the General Manager. From this, it appears that the capital of the company has been increased from \$500,000 in 1877 to \$1,500,000 in 1881. We see no statement as to the reason for this increase in the stock. Are we to assume it was "water"?

The mine paid 13 per cent on \$1,500,000 in dividends in 1884, and in addition paid for some real estate, permanent improvements, etc., and has now cash on hand about \$76,000. Mr. KNIPPENBERG appears to be a very prudent, economical, and honest manager, and no doubt to him is chiefly due the credit for the company's prosperity.

THE Oxford Gold Mining Company, of Lake Catcha District, Nova Scotia, publishes its annual report, from which we publish in another column a full abstract. This company shows that gold mining in Nova Scotia is not only highly profitable, but that the capital required in it is not necessarily large. The total cost of plant at this mine is given at \$21,704.09, while the total dividends to date are \$36,000, out of a total gold product to the end of 1884 of \$108,330.32. The gold product for the year 1884 was \$43,395.51, the ore averaging \$16.84 a ton. These results are very satisfactory; but a still more remarkable result is recorded when we are told that "the assays regularly made show that from 95 to 98 per cent of the value of the ore is saved; and most of the gold lost is in the sulphurets, which are not rich or abundant enough to warrant saving." This statement is so remarkable that we shall be pleased to hear from the manager further as to how it was attained. With the coarse or nugget gold of most of the Nova Scotia mines, a very heavy percentage of the value of the ore is generally allowed for "stealage;" and on fine gold worked in the battery, a saving of from 95 to 98 per cent is unheard of in battery amalgamation.

A PHILADELPHIA firm, interested in the tin deposits of Virginia, issues a circular in which a very remarkable statement is made. After referring to "many difficulties" found in making "a systematic and properly conducted exploration of the Virginia tin district," they particularize as follows: "In doing this, we were under many difficulties from the lack of chemical skill attainable by us in having assays of the ore made, doubtless owing to the fact that the determination of metallic tin, and the manipulation of tin ores were entirely unknown to the majority of American chemists. This was overcome by the establishment of a laboratory of our own, with a chemist in our own employ, who followed the processes and formulæ of the best English and French analytical chemists in his work." We greatly fear the gentlemen issuing this work have fallen into the hands of one of those so-called "practical miners" from Cornwall, who think there is something so mysterious about "tin-stone" that even the laws of gravity will not act in its concentration, and the action of the laws of chemical combinations are suspended when tin is treated. It is to be hoped that the other statements of this circular have a better foundation than that quoted. Such exhibitions of ignorance are inexcusable, and were it not that the circular is issued by a reputable firm, they would bring discredit upon the otherwise important statements made concerning the tin deposits of Virginia.

MR. GEORGE W. COPE, the new and accomplished Secretary of the American Iron and Steel Association, has issued an address by the Association on the condition of business, which, considering the slight foundation for its hopeful tone, justifies at the very outset of Secretary COPE'S official life the unstinted eulogy that he received from our esteemed contemporary, the *Iron Age*, as a gentleman of "lively imagination." "The statistician," we are there told, "needs to be ingenious, and, in some degree, imaginative;" and certainly in times like these, such qualities, when combined with a sanguine temperament and a short memory, are invaluable in the mouth-piece of the iron trade. We have every desire to believe the cheerful things we are told; but we should like to feel certain, in the first place, that Mr. COPE'S lively imagination is not supplemented by a spirit of satire, and that he is not indulging in "sarkasm" or "poking fun at us," when he makes the Association say: "We congratulate the American manufacturers of iron and steel, and the country generally, upon the prospect that the depression in business which has continued for about two years is apparently nearing its end. With an abundance of good money, with good crops of all leading staples, with prices for all products and for all reputable railroad and mining stocks so low that they can not be expected to go any lower, only one element necessary to secure a revival of business prosperity is lacking, and that is, confidence in the future of values." If this were all that were needed to bring about a "revival" of business, why not call a mass-meeting, irrespective of "race, color, or previous condition of servitude," and pass a resolution affirming our "undying confidence" in the "future of values," and thus promptly bring about a "boom"?

We find almost universal confidence in "the future of values," but very little in the present; and on the argument of "confidence in future values," it is as difficult to persuade a consumer to use more iron or coal than his immediate necessities require as it is to persuade a man into gorging himself to-day to the point of apoplexy because he is confident that to-morrow he will be hungry again.

The same ingenious imagination congratulates us upon the "abundance

of good money;" but most of the papers and the discussions in Congress are full of denunciations by some of the quality of our money, which is declared execrable, and by the rest of the quantity, which is declared to be altogether insufficient for our needs.

These exhilarating views, and the cheering further announcement that the Association has authorized the distribution of "500,000 more" tariff tracts, are only introductory to the main point of this address, which is a petition to the Senate and House of Representatives, urging "prompt and favorable action" on, and "the adoption of a liberal policy in making appropriations" for, the following measures:

- "1. The establishment of proper mail service upon ships belonging to this country, as proposed in the Post-Office Appropriation Bill, excepting the provision for ships plying between United States ports.
- "2. The creation of a navy suitable for the needs of the United States.
- "3. The establishment of adequate foundry and manufacturing facilities for the production of heavy ordnance, of armor for ships and forts, and of steel for various naval purposes."

There can be no doubt but that the expenditure of \$100,000,000, more or less, by the government for these purposes would put much money in the purses of our iron and steel kings, and would perhaps benefit our coal companies. It is equally certain that the money would come for the most part from those engaged in industries such as agriculture and manufacturing, that are less favored than the iron trade, and that would be equally entitled to government subsidies providing them a larger and better market for their products.

We can not agree with the wisdom of this subsidy policy, and, aside even from the suspicion that is more than whispered in most of our exchanges that these appropriations cover gigantic jobs, it is certain that there is quite as great a diversity of opinion concerning the benefit to arise to the country from them as there is regarding the good quality and sufficient quantity of our money.

A PRIMITIVE MODERN BRIDGE.

At a recent meeting of the American Society of Civil Engineers, a paper was read on Mexican Bridge Construction, by J. Foster Flagg, M. Am. Soc. C.E. The bridge was remarkable for being the work, from his own design, of an ordinary uneducated Mexican laborer or peon, combining, as it did crudely, several principles of bridge construction. Bridges in Mexico are generally built of arched masonry, any thing like a truss being, before the advent of railroads, almost unknown. In the State of Colima, where this particular structure was built, there were very few bridges of any description, and those few the ordinary arched ones. The peon referred to was, some four years ago, the ferryman where a trail for cargo mules crosses the river Armeria. He happened to see a copy of *Harper's Weekly* that had in it an illustration of a suspension-bridge. As a result of his study of this picture, he put up a structure quite closely imitating the ordinary suspension-bridge; the cables and suspenders being twisted from wild vines (*vejucos*), the cables being passed over rude frames for towers, and anchored to huge boulders in the river banks. The whole structure was built without nails or metal of any kind. It was carried away by a heavy freshet the same year; and directly afterward, the same man built another structure quite original in design. It was also put together without nails or metal. The cable was formed of wild vines twisted, and all the joints tied together with lighter vines, no manufactured rope being used in the structure. The piers were made by driving light piles into the river bed, in the form of a square, tying them together with other poles, and filling with stone. The towers were natural forked sticks; the top fork being used to support the cable, and the lower fork to support the timbers. The timbers upon these forked sticks were really rude cantilevers, weighted at the shore end and supporting the timbers of the central span. The only point of attachment of the cable was at the center of the bridge. The roadway was of rude joists and boards, sufficient to pass one animal. The bridge was strong and rigid.

The paper was discussed by a number of members, and reference was made to bridges constructed of raw vines and cowhide in Peru and other South American countries.

THE LAW AS AFFECTING MINING AND METALLURGICAL INTERESTS.

Amended Location.—The following is the text of Representative Rollins's bill for an act to amend section 1823, general laws of the State of Colorado, the same being section 13 of chapter 66, entitled "Mines:" Be it enacted by the General Assembly of the State of Colorado:

Section 1. That said section is hereby amended so as to read as follows: Section 1823. If at any time the locator or owner of any mining claim heretofore or hereafter located shall apprehend that his original certificate was defective in any respect, or that the requirements of the law had not been complied with in the matter of his location, or if he shall be desirous of changing his surface boundaries, or if he shall desire to take in any part of an overlapping claim which has from any cause been forfeited or abandoned, or in case the original location was made prior to the passage of this law, and he shall desire to secure the benefits of this act, such locator or owner may file for record in the office of the clerk and recorder of the county wherein such claim is situated an additional certificate of location, subject to the provisions of this act; Provided, That such amended or additional location shall not impair the existing rights of others in any respect, and the locator or owner of such claim shall not, by reason of such amended or additional location, be precluded from claiming and proving any and all title which he held under the previous location; And provided, further: The party making such amended or additional location shall not thereby be required to put up a new stake or notice, or sink a new shaft, as in the case of the relocation of abandoned claims, as provided in section 1825, unless he shall change the place of his discovery-shaft.

OFFICIAL STATEMENTS AND REPORTS.

Hecla Consolidated Mining Company, Glendale, Montana.

The following extracts are from the report of Mr. H. Knippenberg, General Manager:

GROSS PROFIT, 1884.	
Net value of bullion and matte product, 1884.....	\$741,583.03
Value of matte, lot X, more than estimated December 31st, 1883.....	146.57
Interest collected by John C. Wright, Treas.....	1,874.83
Cash receipts Glendale office, account rents, rebates, etc.....	7,914.21
Permanent improvements 1884.....	20,679.00
Trapper purchase.....	15,155.40
Oneida purchase.....	10,000.00
Value of ores, charcoal, wood, supplies, etc., on hand December 31st, 1884, more than December 31st, 1883.....	8,900.00
Less monthly pay-rolls and other expenses, 1884.....	\$806,253.04
	564,510.69
Gross profit 1884.....	\$241,742.35

GROSS PROFIT.	
Gross profit December 1st, 1880, to December 31st, 1884.....	\$927,139.18

Disposed of as follows:	
Debt January 1st, 1881, paid.....	\$77,785.13
Dividends paid July 1st to December 31st, 1884, inclusive.....	555,000.00
Cash on hand and bullion and matte not paid for December 31st, 1884, less amount of December, 1884, pay-roll, net.....	76,265.34
Permanent improvements 1881, 1882, and 1883, at cost.....	123,754.31
Permanent improvements 1884, at cost.....	20,679.00
Trapper purchase, at cost.....	15,155.40
Oneida purchase, at cost.....	10,000.00
Charcoal on hand, and paid for December 31st, 1884, at cost.....	15,000.00
Wood on hand, and paid for December 31st, 1884, at cost.....	8,000.00
Silver ore on hand, and paid for December 31st, 1884, at cost.....	23,000.00
Mining timbers and supplies on hand December 31st, 1884, at cost.....	2,500.00
	\$927,139.18

CASH DIVIDENDS.

First manager, 1877 to April, 1879.....	\$117,500.00
Second manager, 1879 to April, 1881.....	
Third manager, 1881 to December 31st, 1884.....	630,000.00
	\$747,500.00

I have now had full charge of your business since April 3d, 1881, being in round figures forty-five months. During that period, I show an average cash profit for each month of \$15,867.78.

For the same period, I show an average gross profit for each month, of \$20,603.09.

GLENDALE.

Last May, I concluded to erect a new office. By July 1st, it was occupied. The stone for the walls and iron for the roof I had on hand. The building is 40 by 25, containing four rooms and a substantial vault 10 by 10. The improvement cost me \$1000.

In July, I felt satisfied that it was wise to add to the smelter another large size furnace. The castings arrived at Melrose, October 2d, and on the morning of November 2d the furnace was put in blast, and since has given good satisfaction. The total cost of this improvement was \$5000, including every thing connected with it.

The following is the smelter statement for 1884: Ores, net tons, 9210.24; fluxes, iron ore, tons, 5891.45; lime, tons, 2799.87; slag, tons, 5508.42; fuel, charcoal, bushels, 827,894; coke, pounds, 958,850; cost of fuel per ton, charge of mixture, \$5.05; average assays, silver, ounces, 68.82; lead, per cent, 33.9; silica, 31.

The production for 1884 was: 4,589,280 pounds of lead; 339,925 pounds of copper; 656,849.02 ounces of silver; 248,264 ounces of gold.

HECLA.

In November, 1883, one of our Lion Mountain tramways was swept away by a snow-slide. This had to be replaced this year at a cost of \$2000.

I also had to purchase a new boiler for the saw-mill, which cost us, including transportation, \$1200.

During the summer, we sawed up some 75,000 feet of logs for lumber, which cost us \$5000.

Last April, I purchased one half of the Oneida mine, paying for the same \$10,000. This makes us the sole owner of this mine. The other half was bought by my predecessor for \$30,000, in 1879.

In September, 1884, I also purchased the Ponka lode, being the extension of the old Trapper mine, and having with it a very valuable timber claim; for this I paid \$600.

In April, I also had to buy one car-load of T rail for our long tramway. This cost us, delivered, \$1000.

So, saying nothing of the money expended during the year in this department for underground work in the way of developments, air-courses, and tunnel, we have paid out during the year \$19,800. Of this large outlay, it can be truthfully said, not a dollar of it has benefited the mining operations and results of the year 1884.

December 8th, 1884, Mr. James Parfet, the Superintendent of this department, resigned. His resignation was promptly accepted by me, and the same day I appointed Mr. James Prout as Superintendent, Charles R. Kappes, Assistant General Manager, makes his headquarters at Hecla. In this way, Mr. Prout can give his whole attention to underground work.

All our mines, excepting the Cleopatra, Trapper, and Tunnel, remain in the same condition that they were one and two years ago.

CLEOPATRA.

In this mine, there is some considerable second-class that will be run to the concentrator. From last April to December, we received from this mine no ore that could be regarded real first-class. The ore kept getting lower in lead and silver and higher in silica, until, in the first week in December, it had fallen to 20 per cent lead. On December 9th, I inspected closely this mine, and found it practically exhausted of first-class ore, so far as developed. The energy and good sense immediately introduced under the new order of things yielded most encouraging

results in developments, quantity, and quality of ore shipped. The furnaces also began to confirm matters above, so that the difference in bullion product was, December 8th, 94 bars in twenty-four hours, against December 30th, 209 bars in twenty-four hours. In the Lion formation, it can only be said that if the ore is there it will be found; if not, there is no expert of whatever kind or name can find it. This mine and several others on the Lion will be pushed ahead during 1885 in development-work.

TRAPPER.

The trapper mine I regard now, as I always have, a wash or slide. In my opinion, all the ore that this mine contains is near the surface.

During 1884, much money was expended on this mine, and it yielded 175.03 tons of ore on the surface, assaying 66.6 per cent silica, 7.3 per cent lead, 121½ ounces of silver. During 1885, we shall further develop it.

TUNNEL.

The Lion Mountain tunnel has been driven into the mountain 1760 feet. As soon as we tap the mines above it, we shall push the development-work in Atlantis mine. Until that is done, it is best for us not to undertake any prospect work in the lower mines. I have engaged a thorough surveyor to furnish me with correct notes and surveys of all our underground workings. He will begin in the spring, and may possibly be engaged at this work for thirty days; but when done, we shall have the facts, and no guess-work.

GREENWOOD.

During the year, the concentrator was in full operation from April 1st to November 1st (except during short intervals while repairs were making).

The total number of tons of crude second-class ore furnished this department from April to November, was 9742 tons. This was concentrated at a cost of 97½ cent per ton, yielding a product of concentrates of 1804.39 tons, making each ton of concentrates to cost us \$5.27.

The average assay of the concentrates for the year was 9.6 per cent silica, 42.7 per cent lead, and 82.2 ounces silver.

The concentrator will again be put in motion by April 1st next. Before that time, general repairs must be made, which I expect to do in March.

NORWOOD.

The iron mines have furnished the smelter during the year with 5515½ tons of iron. There are also 800 tons of iron at the mines already mined. Including the latter, our iron has cost us during 1884, on board of wagons at the mines, \$2.25 per ton.

I might here add that I also purchased during the year 500 tons of Birch Creek or magnetic iron, at a cost of \$10 per ton in Glendale. I am satisfied that this clean and high per cent iron is a great help and advantage to us, especially when our ores are of the quality they have been for months past.

ORE PRODUCT.

During the year, all our bullion and part of our matte have been sold to the Omaha & Grant Smelting and Refining Company, Omaha, Neb. The uniform courtesy and kindness of Messrs. Barton and Nash, the careful settlements and prompt remittances to your treasurer, have all aided in making the year, in this particular, a pleasant and happy one, and trust the pleasant relationships will continue between these honorable gentlemen and the Hecla Consolidated Mining Company so long as Lion Mountain will supply the ore.

TRANSPORTATION CONTRACT.

The contract for hauling all our ores, bullion, and supplies, which is the most important contract we have, is with Messrs. J. T. Murphy & Co., Helena, Montana. Between Mr. Murphy, the head of this strong house, and the Hecla Company, there exists the best and most friendly feeling, and during my four years of business intercourse, often somewhat complicated, not a single misunderstanding has arisen between us.

CHARCOAL AND COKE.

During 1884, I have bought 843,259 bushels of charcoal from Italians at 13 cents per bushel. During the same period, I bought of Messrs. Wallace & Lyman 479 tons of coke at \$20 per ton at Melrose. Last July, I agreed with G. M. McLain, of Leadville, to take 50,000 bushels of charcoal each month, provided the company needed it, at 12½ cents per bushel, he agreeing to erect coal-kilns on Cañon Creek Park.

I consider the mining property of this company among the very best in America. Notwithstanding I entertain this high opinion of our property, I will, under no circumstances, make any predictions as to future profits.

The ores produced since last April have been both base and refractory, as well as low grade in lead and silver, making them exceedingly hard and expensive to smelt.

TABLE SHOWING ANNUAL PRODUCTION OF ORE AND COST SINCE THE ORGANIZATION OF THE COMPANY, 1876 TO 1884, INCLUSIVE.

PRODUCTION OF EACH MINE.		SUMMARY FOR EACH YEAR AND COST.		
Name of mine.	Tons.	Year.	Tons.	Per ton mined.
Atlantis.....	9,899	1876	247	\$19.40
True Fissure and Sheep.....	29,985	1877	2,069	14.50
Cleopatra.....	26,090	1878	5,426	12.78
Ariadne.....	101	1879	11,069	32.42
Cleve.....	653	1880	11,413	28.39
Franklin.....	323	1881	8,831	14.82
Trapper.....	175	1882	12,192	13.47
Emina.....	9	1883	12,466	9.03
Concentrator.....	5,689	1884	9,210	12.50
Total tons.....	72,924	Total...	72,924	Tons.

NOTE.—The above tables are as nearly correct as can be ascertained from the system of accounts kept prior to 1881.

NOTE.—The total number of tons second-class ore run to the concentrator during 1882, 1883, and 1884 was about 30,000, yielding 5689 tons of concentrates.

Alice Gold and Silver Mining Co., Butte, Montana.

The management of this company has been severely criticised by some of the Montana papers, and we called attention in our review of the annual report for 1883 to several points of interest, and to some that were open to criticism.

In analyzing the report for 1884, we use the same order and carry out the expenditures to the ton of dry ore, as we did last year.

During the year, there were milled 33,201 tons of dry ore, which produced 1,680,454.8 ounces of doré bullion. The value of this is given by the superintendent at \$1,247,999.85, counting the ounce of silver at the absurd conventional standard \$1.29.29. The secretary gives the "receipts from bullion" 1,239,651.13, or \$8348.72 less than the superintendent's report. From each should be deducted the discount on silver, \$194,408.88, to arrive at the actual value of the bullion, which, was, therefore, \$1,045,242.25. With this correction, the following is the analysis of the secretary's report:

RECEIPTS.		DISBURSEMENTS.	
		Total.	Per ton.
Cash in hand of treasurer and superintendent, January 1st, 1884.....	\$2,953.86		
From bullion.....	\$1,045,242.25		
Old iron sold.....	1,031.33		
Supplies sold.....	2,274.83		
Interest on credit balances in bank.....	1,392.82		
Railroad reclamations.....	606.11		
Other items.....	2,678.35	1,053,225.69	
		\$1,056,179.55	
Expressage on bullion.....	\$18,206.89		
Supplies for storehouse.....	18,832.25		
Lode claims.....	9,398.55		
Bullion reclamations.....	1,407.73		
Mine, permanent improvements.....	32,933.10		
Mill, permanent improvements.....	14,491.47		
Machinery.....	59,049.65	\$154,315.64	\$4.65
Prospecting and dead-work:			
Labor.....	\$83,153.21		
Supplies.....	4,729.20		
Freight.....	1,607.14		
Powder and fuse.....	6,259.32		
Fuel.....	8,834.22	104,583.09	3.15
Ore extraction:			
Labor.....	\$165,413.03		
Supplies.....	9,463.81		
Freight.....	3,214.32		
Powder and fuse.....	9,388.99		
Fuel.....	17,668.44		
Assay materials.....	513.65	205,662.24	6.19
Ore-reduction:			
Labor.....	\$102,436.29		
Supplies.....	5,882.55		
Freights.....	4,812.53		
Salt.....	12,634.68		
Freight on salt.....	81,627.49		
Quicksilver.....	23,036.87		
Fuel.....	53,005.35		
Assay materials.....	1,099.05	284,534.81	8.57
Expense account:			
Salaries.....	\$11,350.00		
General expense.....	1,502.70		
Legal expense.....	3,588.50		
Office expense.....	856.93		
Traveling expense.....	557.75		
Stable and ore-hauling.....	1,969.53		
Insurance.....	5,238.58		
Interest on company's notes.....	8,466.30		
Stationery and printing.....	718.43		
Postage and telegrams.....	355.88		
Professional services.....	200.00		
Advertising.....	174.30		
Registrar's fees.....	675.00		
Taxes.....	5,234.30	40,888.20	1.23
Dividends.....	150,000.00		
Cord-wood on hand.....	22,596.00		
Bills payable.....	58,333.33		
Cash on hand.....	35,266.24		
		\$1,056,179.55	31.81
SUPPLEMENTAL STATEMENT.			
Bills payable.....	\$225,000.00		
Less payments in 1884.....	58,333.33	\$166,666.67	
Mine and mill supplies on hand.....	73,814.35		
Cash on hand.....	35,266.24	109,080.59	
Balance January 1st, 1885.....		\$57,586.08	

On comparison of the disbursements with those of last year, we note that the cost of permanent improvements, supplies, etc., \$4.65 per ton, was greater than in 1883; that of prospecting, \$3.15 per ton of ore milled, was about 40 cents per ton less than in 1883. Ore extraction, still excessive at \$6.19 per ton, was \$1.80 per ton less than in 1883; and ore reduction, \$8.57, or \$3.80 per ton less than in 1883, shows the good effect produced by the criticism of last year's report and of the policy of publishing quarterly reports. Expense account has also declined a little, and the total disbursements are \$31.81 per ton of ore milled, including dividends and cash on hand. We still note that a concern that carries a credit balance throughout the year paid \$8466.30 interest on company's notes. The company is still \$166,666.67 in debt, and yet it goes on paying dividends, and at the end of the year had cash on hand only \$35,266.24.

In closing these abstracts, we must call attention to the high cost of the work done in each department, and the absence of data that would permit of a useful analysis. The assay value of the ore milled is not given, nor the loss in treatment, nor the quantities of material used, nor the prices paid for material and supplies. In fact, the Alice report, as furnished, while a great deal better than no report at all, is very far from being satisfactory. It furnishes, however, quite enough information to justify the stockholders in asking for a good deal more.

Oxford Gold Mining Company, Lake Catcha District, Nova Scotia.

We take the following extracts from the official annual report:

This report comprises the operations of the company from December 1st, 1883, to December 31st, 1884. During this time, work has been confined entirely to the Mill and Coleman lodes, and the ore mined during the latter part of this period has been sufficient to keep the mill running on full time. On this account, it has not been considered necessary to mine on any of the other lodes.

In the first part of the year, a very important addition was made to the mill machinery, and auxiliary apparatus was put up to transfer power from the mill for use at the various shafts.

A very interesting discovery has been made within a few months that may prove to be of great importance. A visitor to the mine, of varied experience in placer mining in the Western United States, having made a number of tests in various places, found that all the soil south from the Mill and Coleman lodes, in a general line with the mill, carried gold, and in more or less paying quantities. Estimating only a distance of 300 feet along the lodes, and 500 feet down to the lake, with an average depth of soil of 10 feet there would be of pay dirt and included boulders in the neighborhood of 100,000 tons. The yield, at a low estimate, would be \$1 a ton. To test this, it would only be necessary to change, at a small outlay, the form of the batteries, making them float batteries, through which could be run from 50 to 100 tons a day. An important and very interesting result of such working of the soil down to the bed-rock, and of the consequent denudation, would be the complete exposure of the croppings of all lodes existing on the land. What disclosures might thus be made, and what might be developed on now unknown lodes, can only be conjectured.

The milling proper or reduction of the ore continues its high character, saving nearly all the gold in the ore.

The assays regularly made show that from 95 to 98 per cent of the value of the ore is saved; and most of the gold lost is in the sulphurets, which are not rich or abundant enough to warrant saving.

Hardly any repairs have been necessary to the machinery of the mill, although working day and night, Sundays excepted, now for nearly three years, showing the good character of the original work, and the care taken in its operation. The shoes and dies of chrome steel (by the Chrome Steel-Works of Brooklyn) have done admirable service, being replaced only after crushing 3300 tons of quartz ore. From data of other gold mills at hand, this would seem to show a remarkable capacity for work, and not on account of the softness of the ore, for on the other hand, the quartz is fairly hard and sharp.

Operations were vigorously continued from the date of our last report on the Coleman lode as then opened, namely, at shafts Nos. 4 and 5, on Coleman East, and shafts Nos. 9 and 10, on Coleman West. The vein showed from time to time a very irregular formation; at times, swelling out to 3 and 4 feet, and then again decreasing to an inch in width. The yield per ton of ore also varied greatly from \$20 to \$8 a ton. On the opening up of the continuation of this lode to the northwest of the mill in July last, it was deemed advisable for the present to transfer the bulk of active operations on this lode to this section. Since then, work has been prosecuted uninterruptedly at shafts Nos. 12 and 13, in sinking and drifting west from No. 13, and east from No. 12. In continuing the drifting east from No. 12, so as to unite with the workings of No. 10, it will probably be necessary to drain the swamp north of the mill, where, from indications of float ore, the lode will be found quite rich. In fact, the last ore milled in December, from the stoping east of No. 12, has showed a marked increase in quality.

The Coleman lode has now been proved almost the whole length of the property, and all developments and indications point to an immense amount of ore in this lode, and particularly to the west, where the vein is very wide. This ore may prove to be of general low grade, and of a value that might not pay to work in connection with a ten-stamp mill. Such a condition would involve the consideration of increasing the crushing capacity of the mill.

The work on the Mill lode has progressed without any interruption, till the eastern stopes are now 350 feet from the main shaft, and shaft No. 4 is now down 148 feet. No new features of interest have developed in this lode since the last report.

MINE OUTPUT FOR 1884.

Mill Lode.	
Tons milled	497
Highest yield per ton	\$57.25
Lowest " " "	14.48
Average " " "	31.67
Coleman Lode.	
Tons milled	2,080
Highest yield per ton	\$25.86
Lowest " " "	4.48
Average " " "	12.06
Total number of tons milled	2,577
Average yield per ton	\$16.84

NOTE.—Total number of tons milled since mill started, 4754.

Bullion produced.....\$108,330.32

The bullion product for 1884 was: Tons milled, 2577; weight in ounces, 2211'07; fineness, from 932 to 966; value, \$43,395.51.

FINANCIAL STATEMENT.

December 1st, 1883, to December 31st, 1884.

Receipts.	
Cash on hand, December 31st, 1883	\$4,323.43
Treasury account	5,000.00
Bullion receipts	\$43,395.51
Less in mill, December 1st, 1883	800.74
Miscellaneous receipts	93.50
Accounts payable	639.75
	\$52,651.45

Capital stock is \$125,000, in shares of \$1 each; 5000 shares are in the treasury of the company.

Disbursements.

Actual operating expenses:	
General expenses, New York	\$2,949.33
General expenses, Nova Scotia	1,035.98
Mill labor	2,604.62
Mill supplies	1,868.24
Mine labor	17,159.38
Mine supplies	3,034.46
Mine prospecting	392.59
Stable expenses	354.05
Salaries	2,338.03
Insurance	171.73
Royalty	325.96
	\$32,234.37
Account of plant:	
Mill	249.70
Mine equipment	2,931.05
Mine construction	501.25
Superintendent's house	1,200.00
Stable account	445.75
Mine and mill supplies	75.00
Accounts due December 1st, 1883, since paid	5,402.75
Dividends Nos. 10, 11, 12	4,353.61
Cash balance, December 31st, 1884	8,875.00
	1,785.72
Total dividends to date, \$36,000.	\$52,651.45
Total cost of plant at mine is \$21,704.09.	

THE METALLURGY OF SAN JUAN COUNTY ORES.

By Theodore E. Comstock.

II. Concentration in the Bismuth Zone.

The Eclipse concentrator is near the axis of the bismuth zone, but so situated that but few of the ores of that belt can be brought to it without going up-hill. There are some pyritous and galeniferous mine products, however, that this mill can profitably treat, and some of the veins in the vicinity carry cupriferos ore and complicated mixtures that must be beneficiated here if at all. The management of these works has been dubious; but there is no apparent reason for the idleness of last season, except inability to procure a steady supply of ore.

Eureka is a center to which large quantities of concentrating material can be readily transported for treatment. Middleton is almost as favorably situated for the purpose, and here the Uncompahgre Mining and Milling Company has erected a small plant, there being nothing of the kind at the former place. After an unsuccessful attempt to use the Tasker-Thompson pulverizer, which was replaced by Cornish rolls, further discouragement was engendered by the discovery of radical defects in the plan of the mill, and by lack of confidence in the local management. It would be difficult now to place this mill in good working order without considerable further outlay, as it is inconvenient and crowded, with much of error in its mechanical arrangements. The plant was intended largely for the working of ores belonging to the owners, which are mined near Mineral Point. These could never be profitably treated at this point, and the success of the mill on the products from adjacent mines was not such as to inspire confidence.

But there is no doubt that a large portion of the ores in the bismuth belt will require concentration. The practical difficulties are not mechanical or metallurgical, but they are of such a nature as to produce similar effects, at least for the present. The fact is, that many of these ores carry but little gangue, and yet the grade is low enough to render them unprofitable under the existing conditions. Some of them might be improved by separating their component minerals; but even with these, there must be better and cheaper transportation facilities before they will be marketable at a profit. The next move must be in the direction of such improvements as will cheapen freights. Not a little progress has been made within the last two years, but it has been almost wholly confined to wagon-roads, which are not yet very satisfactory. It can be demonstrated that the traffic over a railroad along the Animas Valley above Silverton, with connecting tramways through the side gulches, would be so heavily augmented that the investment would be highly remunerative. But the time has not yet come for outside investors to be captivated by promises that depend upon future mining work. The mine-owners themselves must show their faith by liberal cash subscriptions to such enterprises.

Whenever these facilities are afforded, it will be feasible to put many of the ores of the district into marketable form that now are worthless, and that will not justify the present cost of beneficiating. Eureka and Gladstone are the best points for collecting the product of the belt, and at both places the water supply is abundant for all requirements, including power. The material that will need to be concentrated is chiefly such as can be readily jigged, and ordinary crushing will not commonly give trouble from an overproduction of slime. The bismuth ores and allied minerals are not usually in a condition suitable for concentration, but, fortunately, they are rarely of such grades as to make this treatment necessary. Galena, pyrites, copper pyrites, and some zinc-blende, with gangue of quartz, make up the list, and no serious difficulty can arise, if ordinary skill is exercised.

There is, however, a special problem to be met in certain localities, the proper solution of which is much less troublesome than would appear from the experience of some who have attacked it without the necessary understanding and experience. The Samson mine affords the most striking example, the concentrating plant (of the Fort Scott plan) having been designed for ores of a different character from the regular product. The bulk of the output consists of quartz bearing free gold and auriferous pyrites, with sparsely disseminated specks of a mineral popularly known as silver sulphuret, but which is probably argentiferous bismuth-glance. Not a little of this material can be profitably treated by amalgamation, with great care in saving the "float-gold," but there still remains in the tailings a notable proportion of auriferous pyrites that has heretofore been wasted. The only practicable method will be to run the tailings from the gold mill over slime-tables, the Embrey or Frue being well adapted for this work. The concentrates will then find a ready market at Durango. The jigging of the original ore, as intended in this case, is almost impracticable, and the present plan of amalgamating without concentration is wasteful and ineffective, although it may, perhaps, yield an average profit sufficient to satisfy those who do not understand the additional gain that is readily obtainable.

There are a few mines in the bismuth zone that yielded galena and copper pyrites in a mass so thoroughly commingled that the two ingredients can not be separated except by machinery. The importance of such separation is evident, for none of the ore-buyers will now pay for both copper and lead in the same lot. In some cases, the cost of parting the minerals will be much less than the added value thereby secured. Examples are the Hamlet, Charity Ann, etc., near Middleton, several veins in the vicinity of Eureka, and others not far from Gladstone. There are no working concentrators at present in the bismuth zone, the Samson mill having been destroyed by a snow-slide before it had been fairly tested; the Eclipse and Middleton mills being the only others erected to date.

CLEVELAND, OHIO, Feb. 14.

The Manufacture of Chlorine.—*Le Génie Civil* says that MM. Pechiney & Co. have patented a new method of making chlorine. It consists in the addition of magnesia to a concentrated solution of magnesium chloride, so as to produce a solid mixture, which is then treated with air and heat. Nearly the whole of the chlorine is liberated, a part as free chlorine and a part as hydrochloric acid. The residue consists of magnesia, which is used over again with a fresh charge of magnesium chloride.

A MEXICAN OUPELLATION-HEARTH.*

By W. Lawrence Austin, Ph.D., Santa Barbara, Chihuahua, Mexico.

At the Troy Meeting of the Institute, in October, 1883, I presented a paper entitled "Smelting Notes from Chihuahua, Mexico,"† in which was briefly described a cupellation-hearth, commonly met with in the northern part of Mexico, called in the vernacular *un vaso*.

Since writing the paper, I have had occasion to construct a hearth of this description for myself, using it, in conjunction with a water-jacket, for the reduction of a very refractory ore in the form of concentrates; and I now avail myself of this opportunity to qualify some of the statements made in the paper referred to. At the same time, I wish to present some sketches that will enable any one to run up a similar furnace within three days, should occasion demand it. As it is built entirely of common clay (the more refractory the better) and the ashes of scrub-oak taken from the ash-pit of the furnace itself, the materials necessary for its construction are available anywhere. Even the grate-bars of the fire-place are made of adobes cut in two. There are, scattered over the West, small deposits of refractory lead-silver ores that, because of their rebellious nature or the isolation of the locality, do not admit of the ordinary smelting process, and are not amenable to amalgamation or any other system of reduction commonly practiced; yet with the help of litharge, or, in other words, by performing a crucible assay on a large scale, these ores can be readily and cheaply beneficiated, even where iron and coke are unattainable. I am at the present time engaged in an operation of this description, and am producing fine silver from a mixture of galena, pyrites, and blende, using as fuel oak charcoal, doing without the valu-

cheap lead-flux provided, and the advantages of the former method of shipment tested without incurring serious expense, it might, in some cases, be worth a trial. The Mexican *vaso* requires no expense for castings, no exorbitant freight charges on the material for its construction; in fact, it is simplicity itself, and answers very well for an experiment or where limited amounts of material are handled. In firing up, care is necessary not to crack the test, but heat can be applied immediately after tamping in. Eighteen hours later, the furnace is hot and ready for charging. Should the test be defective or worn out, chisel off the surface for six or eight inches, tamp it in again, and the furnace is ready for firing. In putting in the test, the whole amount of material (clay, 4 parts, and ashes 8 parts, by measure), after being thoroughly mixed and dampened so as to retain the form of the hand when pressed, is thrown in together and tamped solid with wooden poles 5 feet long and 3 inches in diameter, sharpened at one end to a point 1½ inches square. The reason for putting the whole amount of material in at once is, that by this means the whole is beaten into a compact mass; whereas, by tamping in a little at a time, thin layers are formed, which easily peel off. After the whole is thoroughly pounded in, the test is cut out with a piece of hoop-iron. The accompanying diagrams, exhibiting cross-sections and plan of the furnace, are self-explanatory. The *adobes* or sun-dried bricks used are 18 inches by 9 inches by 4 inches, excepting those forming the roof of the canal leading from the fire-place and covering the test, which are 26 inches by 11 inches by 3½ inches. Extra care is necessary in their preparation, and they are dried in the shade, to avoid sun-cracks. The capacity of a furnace of this description is something over one ton of lead bullion in twenty-four hours, consuming less than half a cord of wood,

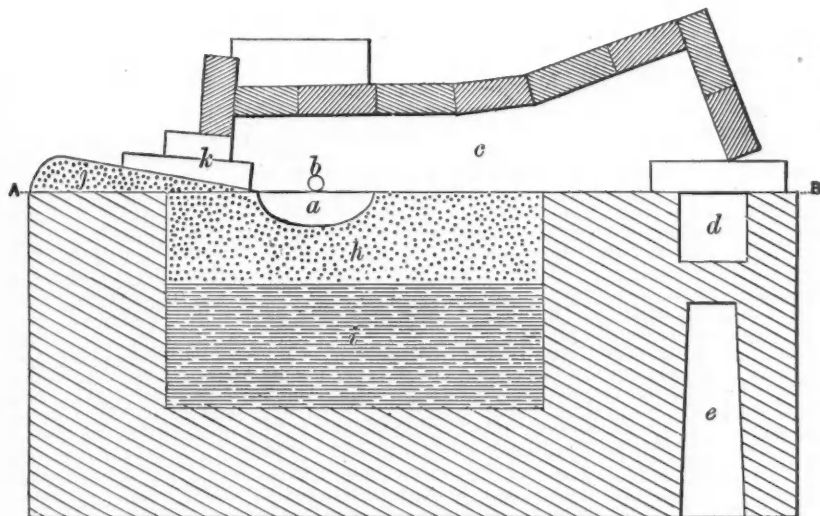


Fig. 1. Vertical Section at right angles to Fig. 3.

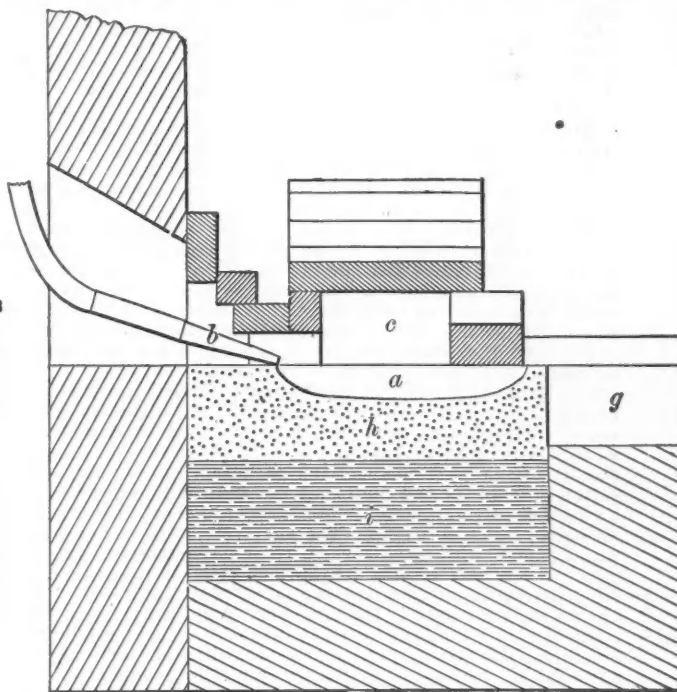


Fig. 3. Vertical Section through b, a, g. (Fig. 2.)

A MEXICAN OUPELLATION-HEARTH.

able fluxing ores attainable in most smelting camps, and depending wholly on the litharge produced by the little *adobe* hearth I am about to describe. In doing this, I am only imitating the common Mexican practice, which has been in use for a century or more.

In building the furnace that is the subject of the accompanying sketch, I made use of labor and materials as follows:

COST OF CONSTRUCTING ONE FURNACE.	
300 adobes, at \$0.01	\$3.00
40 gallons clay, { for test	nothing.
80 gallons ashes, {	
One builder, 4 days, at \$1.20	4.80
Two helpers, 4 days, at \$0.60	4.80
Two boys, 4 days, at \$0.30	2.40
Total	\$15.00

By comparison with my former figures, these will be found somewhat in excess—a fact that arises from two causes: First, the inaccuracy of the statements on which my calculations were based; and secondly, the fact that the natives of Mexico, from one of whom I obtained the figures referred to, are, in their own country, always able to get work done more cheaply than a stranger can. This fact, by the way, it is well to bear in mind when forming estimates in that country, since the cheap operations of small proprietors often allure the inexperienced to commit grave errors of judgment. It will only be in rare instances that the profits of native proprietors can be augmented by handling large amounts of their ore with American machinery.

The Mexican is a good miner and a better metallurgist. It is well to examine closely the property he offers for sale, especially when it has a fine record and still can not yield him sufficient for his simple wants.

Lead ore, even when poor in silver, is very desirable in silver-lead smelting operations, and is sometimes paid for beyond its value. Again, the shipment of silver bars may, under certain conditions, be preferable to handling lead bullion. When a cupellation-hearth can be put up, a

and requiring the attendance of four men, two on a shift, whose collective wages amount to about \$2.80 per ton.

We have, therefore, in this apparatus, a fifteen-dollar furnace, built in three days, capable of reducing one ton of bullion to almost pure silver in twenty-four hours, at a cost of \$6.30 per ton. The operation of the furnace is very simple. The bullion is placed on the inclined hearth at *k*, where the flame passing over the molten metal strikes and gradually melts it down. Blast is not put on until the test, which holds 300 pounds of lead, is filled, when its strength is so gauged as to cause slight ripples to play over the surface of the bath. The litharge is drawn off as it accumulates into a basin outside the furnace, where it solidifies and is lifted off in cakes. It is noticeable that no stack exists, yet the flame shoots fiercely out over the metal whenever a stick of wood is laid in the fire-place. Repairs on the test, made necessary by the corroding properties of the litharge, are attended to when the silver is taken out. An old test pounded up finely and mixed with wood-ashes furnishes the material for making such repairs. The silver is allowed to cool gradually in the furnace, and, when solid, is removed, and the cake is thrown into water.

A New Ceramic Product.—Hegnerte, in the *Bulletin Technologique des Ecoles Nationales des Arts et Métiers*, describes a new ceramic product from the waste sands of glass-factories, which often accumulate in immense quantities, so as to occasion great embarrassment. The sand is subjected to an immense hydraulic pressure, and then baked in furnaces at a high temperature, so as to produce blocks of various forms and dimensions, of a uniform white color, which are composed of almost pure silic. The crushing-load is from three hundred and seventy to four hundred and fifty kilograms per square centimeter. The bricks, when plunged in chlorhydric and sulphuric acids, show no trace of alteration. The product has remarkable solidity and tenacity; it is not affected by the heaviest frosts or by the action of sun or rain; it resists very high temperatures, provided no flux is present; it is very light, its specific gravity being only 1.5; it is of a fine white color, which will make it sought after for many architectural effects in combination with brick or stone of other colors.

* A paper read at the Chicago Meeting of the American Institute of Mining Engineers, May, 1884.
† Transactions, vol. xii., p. 185.

THE NEW YORK MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

An unusually large number of members and their ladies assembled on Tuesday evening, February 17th, for the opening session of the meeting. Mr. David Williams, Chairman of the Local Committee, introduced Hon. W. R. Grace, Mayor of the city, of New York, who welcomed the members in a brief but appropriate speech, which was appropriately and humorously responded to by the President, Mr. James C. Bayles, on behalf of the Institute. The President then delivered his address, as follows:

ADDRESS OF THE PRESIDENT.

GENTLEMEN OF THE AMERICAN INSTITUTE OF MINING ENGINEERS: LADIES AND GENTLEMEN: In opening the annual meeting of a society that subjects all papers brought before it to the analysis of discussion, the President should not presume too much upon the privilege of his office by presenting, as an address from the chair, a technical essay labeled *hors concours*, and expect you to accept it as part of your transactions. Contributions of real value to scientific literature are seldom created like Minerva in the myth. More often, they are like new houses in which, however well planned or well built, there is almost always a settling and shrinkage somewhere; and their publication, "Subject to Revision," is very much like the agreements of owners with their first tenants to point up the cracks and cover the patches with paper within two years. The extensive repairs at the author's expense that are sometimes necessitated by the wear and tear of discussion usually add a great deal to the value of papers; and since custom has given exemption from discussion to addresses from the chair, they should, I think, deal with safe statistical and economic truths, rather than with subjects that, if brought forward in papers, would at least serve the purpose of precipitating some of the wisdom held in solution in our meetings, and which needs an original observation or a new conclusion to build on in shining crystals.

The subject I shall have pleasure in considering this evening is, briefly, Whether the conditions of success in manufacturing are so arbitrary and difficult of attainment as to discourage young men from engaging in competition with the vast aggregations of capital that are popularly supposed to be fast acquiring a monopoly of profitable production?

A thoughtful writer in a recent issue of a leading English magazine, in an article discussing the increasing concentration of industry, presents some statistics that are intended to show that steam has extinguished the handicrafts, and that, as steam-power is most economically employed on the largest possible scale, it is rapidly and inevitably leading to a monopoly of manufacturing by large establishments, and the extinction, one by one, of those that are small. The situation in Great Britain is represented as follows: Trade after trade is monopolized, not necessarily by large capitalists, but by great capitals. In every trade, the standard of necessary size, the minimum establishment that can hold its own in competition, is constantly and rapidly raised. The little men are ground out, and the littleness that dooms men to destruction waxes year by year. Of the cotton mills of the last century, a few here and there are standing, saved by local or other accidents, while their rivals have either grown to gigantic size or fallen into ruin. The survivors, with steam substituted for water-power, with machinery twice or thrice renewed, are worked while they pay one half or one quarter per cent on their cost. The case of other textile manufactures is the same, or stronger still. Steel and iron are yet more completely the monopoly of gigantic plants. The chemical trade was for a long time open to men of very moderate means. Recent inventions threaten to turn the plant that has cost millions to waste brick and old lead. Already nothing but a trade agreement, temporary in its nature, has prevented the closing of half the factories of St. Helen's and Widnes, and the utter ruin of all the smaller owners. Every year, the same thing happens in one or another of our minor industries. Retail trade was, until lately, the recourse of men whose character, skill, thrift, and ambition won credit and enabled them to dispense with large capital. The larger branches of retail trade are already superseded by co-operation, or monopolized more and more generally by vast skillfully organized establishments with which the small capitalist, however diligent, honest, and able, can not possibly compete. They can sell at little over wholesale prices, while giving their customers all and more than all the conveniences proffered by the ordinary tradesman. A gloomy picture, certainly, but possibly somewhat overdrawn.

In this country, it is not unusual to hear similar statements from those who study great social and industrial problems from their surface indications only. We hear it on all sides as furnishing an excuse for the lack of success that attends so many industrial ventures; but its insufficiency as an explanation of failure is found in the fact that here, as elsewhere, industrial greatness is usually, if not always, the result of development from small beginnings. The investment of capital in manufacturing enterprises that are to be great from the outset is always perilous and often disastrous to the inventors. Among those that start small, the law of the "survival of the fittest" operates in a perfectly natural and proper way. We can see the reason for what happens, whether the happening be success or failure. With conspicuous justice, "the many fail, the one succeeds." To those enterprises that succeed, capital is naturally attracted, while from those that do not succeed it as naturally withdraws in search of safer and more profitable investment. The successful establishments are extended and enlarged, and become corporations of overshadowing importance; those less successful barely hold their own, or gradually fall back, changing hands from time to time, and finally relapsing into permanent idleness. This process is constantly going on, for the reason that, with the ever-changing conditions of business success, the establishments that become great under one management may decline or collapse under another.

Industrial greatness would, perhaps, be a function of capital alone if capital were something outside of business, always available for use and self-renewing. But capital represented by land, buildings, machinery, patterns, etc., may become like a millstone around the neck of a corporation, and often does. The management that made a manufacturing establishment great rarely suffices to keep it at the head, even during the life of the generation that saw it begun. Ordinarily, the longer it lives,

the more dead weight it has to carry, and the instances are comparatively few in the world's industrial history in which a plant adapted to supply the wants of one generation is suited to meet the wants of that which succeeds it. For this reason, the field is always open to skill, enterprise, and courage.

I have been led to these reflections by a careful and more or less thorough study of the conditions of success in the manufacture of iron and steel. The history of the iron industry of this country shows most strikingly upon how many conditions other than the extent and temporary importance of iron-making plants is success dependent. It is unnecessary to examine its statistics in detail or in general, further than to note that they show a gradual and fairly steady Westward progress of the wave of iron production. It is not long since the conditions of success in iron-making were found in small furnaces planted in the woods of New England and the Middle States, and dependent for an outlet upon the haulage of their product over corduroy or country roads; and in rolling-mills planted on streams affording ample water-power to drive their rolls. The census tabulations for 1880 place the geographical center of iron production in Western Pennsylvania beyond the Alleghany range, and the development in the South since the census was compiled would probably move the point as far west and south as Pittsburg. This shifting of the geographical center of production means a gradual but irresistible change in the conditions of success in iron-making; and as offsets to such changes, the *prestige* of former greatness and controlling industrial importance count for very little. That the Northeast is not keeping up its proportion of the pig-iron production of the country is clearly shown by the statistics of the trade. The natural territorial sources of pig-iron supply for the Northeast are the New England States, New York, New Jersey, and the Lehigh Valley of Pennsylvania. That these sources have not made much progress in production in the past ten years is indicated by the fact that within that time their proportion of the total pig-iron production of the country has declined from 30 to about 20 per cent. Southern and Western irons have come in to supply the increased consumption of the Northeast, and they are to-day crowding our markets, while so many of our local furnaces stand idle, unable to produce at present prices. These facts are significant as showing that the large capitals of the old established iron-works of the Northeastern States do not give them any conspicuous advantage in competition, as against better natural advantages elsewhere offered. In fact, their large capitals are the heaviest burdens they are staggering under.

The steel industry is still comparatively a new one in this country, and we have, as yet, witnessed no great change in its geographical center of production. Even the youngest in our membership can remember—not its beginning, perhaps, but its initial triumphs in the production of grades of steel that could safely challenge comparison with foreign makes. But during this brief period, we have seen some surprising happenings. Small capitals have grown, and large capitals have, in some instances, shrunk to nothing. Great establishments have been organized that, because of their greatness, have fallen to pieces almost before they began production, and small beginnings, judiciously planned and managed, have been the foundations of brilliant industrial and financial successes. The changes of the next twenty years, though impossible of prediction, are likely to be quite as important as those of the past twenty years. In the steel rail industry, we have witnessed a marked change that is probably but the prelude to one still more marked. Its beginnings are easily recalled and its history is familiar. Certainly it shows that courage and enterprise often count for more than large capital and the *prestige* of past success. No industry has seemed to be so completely a monopoly of large capitals as steel rail making. The bigger the converters and the more of them, the better seemed the chances of success. Every thing else needed to be big in proportion, and the more tons of rails a mill could turn out in a year the greater the apparent security of the investment. It looks now as if the small plant was more desirable than the large one, and four-ton converters seem to be more convenient and desirable property than fifteen-ton converters. During the next few years, we are likely to see Bessemer mills built and run as departments of works of medium size, as rolling-mills might have blast-furnaces connected with them; and there are doubtless some large Bessemer plants representing an enormous investment that could be bought for a very small part of their original cost, but which few shrewd business men would care to take as a gift on the condition of keeping them in operation for a term of years.

But if no one need be deterred from entering iron and steel making by the apparent impregnability of the great capitals that stand like fortifications along the highways of industrial enterprise, still less need he fear those gigantic organizations effected by combination and consolidation. More often than otherwise, these consolidations are brought about in the hope of shoring up enterprises that can not stand alone. They are very formidable on paper, but they are apt to fall to pieces suddenly through the weakness of their component parts. We have watched the formation of several such consolidations in the iron trade; but in every case, they have failed to accomplish the object for which they were formed, and sooner or later they have gone the way of all bubbles that owe their expansion to the elasticity of an extremely tenuous film.

In other and allied industries, we find reason to doubt that, in this country at least, manufacturing is, in any sense, the monopoly of large capital. Those who own or control vast establishments are likely to insist that, through the advantages of larger capital and the control of plant in which every appliance for economizing the cost of making and handling has been provided, they can make and sell cheaper than their small competitors, for the reason that, while their cost per ton or per piece is less than it would be with less perfect appliances, they have an important advantage in the fact that their incidental expenses, being divided into a larger product, show a less percentage per ton or per piece than in the case of the small factory. Those who lead the trade consequently affect to believe that the tendency is to make the great concerns greater and the small concerns smaller and less numerous; that within a few years production and distribution will be controlled by a few immense corporations, and that the smaller manufacturers, unable to compete, will give up the unequal contest. On the other hand, the small manufacturers are by no means ready to be convinced, by argument or statistics, that their position is hopeless. Primarily, they do not admit that

the great establishments are, by reason of their greatness, able to produce on a large scale cheaper than is possible on a small scale. They claim that there always exist in large establishments conditions involving costs that can not be taken into account in an estimate, but that appear in the annual balance-sheets. There is too much subdivision of responsibility, a less close and intelligent supervision of details, more small leaks, and a greater proportion of waste. The small manufacturer who wanders about the establishment of his great competitor usually thinks he recognizes a disregard of that which, in his case, would make all the difference between profit and loss; and while he can not fail to notice that there are advantages in a large plant that a small one does not possess, he also sees disadvantages in a business that has so far outgrown the supervision of the proprietor that he is at all times dependent on the skill and fidelity of subordinates, who, even if skillful and faithful, do not always work together so harmoniously as to insure the best results.

It is unnecessary to take sides in this discussion; but without doing so, I may say that in assuming that only the great capitals can safely meet the increasingly sharp competition of trade, we are in danger of mistaking the effect for the cause, and so hopelessly confuse our argument. It is sufficient for our present purpose, however, to accept the fact that the greatness of the now great industrial establishments does not necessarily bar the way to progress for those that are now small. The chances of twenty years are rather in favor of what are now small beginnings, provided they are headed in the right directions, than of the great enterprises that now seem to overshadow their modest competitors. There is a reason for this. A successful manufacturing business is likely, in a quarter of a century, to outgrow the conditions that made it successful. When there died in this city, some years ago, a merchant whose name had come to be almost a synonym for business success and uncounted wealth, a great many surprising facts came to light. In the complex structure of his vast business, there were hundreds of rotten timbers. Carried from year to year by the sheer force of an enormous capital, it might have gone on for years longer; but it was in no sense profitable as a business. It had millions of dollars' worth of mill property that had not turned a wheel for years, and competition had tapped it at so many points that it was honeycombed through and through. Those who are old in business experience can recall a score of instances in which the great establishments of the last generation have disappeared in this.

The facts that I have presented are significant merely as so many emphatic contradictions of the popular impression that the tendency is toward a monopoly of manufacturing by great corporations. It is toward a monopoly in the hands of those who can manufacture the best product at least cost, and this is not always true of the largest concerns. There is always room enough in the forest for young trees to grow. Those that have already grown may lock their branches overhead, but somehow the saplings manage to get their share of light and heat and nutriment from the soil. So it is in the manufacturing industries. Those that take root and begin to grow adapt themselves to the conditions that surround them. As their plant increases, it constantly gains in productiveness. Its development is along the lines of natural progress. Each generation has its own development, and its legacy to the future coming generations will necessarily discard in great part. There is just as good a chance to-day for skill, courage, and enterprise as there ever was. Machinery has destroyed the handicrafts to a great extent, but it has given each man muscles of iron and fingers of steel with which to work. The conditions have changed, but the opportunities have broadened and diversified.

Within a few years, we have had a great development in this country of facilities for technical education. Large classes are annually graduated, and every year a considerable number of young men, peculiarly well equipped for industrial success, are called upon to decide what they will do in life. That only a small proportion engage in pursuits in which their education gives them an important advantage over young men who have spent in business the years they have passed in college, is unfortunately true. Having been brought a great deal in contact with graduates of our technical schools, I know that they are all more or less impressed with the idea that the time is past when a young man without capital or influence has any chance of success in applying his knowledge practically in manufacturing. They seek employment in the service of the great concerns, and generally fail to get it for the reason that very few capitalists care to provide these boys facilities for a post-graduate course. They seek employment as assistants to the management of smaller works; but their qualifications are not usually of a kind much in demand, and they are not, as the rule, willing to accept what they can get. At last, discouraged and disheartened, they make up their minds that no way of utilizing their knowledge is open to them, and they are very apt to go into trade, with regrets that they had not spent in gaining business experience the time they feel they have wasted in college. Their decision is, in most cases, based upon an entirely erroneous conception of the opportunities that are open to clever and ambitious young men in the manufacturing industries. In these, better and easier than in any other fields of usefulness, can a young man who has the elements of success in him afford to be indifferent to his lack of capital and influence. It devolves upon the young engineer who has such education as the schools can give him to select the line of work most congenial to his taste. If he has no preferences, he can find cause for congratulation in the fact that one line is as good as another in the average of years. How he begins is a matter of no consequence; but the less he depends upon his academic degree, and the more he relies upon his industry and capacity to learn, the better his chances of starting right and making a steady upward progress. There is always a demand for competent foremen, and a young man who, at the bench or in any subordinate position among the wage-earners, gives evidence of fitness and capacity beyond his fellows can have promotion without asking for it in ninety-nine cases out of every hundred. What he has learned in college, combined with what he has learned in practical work, should make him so much more competent than foremen usually are that one responsibility after another will devolve upon him. From that point, his fortune is pretty much what he may choose to make it. Capital is constantly on the look-out for men who are distinguished for capac-

ity and skill, and there never has been, and probably never will be, a time when there is not room for new undertakings to succeed in competition with old ones. These may seem to be mere commonplaces—bits of good advice of the kind ladled out to long-suffering and much patronized graduates on commencement-day, but they are something more. I speak for our manufacturing industries. They need every one of the young men who are graduated from our technical and engineering schools—not as superintendents or consulting engineers, but as material out of which to make the great captains of industry who must organize and lead our manufacturing progress ten or fifteen years hence. Trade offers them no such inducements; the professions hold out no such opportunities. No country of the world has such a promise of extensive industrial development as this. The iron and steel industries offer to any young man of good habits, good courage, fixed purpose, and a technical education all the chances of success that the most ambitious could desire. They turn their backs upon these opportunities, less because they are afraid of work than because they are deceived as to the conditions of success in manufacturing, and fail to discover that, notwithstanding the apparent tendency to a monopoly by large capital, there was never a time in the history of the world when equal opportunities were offered for those prepared to lead industrial progress.

If the distinguished honor of having been chosen to the presidency of this great Institute, which includes in its membership so many of those eminent in science and industry, shall seem to the young men of our technical schools to entitle what I have said to more consideration than attaches to words of truth and soberness spoken unofficially, I shall find cause for satisfaction in the thought that I have used this dignified opportunity for a good and worthy purpose.

Dr. T. Sterry Hunt, of Montreal, rose to make some remarks on the life-work of the late Prof. Benjamin Silliman, of New Haven, which expanded to an address in which he eloquently traced the eminent achievements of the elder Silliman, the early work of his son, the late professor, in connection with the teaching of science in its applications to the arts in the laboratory of his father, an early beginning from which developed the Sheffield Scientific School. He dwelt on Professor Silliman's long connection in an editorial capacity with the *American Journal of Science and Arts*, on his work in connection with the mining and metallurgical industries of the country, notably the Lake copper industry, his chemical researches that guided the early development of petroleum refining and the examination of potable waters. He paid an eloquent and graceful tribute to the memory of Professor Silliman as a friend.

Dr. R. W. Raymond then gave a full and thorough description of the principles underlying

THE FAHNEHJELM WATER-GAS INCANDESCENT LIGHT.

He dwelt at length on the advantages that water-gas possesses as the basis of the manufacture of illuminating and heating gas, which we have frequently discussed in these columns. The aim of Mr. Fahnehjelm has been that of many other inventors less successful, to utilize the high caloric power of cheap, non-luminous water-gas to render incandescent some substance so chosen and arranged that a steady, uniform light can be obtained. Mr. Fahnehjelm tried first round burners in different forms, but finally abandoned the path chosen by almost every investigator in this field. He tried to adapt the form of the material to be made incandescent by the burning water-gas to the ordinary flat flame. The apparatus consists of two parallel rows of needles, a small distance apart, and looking like two very coarse combs placed side by side. These needles are highly calcined, compressed magnesia, mixed with a substance to make it bind. The magnesia thus prepared has nearly the appearance of porcelain when heated. The form of the burner, if it may so be termed, is such that the gas rising upward can readily heat the magnesia, and the flame striking the needles makes them incandescent. The cost of one of the burners is from 2½ to 3 cents a piece, which have lasted 100 hours, and will be guaranteed to stand 80 hours of lighting. Mr. Fahnehjelm made some experiments, first, to show the intensity of the water-gas flame, by melting a bead on a platinum wire; then to illustrate clearly the quality of the light, by showing the comparative effect of the water-gas flame and an ordinary coal-gas flame on color.

Dr. T. Egleston presented a report from the Committee on Uniform Methods of Testing and Test Pieces, stating that an effort had been made with some success to enlist the co-operation of engineers in other countries, and to induce them to make the question an international one.

Dr. Raymond, on behalf of the Holley Memorial Committee, reported that it had made progress, and after having had a large number of designs for the Holley memorial, had provisionally adopted one, largely due to the work of one who had long been intimately associated with Mr. Holley. A model of this design was unveiled at the meeting. The memorial itself can not be erected for a number of years, since, under the rules of the Park Commissioners, no such memorial can be placed in the Park until the expiration of five years from the date of the death of the person to whom it is to be erected. The proposed memorial, which will be placed in the Park, is to be of granite, surmounted with a bust of heroic size. The pedestal is to be ornamented with three bronze plaques, representing the three arts in the development of which Mr. Holley was identified, the manufacture of Bessemer steel, the manufacture of heavy ordnance, and the building of locomotives.

THE SECOND SESSION

was held at the Stevens Institute, at Hoboken, the proceedings being opened by the reading of a paper by Mr. W. I. Pierce, of New York, on the cost of Gold Mining and Milling in Nova Scotia, followed by a paper by Mr. P. Barnes, of New York, on Fuel Economy in Engines and Boilers. We shall in the future present at greater length the data brought out in the former paper.

Mr. Barnes, after a general discussion of the points at issue in the making and using of steam, brought forward a description of a stayed box boiler. Professor Thurston, of the Stevens Institute, in the discussion, gave his views on the points raised by Mr. Barnes, while Mr. W. Kent, of New York, criticised the form of the boiler proposed.

The next paper was one by Mr. John Fulton, mining engineer of the Cambria Iron Company, Johnstown, Pa., entitled

THE SOURCE AND BEHAVIOR OF FIRE GAS IN THE MINES OF THE CAMBRIA IRON COMPANY.

Mr. Fulton's introduction sketched the history of the Cambria Iron Company and its coal and iron mines, and reviewed the past record of the collieries, so far as the explosions in them are concerned. He noted the general fact that explosions had occurred in the wet mines. He combated the inference that, since gas had been found in all the Johnstown beds opened, its source must naturally be the coal or the bituminous shales occurring with them. He gives the following three objections against the assumption that the coal-beds of the Alleghany are the source of fire-gas.

1st. The fact that where one coal-bed has been mined in part or entirely under another, the upper workings were entirely free from gas.

2d. If the coal-beds are the source of fire-gas in this portion of the Alleghany field, then all the mines eastward should produce fire-gas. None has yet been found in the large number of mines east of Johnstown, and the same absence of gas is noticed in the Clearfield, Broad Top, and Cumberland fields.

3d. The discoveries of natural gas, the fire-gas of the mines, during the past year in such large quantities under the lower coal measures in Western Pennsylvania, beginning at Johnstown and increasing westward to Pittsburg, affords a definite solution in this part of the Appalachian field at least, of the true source of natural gas or mine-gas.

The Cambria Iron Company has sunk a test well at Johnstown at a point 1189 feet above ocean level and 12 feet under the Cement coal-bed. The workable coal-bed of the lower coal measures was reached at a depth of 640 feet, and 40 feet below natural gas was reached, the supply, however, soon showing signs of falling off. At a depth of 800 feet, a second gas horizon was found, though less productive than the first, and no gas was found below it. Mr. Fulton holds that this test bore-hole clearly indicates the source of the gas met with in the coal and iron mines of the Cambria Iron Company. The gas has ascended through the cracks, cleavage plane openings, and fissures of the intervening rocks, reaching the coal and iron ore-beds above. This is corroborated by the fact that all issues of gas yet discovered have been found in those ore portions of the mines whose strata of underlying rocks have been flexured and broken, affording openings for the upward movement of the gas. The rapid exhaustion of these jets of fire-gas in the disturbed places in the floor of mines is in harmony with the rapid exhaustion of the source of it in the test well. Mr. Fulton, while realizing the fact that it is difficult to establish whether the gas was found in the bore-hole in its normal home, or whether secondary reservoirs were struck, believes it reasonable to infer that its source is the Pocono sandstone, the equivalent of the Butler, Clarion, and Venango oil sands.

He states that, in the flashings and explosions of fire gas in the mines to which he refers, the gas itself has always been the cause, fine, dry dust not having contributed materially to the violence of the explosions.

Mr. Fulton distinctly disclaims any intention to assume that the source of fire-gas met with in bituminous coal mines is always to be looked for in the underlying coal measures, though the developments at Johnstown point in that direction.

Dr. T. Sterry Hunt, of Montreal, confirmed Mr. Fulton's observations as to the horizon of the gas.

Mr. W. J. Taylor then followed with a paper entitled

NOTES ON THE USE OF HIGH EXPLOSIVES IN THE BLAST-FURNACE, AND OF A WATER-SPRAY FOR COOLING IN BLOWING DOWN.

In trying to blow down his furnace to within three or four feet of the tuyeres, Mr. Taylor found that his gas down corner, which was not lined, became red-hot when the stock had gone down 15 or 20 feet. The use of limestone was impracticable, and at the suggestion of Mr. Langdon, his assistant, it was concluded to try the use of a water-spray to cool the gases. He introduced a small stream of water through three one half inch pipes, which had been used to test how low down the stock had got. In this manner, the temperature of the gases was in a short time lowered from 1300 to 700 degrees Fahrenheit. When the stock got down to 4 or 5 feet above the tuyeres, more water was put on; but in consequence of an excess of water, the furnace began to chill partially. A hole was drilled into the cinder-notch at such an angle that it would strike the bottom of the hearth at the center, a three-inch pipe was inserted, loaded with five pounds of No. 2 giant powder, plugged, and fired. The explosion did the furnace no harm, but broke up the chill, the blast pressure going down from 14 pounds to 2 pounds, the tuyeres cleared, and in three hours cinder was tapped at the notch. Mr. Taylor also described cases in which he used dynamite successfully for getting relief when the stock bridged at the boshes in blowing in, and without good results for cleaning dirty walls or partial scaffolds.

The last paper of the session was that of Mr. J. C. Long, of Mechanicsburg, Pa., on a new Regenerative Hot-Blast Oven, the main principle in the construction of which is that, as the blast is heated in its passage through the stove, the area of the flues must be enlarged in a ratio corresponding with the expansion, in order to secure the desired uniformity in the velocity of the flow of the blast through the stove.

The Institute was then entertained by President and Mrs. Morton, at their residence near the Stevens Institute.

Wednesday afternoon was reserved to give the members an opportunity to visit a number of points of interest, among which were the government excavations at Flood Rock, East River, the testing-works of Messrs. McDermott & Duffield, and the show-rooms of Messrs. Paulsen & Eger, for Bower-Barff art castings.

Wednesday evening, the members again assembled in the hall of the Academy of Medicine for

THE THIRD SESSION,

which was opened by the reading of a paper by J. P. Witherow, on the CLAPP-GRIFFITHS PROCESS.

Mr. Griffiths was the engineer in chief of the Thomas & Gilchrist process in its earlier stages of development, while Dr. Clapp, of Nantyglow, Monmouthshire, was the inventor of a number of inventions that stood in Mr. Griffiths's way, and which led to a consolidation of the interests. Mr. Witherow investigated the process when in England, and became convinced of its importance, his opinions being shared by Mr. Henry W.

Oliver, Jr. They visited the tin plate works of the Messrs. Conway, of Newport, Wales, and noted in particular the high quality of the metal produced, making similar observations at the larger converter at Margin's, some forty or fifty miles below Cardiff. This led to the erection of a small plant at the works of the Olivers at Pittsburg, their completion being delayed until April. Great trouble was first experienced with the tuyeres, tuyere blocks, and linings. When that was overcome, it was found that the steam cranes were inadequate for handling the ingots. The latter had to be cast small, resulting in trouble in getting the ingots out of the molds, and the steam cranes had to be replaced by hydraulic cranes, again leaving the plant idle, so that it was not again operated until fall. After running for a while, it was discovered that it would be desirable to have the converters with movable bottoms, in order to make repairs more expeditiously. The two old converters were dismantled and new ones have been built, which, it is expected, will be in operation between the 23d and the 25th.

Mr. Witherow then discussed the scope of the new process. He stated that there have been made at the Oliver plant about 2000 tons of steel, a part of which was sold to the trade. A careful account of the expenses while making this 2000 tons shows that, including cost of ferro-manganese, coke, and keeping up the plant, expenses for steam power, labor, and every thing connected with the process, its cost did not exceed \$6.50 per ton over the price of the pig-iron used, in spite of the interruptions. Mr. Witherow states that he feels safe in assuming that the process can be conducted making steel blooms, in mills, at a cost not exceeding \$6 per ton, and at blast-furnaces for from \$3 to \$4 per ton, as compared with the cost of \$12.50 for converting a ton of pig-iron into muck-bar at the Pittsburg mills.

Mr. R. W. Hunt, of the Albany & Rensselaer Steel-Works, Troy, followed on the same subject.

One of the special features of the Clapp-Griffiths stationary converter is, that it has a tap-hole situated at such a height in relation to the pig-iron to be blown that when the cinder is formed and boils up, as the blow progresses, it can run off, and thus be removed from contact with the iron, and will also be out of the way when the decarbonized metal is tapped into the casting-ladle and the manganiferous alloy added. The tuyeres are situated around the sides of the vessel, and enter the interior some little distance above the bottom. They are provided with plugs through the center of which there is a small opening. When the blow is completed, these plugs are forced forward into the outer orifices of the tuyeres, thus shutting off the blast, excepting the small quantity entering through the passages named, a quantity sufficient to keep the metal from running into the tuyeres. It reduces to the minimum the action of the blast, while the metal is tapped. The pressure of blast is quite light, not exceeding eight pounds, and usually only five pounds are used. A complete plant of two vessels can be constructed at the present time for not over \$55,000, including all buildings having a capacity of certainly 80 gross tons per day, and probably as much as 100 tons. Mr. Hunt places the cost of converting pig-iron of good quality at the following figure, per ton of ingot:

Pig-iron	\$17.00
Loss, 15 per cent.	2.55
Labor	1.50
Coal	.90
Ferro-manganese	.30
Refractories	.50
Molds	.15
Expense and repairs	.20
	\$23.10

This is for metal made from ordinary Bessemer iron; but if a cheaper iron can be used, the figures would be:

Pig-iron	\$16.00
Loss, 15 per cent.	2.40
Other items	3.55
	\$21.95

Mr. Hunt emphasized the point that, with a small plant, small ingots could be cast. As for the quality of the Clapp-Griffiths metal, it is stated that it has been placed on the market in many different forms, as tacks, rivets, wire rods, telegraph wire, lightning-rods, horseshoe nails, pipe strips, plates, sheets, bars, angles, shovels, spades, and stamping-iron. Mr. Hunt showed a good many samples of the metal in different forms, showing how it successfully resisted severe torsion.

With the object of determining to what extent high phosphorus iron could be used, Mr. Hunt made a series of experiments, obtaining finally a steel with 0.54 per cent of phosphorus. In spite of the high phosphorus contents, the physical and working tests of the steel showed exceptional results. Thus steel containing:

Carbon	0.08 per cent.
Silicon	0.01 "
Phosphorus	0.50 "
Manganese	0.48 "
Sulphur	0.09 "

showed the following:

Tensile strength	80,940 pounds
Elastic limit	58,570 "
Elongation	24.00 per cent.
Reduction of area	36.40 "

The silicon in all the analyses is very low, and it is suggested that this fact permits of the high phosphorus. A marked peculiarity of the blow is, that red smoke from burning iron appears at the very commencement, but clears away toward the middle of the heat. Mr. Hunt thinks that it is plausible that the early oxidation of iron furnishes a base that carries off the silicon of the bath, and that this, with the low blast pressure, accounts for the constant small percentages of the silicon. Mr. Hunt, in concluding his paper, said: "I am fully convinced that the Clapp-Griffiths converter possesses great value for this country. While believing that it can not make rails or ship plates in competition with the regular Bessemer plants, it can compete with them in small products, even if it does not make an article that they can not produce. Most certainly, the open hearth is out of the race, so far as cost of product is concerned."

The discussion that followed these papers, while quite animated, did not bring out any facts of material importance.

The session was closed after the reading, by the Secretary, of a paper

by Prof. W. P. Blake, on the Tin Ore Veins of the Black Hills of Dakota, and of a second paper on the same subject, more from the point of view of the question of ore treatment involved, by Mr. E. N. Riotte, of New York. We shall in the future refer to these papers at greater length. A large number of specimens of ores and minerals, and of the tin produced from Etta ore, were shown.

On Thursday morning, the Institute visited the Tilly Foster iron mine, near Brewster's, New York; and on their return in the evening, a large number of the members, their ladies, and invited guests, sat down to an elaborate banquet at Delmonico's.

THE HARRISON SAFETY BOILER.

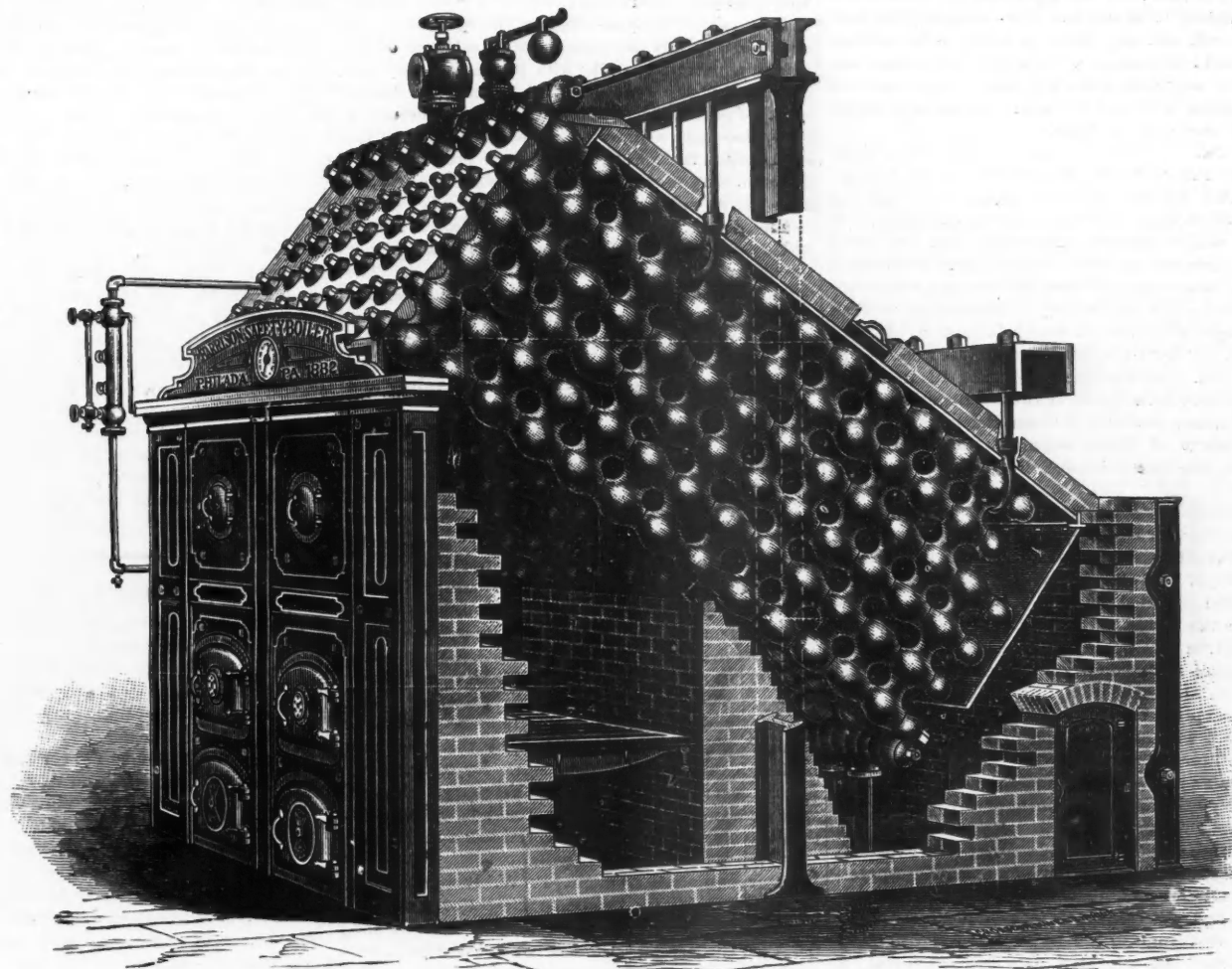
This boiler, made by Messrs. Joseph S. Lovering Wharton and Richard Norris, at their works at Germantown Junction, Philadelphia, consists of a number of spheres made of Bessemer metal, termed "units" by the manufacturers, each eight inches in diameter and five sixteenths of an inch thick.

These units are connected by ground rebate joints, which are perfectly steam and water-tight, without the use of packing of any kind whatever;

Accessibility of all parts for cleaning or repairs. Facility of erection or repairs by inexperienced mechanics. Perfect freedom for expansion and contraction without straining any parts or impairing tightness of joints. Ease of transportation or erection in places inaccessible to other forms of boilers. Facility of enlargement and increasing capacity without disturbing the original structure. Rapid generation of steam and large reserve power.

It is claimed that the material of which this boiler is made transmits heat more rapidly than wrought-iron, that it is more durable, will resist corrosion better, and that it is impossible for it to blister when subjected to high heat.

British Colliery Explosions in 1884.—The year just closed shows, for the United Kingdom, an almost complete absence of serious colliery disasters. Only 20 explosions were recorded, 11 proving fatal to 45 men. Three rescuers were also killed, and one miner suffocated, raising the total loss to 49—the lowest on record, the previous minimum being 94 in 1864. For the thirty years ended 1880, the average annual loss of life from explosions was 245; for the four years, 1877-80, it rose to 396; but for the four years, 1881-84, it has fallen to the unprecedentedly low num-



THE HARRISON SAFETY-BOILER.

in general practice, for the larger sizes of boilers, these units are connected by bolts running through their interior, into "slabs," and any required number of slabs are suspended side by side from beams above, and connected at the extreme top and bottom by suitable connections forming the steam and water couplings.

But owing to the fact that these boilers, whatever their total capacity may be, are all made of exactly similar and interchangeable sections, their general outside form can be varied to meet the demands of special requirements. Thus, for boilers of small capacity, the required number of units are generally connected in a vertical position, which secures great economy of space and also admits of the boiler being arranged to suit special locations available.

For stationary purposes, the boiler is regularly inclosed in brick-work; but for portable service, the units are inclosed by an iron casing that confines the products of combustion and makes the boiler entirely self-contained.

This latter form of construction is particularly desirable for mining purposes and use in localities difficult of access, owing to the great portability of all the parts and the ease with which they can be correctly put together by inexperienced persons. Besides being used in many undeveloped regions of this country, numbers of these portable boilers are annually exported to Mexico, South America, and even Africa, in which countries they are frequently carried on pack-mules into the mountain districts.

The advantages claimed for this boiler by the manufacturers are:

Absolute safety from destructive explosion even when carelessly used. Highest economy in fuel. Dryness of steam. Thorough circulation of both water and heat. Complete combustion and absorption of the products of combustion. Simplicity and great durability of structure.

ber of 134. In foreign coal-fields, the record for the year has been a very disastrous one, at least 300 lives having been lost in America, and over 150 on the European continent.

SLIDING-SCALE FOR WAGES FOR MINING COAL AT PITTSBURG, PA.

The following is the award of the umpire, Mr. Joseph D. Weeks:

When lump coal sells on the wall at, or below, per 100 bushels.	The price to be paid for mining coal, per 100 bushels, run over a 1 1/4-inch screen, shall be—
\$4.00	\$2.60
4.25	2.13
4.50	2.25
4.75	2.37
5.00	2.50
5.25	2.65
5.50	2.80
5.75	3.00
6.00	3.20
6.25	3.40
6.50	3.60
6.75	3.80
7.00	4.00
7.25	4.20
7.50	4.40
7.75	4.60

From February 1st, 1885, the price of mining 100 bushels of coal, of 76 pounds each, run over a 1 1/4-inch screen, shall be \$2.50, the wages attached in the scale to the \$5 selling price.

The Coal Trade Tribunal, of Pittsburg, has accepted Umpire Weeks's award of 2 1/2 cents per bushel for mining.

FURNACE, MILL, AND FACTORY.

The Union Iron Mills of Carnegie, Brothers & Co., at Pittsburg, Pa., resumed operations in all departments February 16th.

The Cordelia Furnace Company, of Ohio, has discovered a fine seam of coal on its lands near the furnace, at Willston, and proposes changing the furnace from a charcoal to a hard coal furnace in order to utilize it.

It has been decided to erect a plant for making steel nails at the Benwood Nail-Works, at Bellaire.

The executive committee of the American Iron and Steel Association, at a full meeting of its members held at Philadelphia, Pa., February 12th, issued an address to all iron and steel manufacturers in the United States. It congratulates the American manufacturers of iron and steel and the country generally upon the prospect that the depression in business that has continued for about two years is apparently nearing its end, and says there is much in the business situation to encourage a feeling of hopefulness, and absolutely no ground whatever upon which to base the apprehension that a prolonged continuance of the present depression is possible.

J. H. Dunbar, foreman in the machine-shop of the extensive mill of Brown, Bonnell & Co., at Youngstown, Ohio, has been granted a patent for a nail machine that promises to revolutionize this industry. It is very simple, differing materially from the barrel feeder. One boy can attend two automatic feeders and turn out nearly twice as many nails as two hand-feeders. The speed is regulated by inclined rollers, and can be changed while the machine is in motion. It was intended for hot nails, but was found to work just as well on cold. One machine is operating in Hamilton, Ont., and five in the works of Brown, Bonnell & Co.

The amount necessary to retain the manufacturing establishment of Elbel, Gilliam & Co., at Canton, Ohio, has been subscribed, and the works will be rebuilt there.

The project of starting the Westlake rolling-mill in Warren, Ohio, on a co-operative plan has assumed a more favorable aspect, and it is believed will succeed.

The Royer charcoal furnace, at Springfield, Pa., owned and operated by John Royer for fifty years, will close this spring.

Cobb's Iron and Nail Company, of Aurora, Indiana, will, during the coming year, increase its nail plant from 50 to 100 machines.

The Committee on General Laws, at Albany, gave, on the 8th instant, a hearing to Edward Green, a manufacturer of dynamite, on Mr. Barnum's bill, which makes provision for the punishment by a penalty of a heavy fine and imprisonment of any person who fails to obtain a permit from the proper authorities to manufacture or sell dynamite. Mr. Green explained that dynamite was more or less of a generic term, embracing all sorts of explosive materials, Hercules, Vulcan, and other kinds of powder used for heavy blasting and tunneling. Dynamite was originally common clay, but, saturated with nitro-glycerine, it became a highly powerful agent of destruction. It is a dull, inert, and harmless substance, if properly looked after and handled. There are, he estimated, 14,000,000 pounds of it manufactured in this country every year. He was perfectly willing to have a law enacted to punish the unlawful use of dynamite and its manufacture and sale by irresponsible persons; but he thought the bill before the committee was too diffuse and too sweeping, and would seriously embarrass legitimate manufacture.

The new mill of the Phoenix Iron Company, at Phoenixville, Pa., resumed operations February 17th.

It is reported that the prospects for business among the rolling-mills at Youngstown, Ohio, are much improved. Cartwright, McCurdy & Co. and the Youngstown Mills have started every thing on double turn, while at the big mills of Brown, Bonnell & Co. every thing goes on double turn except the puddle mills. The mills of Andrews Brothers & Co., at Hazleton, and Struthers's mill, have also started on double turn. Two furnaces connected and owned by Brown, Bonnell & Co. will soon be blown in. Only a part of the works at the Valley Mill is in operation. The Trumbull Iron Company, at Girard, has closed a large contract for its specialties, and is running on full-time. The Wood Mower and Reaper-Works have started in all the departments.

At a meeting of the stockholders of the Reading Iron-Works, the following gentlemen were elected to

serve as directors for the ensuing year: Edward W. Coit, Horatio Trexler, Virtue C. Sweatman, George F. Baer, Peter C. Hollis, Thomas R. Elcock, Simon Seyfert. At a meeting of the board of directors, the officers were re-elected.

Samuel L. Moore & Son, of Elizabeth and Centerville, New Jersey, have completed and set up for Lombard, Ayres & Co. in the paraffine works of their Seaboard Refinery at Constable Hook, New Jersey, an ice-machine of large capacity, which possesses many original features, and is in many respects a broad departure in ice-machines. It has been designed by practical men who have had extended experience in the operating of this class of machinery and who have introduced in its design all that has been of any practical value to them. The engine is of the horizontal type, with a steam-cylinder 16 inches diameter and a stroke of 36 inches. The steam is admitted by a plain slide-valve with independent variable cut-off valve riding on back of main valve. The gas-cylinders, two in number, are double-acting, and are placed one on each side of the steam-cylinder and parallel with the same; they are each ten inches diameter with twenty-four inches stroke of piston. These pistons are driven by cranks on the engine-shaft, and are so placed in relation to the engine-crank that, when the greatest pressure is required in the gas-cylinders, the engine-crank is in such a position as will develop the greatest efficiency of the steam-cylinder. The engine is intended to run at seventy-five revolutions a minute, but much higher speed may be obtained with safety, if required. The cylinders are all rigidly bolted to a heavy bed designed to receive the strains in direct lines. All wearing surfaces are made large; the shaft, cranks, and such other parts as are subjected to greatest work are made of steel. This firm makes a full line of heavy valves and fittings for ammonia work.

The Victoria iron mines and furnace in Rockbridge County, Va., have shut down on account of overstock. Graff, Bennett & Co., iron manufacturers of Pittsburg, who failed last spring and got an extension, having paid 40 per cent of their debts, have requested their creditors to grant a further extension on the balance, owing to the dullness of the iron trade.

Since the recent labor troubles in South Bend, the Oliver Chilled Plow-Works have resolved, it is said, to remove to another point, and the proprietors have expressed themselves as favoring Laporte, Ind. Over \$10,000 have been subscribed by citizens as an inducement to get the works there.

Recently the manager of the Junction Company, Youngstown, Ohio, offered to fight the steel nail makers, if the puddlers would work for less wages; but the men refused to do so, and February 17th they were informed that their wages would be reduced 75 cents a ton. The reduction was resisted, and the mill started to manufacture steel nails.

We have received from Mr. F. W. Richardson, of Troy, New York, his handsome illustrated pamphlet descriptive of the Richardson Balanced Slide-Valve and the Allen-Richardson Balanced Slide-Valve for locomotive, stationary, and marine engines.

The Broughton Copper Company, Limited, of Manchester, England, sends, with its General Price-List, Tables of Weight of Seamless Copper Tubes, according to the Imperial Wire Gauge, 1884; and Weight of Seamless Brass Tubes containing 70 per cent Copper, according to the same gauge; giving the thickness of copper and brass respectively, and then the weight of a lineal foot in pounds. The fractions of an inch and the inches are also given in millimeters; and the decimal equivalents of inches and feet.

LABOR AND WAGES.

The Chickies Iron Company, of Marietta, Pa., has made a reduction of 10 per cent in wages.

The Mansfield Valley coal miners met, and, after censuring the Trades Tribunal, resolved not to abide by Umpire Weeks's decision. A strike will probably be the result.

A dispatch from Struthers, Ohio, says the employes of Summers Brothers' iron mill have accepted a ten per cent reduction in wages.

Trouble is reported at Pocahontas, Tazewell County, Va., and more is anticipated. Owing to the depression in business, a number of miners were recently discharged from the coal mines. Since their dismissal, several persons have been fired upon in the night, and a negro policeman was killed. Other persons, including a mine-boss, have been ordered to leave town

under penalty of death. At a meeting of the citizens, the outrages were condemned and money subscribed for the equipment of the police force.

The wages of the employes of the Baltimore & Ohio Railroad Company's rolling-mill at Cumberland, Md., will be reduced March 1st. The reduction will be 25 cents a ton on puddlers, and helpers proportionately, heaters, and rollers. The other employes will not be affected.

The Coal Trade Tribunal, at a meeting in Pittsburg, Pa., after a long discussion, accepted Umpire Weeks's award of two and a half cents a bushel for mining.

A further reduction of trackmen on the Philadelphia & Reading Railroad took effect February 16th. Sections were lengthened, by means of which five men out of every twenty were dismissed.

The Hocking Valley, Ohio, strike is practically over. It has lasted since April. It died of want of funds to sustain it.

An effective blow has been delivered to the miners' strike in the Tuscarawas Valley, Ohio. About two thirds of the miners at the Beaver Run mine returned to work February 16th, at the reduced price of seventy-five cents a ton, and the workmen at the Willsee Bank Company's No. 6 mine and the Rose Hill and Camp Creek mines have also resumed work at the same rate.

The miners and laborers at the Milneswell Colliery, near Hazleton, Pa., operated by the Stout Coal Company, struck February 19th against a reduction of 10 per cent in their wages.

The State Trade and Labor Assembly, now in session at Columbus, Ohio, has adopted resolutions against license laws in general; against the use of the word trades-unions by Anarchists, and disclaiming any affiliation with Nihilist ideas; indorsing the action of Governor Hoadly in not sending troops to Hocking Valley during the strike; asking the General Assembly for night-schools for children; protesting against the passage of the law pending in Congress modifying mechanics' lien laws; indorsing the Labor Press Association and the eight-hour law; and requesting the passage of a law making mechanics' liens apply to all trades.

RAILROAD NEWS.

The Tampico Branch of the Mexican Central Railroad is now completed 140 kilometers from Tampico, Mexico, at an average cost of \$40,000 a mile, leaving about 650 kilometers to construct to connect with the main line. It is estimated that the road to be built will cost \$40,000 a mile. The company is now expending \$15,000 a month in construction.

The Electric Locomotive and Railroad Supply Manufacturing Company, of New York, has been incorporated with a capital of \$1,000,000.

The Tennessee Coal, Iron, and Railroad Company's report for January shows: Coal received directly from mines, 15,906 tons; coke received directly from mines, 9162 tons; total transported, 25,068 tons.

The suit of the Commonwealth against the New York, Lake Erie & Western Railroad Company for the recovery of 30,000 acres of land, valued at \$1,000,000, was begun at Brookville, Pa., February 16th.

The Flemington Railroad and Transportation Company and the Belvidere-Delaware Railroad Company have been consolidated. The new road will be called the Belvidere-Delaware Railroad Company, and the capital stock will consist of 23,000 shares, valued at \$50 each, making a total of \$1,150,000.

COAL TRADE NOTES.

CANADA.

PROVINCE OF NEW BRUNSWICK.

On the 4th inst., the annual meeting of the Joggins Coal Mining Association was held in St. John's. The directors' report showed that about 25,000 tons of coal were raised and sold in the year 1884. All the plant and machinery are in first-class condition, and the output for the ensuing year will probably be increased to 30,000 tons. Financially, the business of the association for the year is declared successful. The old board of directors was re-elected.

PROVINCE OF NOVA SCOTIA.

A movement is on foot at Halifax for the manufacture of patent fuel from Cape Breton slack coal.

PROVINCE OF ONTARIO.

A well of natural gas has been discovered in the township of Mersea, Essex County. There are also very strong indications of oil in the vicinity.

OHIO.

The miners at Pike Run have brought suit against John Davis, the mine-boss, and John Lyttle, the weigh-boss for short weight. The trial is set for the first Monday of April, at New Philadelphia.

The property of the Ohio Central Coal Company, consisting of 12,000 acres of land, was sold at Columbus, February 18th, by order of the United States Court. The purchase was made by the first mortgage bondholders in New York City. The price paid was \$300,000. The sale was made on a suit of the Central Trust Company, of New York, trustee for the bond holders.

PENNSYLVANIA.

The mine inspectors whose terms expire are Robert Mauchlin, of the Shenandoah District, and Samuel Gay, of the Pottsville District. For these two positions fourteen applicants have presented themselves, as follows: John H. Reese, Shenandoah; A. G. White, Pine Forest, St. Clair; William Taylor, Minersville; William Stein, Girardville; Robert Mauchlin, Shenandoah; Martin Kelley, Swatara; John Shamokin; W. P. Jones, Girardville; D. E. Griffith, St. Clair; Samuel Gay, Pottsville; Albert Gainesberg, Frackville; John Eltringham, Branchdale; Arthur E. Jones, Centralia. Only two of these, Reese and Gainesberg, are new applicants, all the others having appeared before previous examining boards.

ANTHRACITE.

An explosion of gas occurred at Packer Colliery No. 2, near Girardville, February 18th. Two men were badly burned.

The mine of the Hillman Vein Coal Company, near the outskirts of Wilkes-Barre, was the scene of a disastrous explosion of gas February 17th, which resulted in the death of one man and serious injuries to thirteen others. The explosion took place in the Hillman vein, 300 feet below the surface and 600 feet from the foot of the shaft. Twenty-five men were working in the vein at the time. The slackening of the fan had allowed the gas to accumulate, and the instant the fan stopped the gas ignited from the miners' lamps. The force of the explosion was terrific.

A boiler at the North Mahanoy colliery of the Philadelphia & Reading Coal Company, near Mahanoy City, exploded February 13th, displacing eleven other boilers and wrecking the engine house, and killing two men.

COKE.

The threatened disruption of the Connellsville coke pool has been averted by the dissatisfied members signing an agreement, and the same combination that controlled the coke trade last year will manage the affairs of the trade another year. The pool now controls over seven thousand ovens. Trade is reported as looking up, and the prospects for the future are exceedingly bright. Furnaces are firing up almost every day, and from present indications it will be necessary to increase the output of coke in a few weeks. An increase of ten per cent was made the past week. Prices are firmer than for some time past, but will not be advanced until trade shall warrant such a move.

The following board of directors of the Fayette Coke and Furnace were elected at the annual meeting: W. Beeson, A. B. de Saulles, James M. Hustead, A. W. Bliss, and H. W. Hazard. The board organized the same day, and elected A. W. Bliss President and Treasurer and G. C. Marshall Secretary.

The company owning the Daguis mines, near Du Bois, has just completed twelve coke-ovens, and should these prove successful, the company will erect several hundred more.

VIRGINIA.

The total production of coal and coke for 1884 of the Southwest Virginia Improvement Company, of Pocahontas, was 294,898 tons of coal mined and 95,945 tons of coal coked. During January of this year, 39,760 tons of coal were mined and 6127 tons of coal coked.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

A dispatch, dated February 17th, states that a fire this morning destroyed the entire business portion of the town of Bisbee, causing a loss of \$100,000.

BISBEE QUEEN.—A strike of high-grade copper ore was recently made on the 500 level, south of the main incline.

TOMBSTONE DISTRICT.

CONTENTION.—The machinery for the pumps is now all in, and will be ready to start up when the pumps

and other machinery of the Grand Central are in position and in working order. The Contention has a double of 12-inch pumps, with an 18-inch sinking-pump, with 500 horse-power.

GRAND CENTRAL.—The extensive foundation for the pumps has been completed, and a large force of men is now employed in putting up the machinery. They are putting in double-line 14-inch pumps with 20-inch sinking-pumps. The machinery is said to be the most complete that has ever been erected in the territory.

GRAHAM COUNTY—CLIFTON DISTRICT.

ARIZONA COPPER COMPANY.—In order to encourage the development of the mines of this district, the company, the local papers say, is buying copper ores and giving the best price possible for them. On the second level of the Detroit, 150 feet from the surface, a new body of ore has been struck. This is one of the properties on Longfellow Hill, and gives promise of becoming a large producer. At the Metcalf group, the usual work is going on, and about twelve tons of self-fluxing ore of a good grade are shipped daily from the Whiteawk, one of the claims of this group on which development-work was but recently begun.

DETROIT COPPER COMPANY.—One of the furnaces has been blown in.

PIMA COUNTY—QUIJOTOA DISTRICT.

On February 1st, the financial standing of the companies mentioned was as follows: The Peer Mining Company, cash on hand, \$1692.03; Crocker Mining Company, cash on hand, \$3807.38; Peerless Mining Company, in debt, \$1524.68.

CALIFORNIA.

The mines mentioned produced quicksilver during January, 1885, as follows: Aetna, 189 flasks; Napa, 131; Great Western, 172; New Idria, 190; Sulphur Bank, 24; Redington, 40; Great Eastern, 37; New Almaden, 1700; total, 2483 flasks—a decrease of 402 flasks, as compared with December, 1884.

MONO COUNTY—BODIE DISTRICT.

BODIE CONSOLIDATED.—The Bodie mill is undergoing some repairs, and will resume operations soon.

STANDARD CONSOLIDATED.—During the week ended February 7th, there were extracted and shipped to the mill 400 tons of ore, and received 900 ounces of crude bullion, which will be melted and shipped on the 16th. There is no change to note in the appearance of the mine.

NEVADA COUNTY.

EXCELSIOR WATER AND MINING COMPANY.—The suit of Frank T. Butler against Lounsbury & Haggin, James B. Haggin, of California, and Wells, Fargo & Co., was concluded February 17th in the Supreme Court before Judge Van Brunt. Judge Van Brunt dismissed the suit as to all the defendants except James B. Haggin, and confined the suit to the purchase of 350 shares of stock by Messrs. Birdseye & Bolles between January and September, 1880, within which period James B. Haggin was a director of the company and dividends had been paid with moneys advanced by him. No additional evidence was put in and the case was summed up. After the judge's charge, the jury found a verdict for the plaintiff for \$6801.24. The case will be appealed.

SAN BERNARDINO COUNTY.

BISMARCK.—The shaft has attained over 100 feet. A long tramway and chute and a large ore-bin are building at the south end. Preparations are making to develop the mine on a large scale.

BONANZA KING CONSOLIDATED.—It is reported that new hoisting-works are to be erected preparatory to more extensive operations for developing the ore-body believed to be in the lower levels of the mine.

GARFIELD.—Several tunnels have been driven, the longest of which is 1300 feet in length. The lowest depth is 460 feet, from which point rich ore is taken.

SIERRA COUNTY.

MARGUERITE.—The newly erected pumping machinery runs smoothly, and the work of development will be energetically pushed ahead.

CANADA.

PROVINCE OF MANITOBA.

The project of smelting works is making progress in Selkirk. A by-law for a bonus has been formally passed by the town council of East Selkirk, payable in twenty years, and conditional upon the building and maintaining of a forty-ton blast-furnace and a staff sufficient. Private capitalists have also secured to the company 50 acres of land free of charge. The company has at this time a gang of men working at its docks and other buildings near the mines on Big Island

in Lake Winnipeg, preparatory to beginning work in East Selkirk in the spring.

COLORADO.

ARAPAHOE COUNTY.

OMAHA & GRANT SMELTING AND REFINING COMPANY.—The official figures, as given by the Denver *Tribune-Republican*, are as follows:

Silver and gold bars	\$11,118,349 17
Lead and antimony earnings	2,531,358 97
Blue-stone	101,477 00

Total

More than one half of the total value of the metals treated by this company is the product of the Denver branch of the Omaha & Grant Smelting Company, and the larger part is from the treatment of Colorado ore.

CLEAR CREEK COUNTY.

PAY ROCK.—Various improvements are making at the mill. A new battery of stamps will be put in to treat the tailings from the coarse jigs. New sets of slime-tables will also be added, and during the coming summer a boiler and engine will be placed in position, so that the mill may be operated the year around. With the present water-power, the company is compelled to close down the mill during the winter months.

CUSTER COUNTY.

BULL-DOMINGO.—The mine has shut down for an indefinite period. This move has been made pending settlements that are to be made with the sheriff during the month and the month to come.

DOLORES COUNTY.

PASADENA.—The late run has shown the necessity for more room to store ore and fuel, and a building will be erected on the south side and adjoining the main building. This will give ample storage for ores, and save the expense of handling again after unloading, protect the ore from the weather, serve as a drying-floor, and thus save the trouble and great expense of handling frozen or wet ores. The under portion of this building will be used for additional furnaces, which will be built as needed, and for a coal-house with a capacity of 700 tons of coal, to be supplied for domestic use. The company will build a wagon-road to its coal mines and make a coal-yard at its coke-ovens where it proposes to supply Ophir, Ames, Telluride, and that section of country at a low price.

RICO REDUCTION COMPANY.—The works will soon start up.

GILPIN COUNTY.

CENTRAL UNION.—A strike is reported in the main shaft on the Galena lode.

GUNNISON COUNTY.

IRON MINE.—The mine is situated a few miles from Tin Cup. The veins, which are between granite and quartzite, consist of a four-foot vein of magnetic hematite, red; a six-foot vein of magnetic hematite, black; and a foot vein of copper ore. The red runs sixty-two per cent iron, as shown by a mill-run of twenty-five tons, while the black gave a return of fifty-eight per cent. There are now about 150 tons of the red iron and 300 tons of the black iron on the dump.

LAKE COUNTY.

SILVER CORD.—Mr. A. A. Blow has succeeded Mr. Tingley S. Wood as manager of this mine.

PITKIN COUNTY.

Messrs. Wilson & McMurchy, it is said, are negotiating with Denver parties for the remodeling and enlarging into a smelter of their concentrator, on the banks of the Roaring Fork. If this arrangement is completed, the capacity of the new smelter will be two stacks of from thirty-five to forty tons each.

DURANT.—It is stated that J. B. Chaffee and D. H. Moffatt have been negotiating for this property.

SUMMIT COUNTY.

ROBINSON CONSOLIDATED.—The lessee is doing good development-work. The ore is all shipped to Argo. Leadville and Pueblo parties have begun to figure on this ore, it is said.

DAKOTA.

LAWRENCE COUNTY.

FATHER DE SMET.—The superintendent reports for the week ended February 8th: Ore extracted from first, second and third levels, 2035 tons. Ore milled, 1985 tons.

PENNINGTON COUNTY.

The Peacock tin location, one half of the Bird, one half of the Crow, and one half of the Little Giant locations, have been sold to A. J. Van Cleft, of Scranton, Pennsylvania, for \$8000 cash.

IDAHO.

The troubles between the Miners' Union and the Queen of the Hills and Minnie Moore companies have

not yet been adjusted, according to reports up to the 10th instant.

BULLWHACKER.—This group, on Deer Creek, has been incorporated in Philadelphia, and operations at the mines will be resumed early in the spring, and vigorously prosecuted.

LUCIA.—The main tunnel is in 100 feet. At its initial point, it cuts an eight-foot vein of carbonate of iron and quartz containing silver that will pay to concentrate, although it is dry or milling ore. Twenty feet farther, another vein of very nearly the same kind was cut through. It is five feet wide. The remainder of the tunnel is cut through lime and spar until the face is reached.

MICHIGAN.

COPPER MINES.

OSCEOLA.—It is the intention to remove the mine's present crushing and dressing plant to the proposed new mill on Torch Lake, about a mile and a half below the Calumet & Hecla mill.

PENINSULA.—According to the *Hancock Herald*, an injunction has been granted restraining the sheriff from making sale of the personal property of the Peninsula Copper Mining Company, on executions issued on judgments confessed by the general manager in favor of several creditors. This will bring the matter fairly before the courts, and give the other creditors a chance to make good their claims, or at least to share equally in the division of the company's assets.

PEWABIC.—T. Henry Mason and associates, who have brought suit against this company, are trying to get a receiver appointed for the mine. A hearing was to have taken place at Grand Rapids, February 9th, before Judge Withey, of the United States District Court.

IRON MINES.

EMMET.—The company's shaft is down very nearly 600 feet in the siliceous slate formation that overlies the Ludington ore-deposit. The formation shows signs of a flattening out toward the north, says the *Marquette Mining Journal*, and from the dip as shown in the shaft, and the work done on the fifth level of the Ludington, it is estimated that the ore is still about 35 feet from the shaft, measuring due south, and that it will have to be sunk about 100 feet deeper to catch it on the underlay. This will be the deepest shaft in the Lake Superior iron region; there may be others of equal depth; but if there are, they have been continued in ore from near the surface, instead of being sunk to the extraordinary depth of 700 feet before reaching any thing of value. The nearest approach to this undertaking among our iron mines was the sinking of A and B shafts at the Barnum, the combined depths of which are not much greater than that of the Emmet, though the sinking of either one was much more difficult and expensive. It is to be hoped that the final outcome will be such as to abundantly reward the Emmet Company for the indomitable pluck and enterprise that have thus far characterized its management, in this direction, at least.

LUDINGTON.—Hoisting has been resumed in No. 1 shaft. During the past month, connection has been made between Nos. 2 and 5 shafts, on the fourth level, where the main ore-body is found greater in length by 70 feet than on the level above. A cross-cut 90 feet east of No. 5 shows 65 feet of ore, while on the third level there were but 48 feet between walls. At No. 1, the fifth level is opening up and making ready for breaking, while No. 5 is pushed on its way down to another lift of 100 feet.

MENOMINEE.—It is stated that the sinking of a third downright shaft, to be known as the C shaft, is contemplated. Work is steadily progressing at A and B shafts.

MARBLE QUARRIES.

Operations have begun at the marble quarry near the Ropes mine by the parties working the same under lease from the Deer Lake Company. The rock is quarried by boring holes closely together and then breaking with wedges. This does away with explosives and does not fracture the marble. Several large blocks will be sent away to be polished and placed on exhibition.

MONTANA.

BEAVER HEAD COUNTY.

HECLA CONSOLIDATED.—The production for 1884 amounted to 4,589,280 pounds of lead; 339,925 pounds of copper; 656,849 ounces of silver; and 248 ounces of gold.

LEWIS & CLARKE COUNTY.

MONTANA COMPANY, LIMITED.—The aggregate run

at the Drum Lammon mine for the month of January amounted to \$75,000. A portion of the stamps was in operation during this time.

NEVADA.

STOREY COUNTY—COMSTOCK LODGE.

The completion of the west drift connecting the main incline winze in the Hale & Norcross, on the 3000 level, with the Combination shaft, is the only event of importance that has occurred during the week ended February 7th, to relieve the usual monotony of mining operations on the Comstock. The completion of this connecting drift has vastly improved the ventilation, and is rapidly moderating the torrid heat in the cross-cut on the 2800 level of the Norcross.

It is rumored that extensive mining operations will soon be inaugurated on Cedar Hill by the north end companies whose surface claims cover the ground, and that a large force of men will be employed in prospecting it from cone to base. Tunnels will be driven into the side, and shafts and inclines sunk wherever favorable indications are found.

ANDES.—The mine is still shut down, pending instructions from the management.

BLUE JACKET.—This old mine, on Cedar Hill, north of the Sierra Nevada, has recently been started up. The shaft is 200 feet deep. From this, a drift has been run west 730 feet, and it is reported that here the old Peytuna ledge was struck, and that assays ran as high as \$17 in gold.

KEYES.—The mine will remain closed down until the indebtedness has been liquidated, when it will be started again on a cash basis.

SCORPION.—Work has been temporarily suspended.

SIERRA NEVADA.—The committee of investigation appointed at the recent annual meeting to examine and report upon alleged concealment of ore-bodies in the mine, and extravagant expenditures of money by the officers, has issued a letter announcing that, owing to the refusal of the directors to furnish money necessary to make the investigation, and to the flooding of the mine above the 2500 level, by their authority, the investigations authorized can not be made.

WHITE PINE COUNTY.

OSCEOLA MINING AND DITCH COMPANY.—The ditch to carry water to the extensive gold placers will be completed in two months, when hydraulic operations will begin.

NEW MEXICO.

GRANT COUNTY.

The Murdock process of reducing ores, a trial of which was to have been made at Carlisle, is pronounced a failure, according to local papers, and the works that were built for this process will not be started up. The White roaster, which was put up in connection with these works, will, however, be used in roasting the concentrations, which will be run through the mill again.

SANTA FÉ COUNTY.

SAN PEDRO & CAÑON DEL AGUA.—In the case of Orsamers, Lamb, and other Boston stockholders in this company, who oppose the Ballou interest, Judge Axtell has rendered a decision denying the prayer of the complainants to set aside the sale that was made last September by the Master in Chancery. The case will be taken to the Territorial Supreme Court upon a writ of error.

UTAH.

BEAVER COUNTY.

A concentrator and leaching-works are to be erected at Milford.

SALT LAKE COUNTY.

The greater portion of the mining village of Alta was destroyed by a snow-slide February 13th. At the Emma Mine Works, no damage was done except the destruction of the smoke-stack. The Vallejo Works, including buildings and tramways, were crushed.

SUMMIT COUNTY.

CRESCENT.—During the month of January, the output of first-class or shipping ore was 1856 tons. While this ore is going out, there is piling up second-class or concentrating ore at the rate of forty tons a day, making a total of 100 tons taken out from the mine.

SAMPSON.—The drain tunnel on this property has been driven in some 600 feet and is pushed rapidly. The company has resumed work in the stopes from the 200 level, and considerable ore is shipped by them.

UTAH COUNTY.

The mill at Hensonsville has been leased for a year to parties who propose to start it up at once.

VIRGINIA.

A cave said to be of large dimensions has been discovered in Fincastle, Botetourt County. The cave has been explored for a short distance, and found abounding with brilliant stalagmites and other beautiful formations.

VIRGINIA TIN MINING AND MANUFACTURING COMPANY.—It is reported that a large force is at work developing these mines, which are near the line of the Shenandoah Valley Railroad.

WISCONSIN.

COLBY.—Nothing is doing at this mine.

NORTHERN BELLE.—The work on the tunnel is progressing. In a few weeks, it is expected to reach the point where the intersection of the vertical shaft and tunnel occurs. Work will then be resumed on the upper shaft and pushed rapidly forward to its junction with the tunnel.

WYOMING.

LARAMIE REDUCTION-WORKS.—This company has been organized with a capital of \$100,000. The existence of the company is to continue forty-nine years. The object of the organization is to carry on a manufacturing, mining, chemical, merchandising, and mechanical business, and any other branch necessary to the success of the enterprise.

WYOMING LAND AND IMPROVEMENT COMPANY.—This company, which last summer purchased all the unsold railroad lands, lying south of the Union Pacific main line, in Albany County, and subsequently disposed of the same, now has the contracts with the purchasers all made out and ready for delivery.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Feb. 20.

Since the listing of railroad and other stocks at the Mining Exchange, attention has been almost entirely directed to these securities, and the cold shoulder turned to mining stocks. During the past week, the dealings have been small, with generally steady prices. An informal meeting of the committees of the New York Mining Stock and National Petroleum Exchange and of the members of the Stock Exchange who also belong to that Board was held yesterday, and, it is stated, resulted in partially restoring harmony between the two Exchanges. A proposition was submitted that the Mining Board should deal in fractional lots not exceeding forty shares, with severe punishment for breaking the rules; but no action on the above question has yet been taken.

The only feature of interest in the Bodie stocks was Standard Consolidated, which, during the week, declined from 88@55c.; the sales amounting to 750 shares. Bodie Consolidated was firm at \$2.10, and 700 shares changed hands. The financial statement of the company for January shows cash on hand on the 31st ult., \$94,742.72. Bulwer Consolidated sold as low as 4c., assessment unpaid, and at from 25@28c., assessment paid. Consolidated Pacific shows sales amounting to 4500 shares; the price varied from 90@96c., closing at 90c. Plymouth Consolidated holds its own at from \$15.50@16.25, the transactions amounting to 1425 shares.

The Nevada stocks show the usual amount of business. Among the Comstock shares, Consolidated California & Virginia shows the largest sales, amounting to 4700 shares; the price was steady at from 27@29c. Hale & Norcross sold at high figures, ranging from \$4.10@4.25; the transactions amounted to but 200 shares. Sierra Nevada declined from 40@28c., with sales of 1000 shares. Union Consolidated has also dropped from 40@30c., with sales of 450 shares. The Tuscarora stocks have received but little attention. The price of Navajo has taken a downward course, and dropped from \$1.05@95c. Last week, it sold at from \$1.25@1.30; the sales amounted to only 600 shares. North Belle Isle, Independence, and Belle Isle show a small business and firm price. A lot of 1500 shares of State Line 1 & 4 sold at 1c. Eureka Consolidated remains steady at from \$2.50@ \$2.90.

But little interest was manifested in Colorado stocks. Lacrosse shows the largest transactions, 6400 shares selling at from 10@12c. Decatur and Amie Consolidated follow, with sales respectively of 3300 and 2300 shares at 1 and 4c. Robinson Consolidated has been quite active, selling at from 27@34c., sales

amounting to 2000 shares. Little Chief has been quiet at from 32@33c. A sale of 200 shares of New Pittsburg is recorded at 42c. One of 500 shares of Colorado Central at 90c.

Horn-Silver has been weak, and records sales of only 2755 shares; the price continues its downward course, selling at from \$2.20@\$2.40, closing at \$2.25.

Father de Smet, Rappahannock, Central Arizona, and a few others show small sales, and are steady.

The total sales this week amounted to 49,730 shares, as against 62,766 shares for the preceding week, showing a decrease of sales of 13,036 shares. A complete summary of the market will be found 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:

Alexander H. Dey Iron Mining Company, No. 45 Newberry & McMillan Building, Detroit, Mich., March 10th, at ten o'clock A.M.

Argyle Iron Mining Company, No. 45 Newberry & McMillan Building, Detroit, Mich., March 10th, at ten o'clock A.M.

Gouris Coal and Iron Company, No. 243 Broadway, New York City, March 5th, at four o'clock P.M.

Virginia Iron and Steel Company, Buffalo Gap, Augusta County, Virginia, March 25th, at noon.

DIVIDENDS.

Father de Smet Mining Company, of Dakota, has declared a dividend (No. 42) of twenty cents a share, payable February 28th.

Jocunita Mining Company, of Mexico, has declared a quarterly dividend of fifty cents a share, payable February 28th.

Ontario Silver Mining Company, of Utah, has declared its 104th dividend of \$75,000, payable at the transfer-agency of Messrs. Lounsbury & Co., No. 15 Broad street, February 28th. Total amount of dividends paid to date, \$6,200,000.

Silver King Mining Company, of Arizona, has declared a dividend (No. 46) of twenty-five cents a share, payable February 16th.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, reports as follows for the week: The oil market has steadily advanced during the week from 70 last Saturday to 76 last night. The consumption of oil is about 15,000 bbls. per day in excess of production, and as the public have gradually been selling out on the dull market of the past six weeks, the bull clique, with nearly all the certificates in their hands, have been able to advance the market sharply. It is likely to go higher still.

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

	Opening.	Highest.	Lowest.	Closing.	Sales.
Feb. 14	\$0.70	\$0.72 1/2	\$0.69 1/4	\$0.70	4,963,000
16	.69 1/4	.71 1/4	.69 1/4	.71	3,246,000
17	.71	.72 1/2	.71	.72 1/4	3,344,000
18	.72 1/2	.72 1/2	.71 1/4	.71 1/2	3,699,000
19	.71 1/2	.72 1/2	.71 1/4	.72 1/4	2,452,000
20	.72 1/2	.76	.72 1/2	.76	6,773,000
Total sales					24,477,000

Boston Copper and Silver Stocks.

[From our Special Correspondent.]

BOSTON, Feb. 19.

The transactions in copper stocks the past week have been light, and confined to the dividend-paying mines. Calumet & Hecla opened at \$162, declined on small sales to \$158 1/2, and closed \$158 bid. There is no special reason for the decline other than that of supply and demand. There have been rather more orders to sell than to buy, and as a result, prices have to yield. Quincy has recovered from the depression of the past two weeks, and is now in good demand, with sales at \$30, a gain of \$4 from the lowest point touched, January 30th. The reports from the mine are of an encouraging character, and warrant the belief that the company will be able to earn its dividend the coming year. Osceola was weak, and an order to sell a hundred shares, in the absence of buying orders, resulted in a decline to \$9 1/4, and later a small lot sold at \$9; the best bid for to-day was \$8 1/2, and \$9 1/2 was asked.

In silver stocks, there is but little activity; but prices for the stocks dealt in are rather firmer, with an upward tendency. Bowman Silver has advanced from 11c. @16c. on small sales. The advance is due to manipulation, and not to any improved condition of the property, and it looks a little as if the stock was pushed

up in order to prepare the way for another assessment. Catalpa is firmer at 21c. bid. Dunkin, steady at 19c. @ 20c. "Cusi," steady at \$1 bid, with sales at \$1.05. Consolidated Pacific comes once more to the front, and is in active demand at 95c. bid, \$1.05 asked.

In miscellaneous stocks, American Electric and Illuminating Company is dull at about \$2. Brunswick Berth, 18c. bid, 20c. asked. New England Water-Meter is in good demand, and sold at \$ 3/4 with same bid, 40c. asked. Standard Water-Meter, dull at 27 1/2 @ 30c.

3 P.M.—Calumet & Hecla sold this afternoon at \$159, and was offered at same price, \$158 bid. Quincy, \$29 1/2 bid, \$30 asked. Atlantic, \$7 1/4 bid. Franklin, offered at \$7.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS.				
	Feb. 13.	Feb. 14.	Feb. 16.	Feb. 17.	Feb. 18.
Albion					
Alpha					
Alta	.40		.35	.30	.30
Argenta					
Bechtel					
Belcher					.70
Belle Isle					
Best & Belcher	.75		.75	.70	.50
Bodie	2.00		1.87 1/2	2.00	2.00
Bullion					
Bulwer					
Chollar	2.62 1/2		2.87 1/2	2.87 1/2	2.75
Con. Pacific	.85		.85	.85	.95
Con. Cal & Va.	.10		.30	.25	.25
Crown Point					.80
Day					.75
Elko Cons.					
Eureka Cons.				2.75	
Exchequer					
Gould & Curry	.65		.65	.65	.50
Grand Prize					
Hale & Norcross	3.87 1/2		4.25	4.60	3.87 1/2
Independence					
Martin White					.45
Mexican	.30				.30
Mono					.30
Mount Diablo					
Navajo	1.12 1/2		1.00	1.00	1.00
Northern Belle					
North Belle Isle					
Ophir	.30		.30	.30	.10
Overman					
Potosi	.80		.90	.85	.80
Savage	.95		.95	.93	.95
Scorpion					
Sierra Nevada	.30		.30	.30	.25
Silver King					.15
Tip-Top					
Union Cons.	.35		.25	.25	.20
Utah					.50
Wales Cons.					.45
Yellow Jacket	1.25				1.12 1/2

The finances of the following mining companies stood as follows on February 1st:

CASH ON HAND.	
Alpha Con	\$2,403.95
Alta	9,007.89
Benton Con.	6,380.77
Best & Belcher	31,186.69
Belcher	1,528.27
Bodie Con.	94,742.72
Chollar	20,126.23
Crocker	3,087.38
Crown Point	22,141.04
Con. California & Virginia	6,702.61
Exchequer	153.37
Gould & Curry	33,549.30
Hale & Norcross	5,484.00
Mexican	\$9,794.66
Mono	17,472.72
Martin White	1,223.23
Navaj	77,473.68
Ophir	11,537.95
Occidental	2,741.88
Peer	1,692.03
Sierra Nevada	13,870.13
Savage	5,860.78
Standard	4,017.38
Syndicate	7,746.20
Tioga	553.77
Utah	984.83

INDEBTEDNESS.	
Albion Con.	\$265,000.00
Bulwer	104.78
Bodie Con.	818.00
Day (about)	90,000.00
Grand Prize (about)	6,000.00
Mono	\$360.00
Peerless	1,524.68
Potosi	16,361.81
Union Con.	1,005.29

METALS.

NEW YORK, Friday Evening, Feb. 20.

Copper.—The condition of this metal is very peculiar. Lake copper depending on the price of Chili Bars is declining in value, while Lake copper outside of the pool is rising, and is rather scarce in the market. We quote 11 1/2 @ 11 1/4 c., while pool copper to manufacturers is 10 3/4 c.; 11 1/2 c. is quoted for Hecla; Baltimore copper from Arizona ores is quoted 11c., and from Montana ores, 10 1/2 c.

Chili Bars were cabled this morning £47 2s. 6d., which was the lowest price yet reached by this brand, a figure which, under the Calumet & Hecla pool arrangement, would make Lake to manufacturers here about 10 1/4 c. for March, as against 10 3/4 c. for February; a lower figure than even Baltimore or Western brands

now command. This alarming price has since been lowered. Private cables this afternoon announce £47 as the price of Chili Bars, and it is said that the sudden decline is due to the arrival of a large amount of ingots from an entirely new and unexpected source. The effect of this anomalous condition of the market is to confirm the general opinion, already reflected in these columns, that the pool management of the copper sales that cover the period up to May was far from wise or beneficial to the companies. The Lake companies will have to ship by land to fill this European contract.

We are reported sales of a large quantity of Arizona pig copper (guaranteed 96 per cent), at 9 30 per pound of weight. Some Bessemerized copper from Montana received here is of excellent quality, and appears to demonstrate the success of this process in eliminating arsenic.

The Anaconda, Montana, is running twenty-two furnaces, and other Montana smelters have also resumed operations for the purpose of filling foreign orders. The Arizona smelters, including the Old Dominion, are running satisfactorily.

The Calumet & Hecla will probably have to increase its output to fill the foreign contracts made while the Quincy was still supposed to be in the pool.

Among all these conflicting influences, the copper market here is to-day in an anomalous condition.

Tin.—There is nothing of note doing in this metal. The deliveries from London to America for the first half of February are reported at 600 tons, and the London prices cabled to-day are for Spot tin £78 16s., and for three months £79 10s., with the market strong. A little business has been done here, and we quote 17 15 @ 17 25c. as a week ago.

Lead.—There is absolute dullness in this metal; 300 tons of St. Jo sold at 3 32 1/2 c. and 3 65c. being the only transactions reported. We quote 3 62 1/2 c. as the obtainable price; 3 65c. is asked, but is not obtainable. Large holders hold to prices, but no business can be done at this figure.

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

Market lower. Four hundred tons Corroding sold at 3 45c.; 200 Chemical sold at 3 40c.; closing firm at above figures with few sellers.

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

Our market has declined slowly since last report. Trade is almost at a stand-still. Prices nominally 3 45, though some refiners still ask 3 55c.

Spelter.—The market is quiet. We quote nominally 4 30 @ 4 50c., according to brand.

BULLION MARKET.

NEW YORK, Friday Evening, Feb. 20.

DATE.	LONDON.		N. Y.	
	Pence.	Cents.	Pence.	Cents.
Feb. 14	49	106 1/2	Feb. 18	48 13-16
16	48 1/2	106 1/2	19	48 13-16
17	48 13-16	106 1/2	20	48 15-16

* 106 1/2 @ 106 1/4. † 106 1/4 @ 106 1/2.

BULLION PRODUCTION FOR 1885.

MINES.	States.	Month of January.		Year from Jan. 1st, 1885.
		\$	oz.	
*Alice, G. S.	Mont.	94,020		
*Belmont	Nev.	10,063		
*Boston & Montana, G.	Mont.	31,278		
*Derbec Blue Gravel, G. S.	Cal.	15,226		
*Father de Smet, G.	Dak.	34,567		
*Grand Prize, S.	Nev.	25,150		
*Granite Mountain, S.	Mont.	62,900		
*Head Center & Tranquillity	Ariz.	18,823		
*Hope, S.	Mont.	5,900		
*Lexington, G. S.	Mont.	61,183		
*New Pittsburg, S.	Nev.	57,262		
*New York, S.	Calo.	7,785		
*Plymouth Consolidated, G.	Cal.	85,722		
*South Yuba, G.	Cal.	400		
*Stormont, S.	Utah.	12,550		
*Tombstone, G. S. L.	Ariz.	148,104		
		570,943		

* Official. G., gold; S., silver; L., lead. Silver valued by the different companies from \$1 @ \$1.29 per ounce; gold, \$20.67. † Not including value of lead.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Feb. 20.

The whistling of the Iron and Steel Association does not noticeably keep up the courage of our iron men in this market, and they quietly laugh at any one who tells them that all that is needed to bring about a revival is "confidence in future values."

Dull, dull, and nothing doing, is the story heard on every hand, and although prices are probably at the bottom, no great confidence is expressed in any advance for some time to come. We continue to quote as before: \$18@18.50 for No. 1; \$17 for No. 2; and \$16 for Gray Forge. No sales of consequence are reported, though it is said some Southern irons have been sold here below these figures.

Scotch Pig.—About 800 tons have come in during the week. Prices remained unchanged, as follows: Coltness, Langloan, and Gartsherrie, \$22@22; Glengarnock, \$19.50@20; Eglinton, \$19, while cables received to-day quote Coltness 54s. 6d.; Langloan, 54s.; Summerlee, 54s.; Gartsherrie, 51s.; Glengarnock, 48s. 3d.; and Eglinton, 42s. 6d.—a quite small reduction from last week.

Steel Rails.—Steel Rails are quoted at \$26@28 at the works, and we hear of sales of 2000 tons. Old T Rails are quoted at \$17@17.50, and Wrought-Iron Scrap \$16.50@18.

Philadelphia. Feb. 20.
[From our Special Correspondent.]

The volume of business since the writing of the last report shows no improvement, and the inquiries on hand to-day do not indicate much improvement. Buyers seem to be waiting for some new developments. If there were offers on hand, it would give iron-makers an opportunity of doing business. There seems to be nothing of an urgent character on hand, yet there must be more or less business doing, as there is a gradual increase in the capacity all around. The iron is not made for stocks, or it is not held at furnace or mill, but finds its way into buyers' hands, yet makers say business is flat. The habit of complaining becomes chronic. A great deal of capacity is, of course, idle, and when business is secured, it is taken at rates that deprive business of much interest. The trade is dragging along, anxious for the approach of spring, to bring with it a heavier demand.

Pig-Iron.—The f. a. c. e. companies report a moderate steady demand for Foundry and Forge iron at about \$16, \$17, and \$18, with from 50 cents to \$1 off for inferior grades, and sometimes 50 cents more for first-class Foundry iron. Some inferior iron has been crowded on the market, and holders of this inferior make seem anxious to get rid of it. Two or three sales of Foundry of inferior make were made at \$17.25 and \$16.25. More or less Southern iron is coming, and is offered, and every thing indicates that competition from this source will not decline.

Muck-Iron.—Quotations are \$27.50@28, with very little business.

Blooms.—Anthracite Blooms are selling slowly at \$41@42.

Merchant Iron.—Interior makers report sales of from 25 to 50-ton lots at \$1.50@1.60. The local mills are selling at \$1.70. Stores sell at \$1.80@1.85. Agents are looking for spring business, but they are not able to get it.

Plate and Tank-Iron.—The market is quiet, and no important transactions are reported. Plate is 2c.; Shell, \$2.50; and Flange, \$3.50.

Construction Iron.—There is said to be some probability of business for bridge iron, but those who are in the best position to know say it will not probably come to hand for a few weeks yet. Meanwhile, the mills are very short of orders. Angles are 2c.; Tees, \$2.50; and Beams and Channels, 3c.

Sheet-Iron.—No new developments.

Wrought Pipe.—A good deal of business is quietly done in wrought pipe.

Steel Rails.—Light sections are in better request than any other, and one or two large orders are in the market, but cost of delivery from mills in Eastern Pennsylvania will likely send business elsewhere. Large blocks could be placed at \$26.

Old Rails.—The business of the week will comprise four or five hundred tons for immediate and future delivery at about \$17.50.

Scrap.—Yard men report a quiet movement, particularly in Selected Scrap, but are unable to get \$18. Machinery Scrap is \$14@14.50; Turnings, \$10@14.

Reductions in wages have taken place in three or four mills and at some furnaces.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Feb. 20.

Anthracite.

The continued cold weather has so greatly stimulated the consumption of the domestic sizes of coal that at the present time there is a "coal famine" at some points that lay in stock during navigation, and, though New York is supposed to be accessible all the year around, the extremely cold weather has so filled the harbor with ice that "spot coal" of stove and chestnut sizes is scarce, and fancy prices are asked and obtained for it.

The scarcity and high prices of the domestic sizes have induced a consumption of egg coal to a greater extent than usual, so that the stocks of all sizes are diminishing, and the market is in a much better condition than it has been for a long time past. Coal for immediate delivery is held at prices graduated according to the needs of the purchaser. For contract coal, we quote: For Stove coal, \$4@4.25, according to quality, f. o. b.; Chestnut, \$3.40@3.60; Broken and Egg, \$3.20@3.25 for free-burning (Wyoming Valley) coals, and \$3.40@3.50 for the hard Lehigh, best grades. Pea coal is quoted for contract \$2.25 f. o. b., and Buckwheat coal \$1.90@2. These are the manufacturing sizes that compete with bituminous, and there is every probability of their increasing in value. To a certain extent, pea coal is becoming a domestic size, chestnut being now made much larger than was the case some years ago. When the manner of burning buckwheat and even screenings and culm by a steam-jet is more generally understood, these small sizes will advance. In reality, they will produce almost, if not quite, as good results in steam generating, as broken or egg coal. Prices of all sizes are expected to decline in April.

Mr. John H. Jones, official accountant, publishes the following statement of the production of anthracite coal: For the month of January there was a decrease, as compared with January, 1884, of 257,769 tons. The stock of coal on hand at tide-water shipping ports was, at the end of January, but 37,577 tons less than the stock at the corresponding date last year. This fully confirmed our statements regarding the trade at that time. The stocks are now probably lower than at the beginning of the month.

	January, 1885.	January, 1884.	Difference.
Phila. & Reading RR...	601,971	681,782	D. 79,811
Lehigh Valley RR.....	340,745	392,832	D. 52,087
Del., Lack. & West. RR.	238,419	307,256	D. 68,836
Del. & Hud. Canal Co.	164,897	199,711	D. 34,714
Pennsylvania RR.....	208,599	212,324	D. 3,724
Pennsylvania Coal Co.	64,005	88,612	D. 24,607
N. York, L. E. & W. RR.	23,067	17,055	I. 6,012
Total	1,641,803	1,899,572	D. 257,768

This statement includes the entire production of anthracite coal, excepting that consumed by employes and for steam and heating purposes about the mines.

The stock of coal on hand at tide-water shipping points, January 31st, 1885, was 837,104 tons; on December 31st, 1884, 874,681 tons; decrease, 37,577 tons.

Bituminous.

The bituminous trade atmosphere is filled with rumors of large Eastern contracts having been taken, but we have been unable to establish their accuracy. There are probably negotiations going on for the usual Cumberland and Clearfield contracts, which are said to be held strictly to the pool prices of \$2.70 Baltimore, \$2.80 Philadelphia, \$3.25 New York, \$3.50 Boston f. o. b.; but the Vanderbilt coal has certainly been sold far below these figures, and it is, therefore, claimed that it is "not in the pool," and Pocahontas is said to have "cut" also, but this may be explained by the advantages that this coal has for shipment at Norfolk, which practically reduce freights from this point as compared with Baltimore by, perhaps, 10 cents a ton.

Freights may be quoted at \$1.20@1.25 from Baltimore to New York and Sound ports, and 10 cents less to Hoboken; \$1.30@1.40 to Boston. From Norfolk to New York and Sound ports, \$1.10.

Philadelphia. Feb. 20.
[From our Special Correspondent.]

A larger business has been done during the past few days in anthracite coal than was predicted earlier in the month. There is quite a liberal movement,

restricted chiefly, of course, to the domestic sizes, which are in light supply in the consumers' hands. The production of the mines is rapidly distributed to anxious buyers, and at good prices. There is, in short, material in the situation for an upward tendency in prices. But it would be taking too much risk to say that the outcome will be in accordance with the expectation expressed. One feature deserving of attention is the healthy improvement in manufacturing circles, a thing which has been wanting heretofore in the coal trade. There is a moderate improvement in iron and steel, not so much in the volume of business secured, as in the assurance that heavier requirements will come along directly. It is this that has helped the coal trade, and has made manufacturers more willing to purchase freely. The local manufacturing demand is better. The yards are quite busy. Some good contracts have been booked, and large and small buyers generally are coming along, accepting the condition of things as permanent, and making no unnecessary talk over prices or probabilities. In short, the coal trade has turned a corner, to all appearances, that will result in a quiet and steady demand, instead of an irregular demand, as heretofore. Some few large sales have been made, and vessels are in demand, though freights are still a little above what shippers care to pay or are able to pay. Inquiries are more abundant from New England. The condition of the Western markets is satisfactory, and the companies looking to that trade expect to have a large amount of business on their hands presently. The city and line trade is a little more active. The smaller sizes for manufacturing purposes, while not any higher in price, are in better request, and although it is a little early in the year for large transactions, there are inquiries in hand, and negotiations said to be pending for large quantities. Two or three meetings will be held later in the month, and in the mean time some uncertainties as to tolls and freights will be adjusted, and a good deal of business that is now hanging fire will then be disposed of. The traffic of the Lehigh Navigation Company is self-supporting. The lower rates on the renewal of the mortgage bonds, and the decreased rates of rentals paid on leased properties, will increase the reserves of the company. The Philadelphia & Reading Company has carried this year 2,046,767 tons, or about 106,000 tons more than for the same time last year. The soft coal operators are living in expectation of a very large amount of business, and some advices received to-day afford grounds for belief that they will do a large and satisfactory business, beginning with the first of March. The Tyrone Division figures for the week ended February 14th are 58,794 tons, against 56,104 for the same week last year, an increase of 2,645 tons; and for the year, the figures are 341,834, against 337,673 tons, up to the same time last year, an increase this year of 4161 tons.

The bituminous operators had hope that the pool arrangements would be faithfully carried out, but their faith is weakened by rumors that seem to have very good foundation, that rate cutting is already begun.

Buffalo. Feb. 19.

[From our Special Correspondent.]

We are enjoying the "tail end" of another blizzard, not so severe as the last, but for all practical purposes sufficiently satisfactory to dealers in black diamonds. On Tuesday, the thermometer fell as low as 9 degrees below zero, and the wind blew from 28 to 40 miles an hour. The hardest work of the season was done by the train-men on all the railroads centering here; the intense cold and unremitting work of the wind made it almost impossible to keep steam enough in the boilers of the locomotives, to say nothing of the immense amount necessary to pull the cars through the snow and against the wind. The arrivals of coal freight trains were very light; but as the stocks here are comparatively large, no fears of a short supply were or are entertained.

I have seen but three coal dealers on 'Change this week, and no power of persuasion could squeeze a single item from them. "No news," and then the cold topic of the weather descanted upon. However, perhaps they will thaw out before mail-day next week.

Prices of coal and coke are unchanged, as far as published rates indicate.

The report in circulation that the New York, Lake Erie & Western and the Buffalo, New York & Phila

with the Pittsburg, Ohio, and Indiana districts all anxious to help Illinois supply that market, there is little danger of any protracted scarcity. The furnaces and mills of the Mahoning Valley are reported to be generally running full blast, and many of them double turn. It is to be hoped that the iron interest generally may catch the same breeze and be carried on a wave of prosperity.

STATISTICS OF COAL PRODUCTION.

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

Tons of 2240 lbs.	1885.		1884.	
	Week.	Year.	Week.	Year.
D. & H. Canal Co.	60,571	306,659	57,233	332,656
L. & W. RR. Co.	74,300	372,964	81,024	495,532
Peuna. Coal Co.	*	78,083	18,106	110,132
L. V. RR. Co.	24,693	129,373	22,307	144,202
P. & N. Y. RR. Co.	2,256	14,531	3,126	20,840
North & West Br. RR.	*	124,178	12,811	100,983
L. V. RR. Co.	68,952	385,644	75,557	481,919
H. & W. R. RR.	*	11,924	2,791	23,156
P. & R. RR. Co.	198,626	911,010	176,450	1,078,063
Line & Sul. RR. Co.	1,591	10,030	1,410	9,341
Total	430,988	2,344,396	450,815	2,796,824
Increase				
Decrease		452,428		

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.
* Reports not received.

Total same time in 1880	2,020,579 tons.
" " " " 1881	3,014,453 "
" " " " 1882	2,842,558 "
" " " " 1883	3,185,027 "

The increase in shipments of Cumberland Coal over the Cumberland and Pennsylvania Railroad and branches amounts to 11,470 tons, as compared with the corresponding period of 1884.

Comparative Statement of the Production of Bituminous Coal for the week ended February 7th, and year from January 1st:

Tons of 2000 pounds, unless otherwise designated.

	1885.		1884.	
	Week.	Year.	Week.	Year.
Cumberland Region, Md.				
Tons of 2240 lbs.	32,937	182,442	26,497	174,779
Barclay Region, Pa.				
Barclay RR., tons of 2240 lbs.	5,307	23,894	10,961	42,147
Broad Top Region, Pa.				
Huntington & Broad Top RR., tons of 2240 lbs.	3,287	15,858	2,774	20,911
Clearfield Region, Pa.				
Snow Shoe	2,089	22,581	5,075	26,682
Karhaus (Keating)	1,551	6,170		
Tyrone & Clearfield	53,158	311,779	37,372	285,529
Alleghany Region, Pa.				
Galitzin & Mountain	9,651	52,785	7,422	57,328
Pittsburg Region, Pa.				
West Penn RR.	3,590	28,295	5,910	45,292
Southwest Penn. RR.	1,612	1,488	3,464	18,843
Pennsylvania RR.	3,413	19,454	5,635	32,814
Westmoreland Region, Pa.				
Pennsylvania RR.	25,619	129,968	17,756	131,100
Monongahela Region, Pa.				
Pennsylvania RR.	3,510	20,551	3,631	19,405
Total	147,814	827,663	125,597	854,850
Decrease		27,187		

Comparative Statement of the Transportation of Coke over the Pennsylvania Railroad for the week ended February 7th, and year from January 1st:

Tons of 2000 pounds.

	1885.		1884.	
	Week.	Year.	Week.	Year.
Galitzin & Mountain (Alleghany Region)				
West Penn. RR.	36	550	1,587	14,604
Southwest Penn. RR.				
RR.	34,837	182,701	42,573	233,754
Feun. & Westmoreland Region, Pa. RR.				
Monongahela, Penn. RR.	4,463	27,229	3,220	22,078
Pittsburg Region, Pa. RR.				
Snow Shoe (Clearfield Region)	380	2,231	653	2,737
Total	44,442	240,876	52,365	296,604
Decrease		55,818		

Delaware Railroad Report for the week ended February 14th:

	Week.	Year 1885.	Year 1884.
Coal for shipment at Coal Fort (Trenton)		1,028	
Coal for shipment at South Amboy	8,652	57,940	59,920
Coal for distribution	18,151	90,983	104,232
Coal for company's use	4,435	28,412	25,302
Total	31,238	178,363	189,454
Increase			
Decrease		11,091	

FREIGHTS.

Coastwise Freights.

Per ton of 2240 lbs.

Representing the latest actual charters to February 20.

	From Philadelphia.	From Baltimore.	From Elizabethport, Fort Johnson, South Amboy, Hoboken, and Weehawken.
Alexandria			
Annapolis			
Albany			
Baltimore			
Bangor			
Bath, Me.			
Beverly			
Boston, Mass.		1.50	1.25
Bristol			
Bridgeport, Conn.		1.25	.60
Brooklyn		1.30	
Buffalo, N. Y.			
Cambridge, Mass.			
Cambridgeport			
Charleston, S. C.		1.25	1.25
Charlestown			
Chelsea			
City Point			
Conn. Pt., Mass.			
E. Boston			1.25
East Cambridge			
E. Greenwich, R. I.			
Fall River			.80
Jalveston		2.25	
Gardiner, Me.			
Georgetown, D. C.			
Honchester			
Halifax			
Hartford			
Hackensack			
Hudson			
Lynn			
Marblehead			
Medford			
Millville, N. J.			
Milton			
Newark, N. J.			
New Bedford			.80 @ .90
Newburyport			1.40
New Haven		1.25	.60
New London			.75
New Orleans			
New-Berne			
Newport		1.25	
New York			
Norfolk, Va.	.80		
Norwich			
Norwalk, Conn.			
Pawtucket			
Philadelphia			
Portland, Me.		1.50	
Portsmouth, Va.			1.35
Portsmouth, N. H.			
Providence		1.25	
Quincy Point			
Richmond, Va.			
Rockland, Me.			
Rockport			
Roxbury, Mass.			
Saco			
Sag Harbor			
Salem, Mass.			1.25
Saugus			
Savannah	1.50	1.50	
Somerset		1.40	
Staten Island		1.10	
Trenton			
Troy			
Wareham			
Washington			
Weymouth			
Williamsbr., N. Y.		1.25	
Wilmington, Del.			
Wilmington, N. C.		1.25	
St. Thomas, W. I.			
Key West, Fla.			

* And discharging. † And discharging and towing. ‡ 3c. Per bridge extra. § Alongside. ¶ And towing up and down. ¶ And towing. ** Below bridge.
River has been badly blocked with ice this week. Wooden bottoms will not venture out, excepting large offshore vessels with oil and merchandise.
PHILADELPHIA. C. K. SCHULL, Supt.

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. Colored, 24x17 inches. Pocket form, \$1.

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

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.

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.

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 69-1/2 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.

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