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RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND, P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus "R"; and only for articles so signed is he responsible.

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LETTERS for S. L. have been waiting in this office for some time.

DR. E. D. PETERS, Jr., having completed his contract with the Parrot Silver and Copper Company, of Butte, Montana, has returned to his home in Boston for the winter.

WE hear that Mr E. F. LOISEAU, well known in connection with his long-continued efforts to utilize anthracite coal-dust, has been called to go to Europe, April next, to erect works for the manufacture of patent fuel from coal waste, in France and Belgium, with the aid of his process and machinery, which have been described at length in past issues of the ENGINEERING AND MINING JOURNAL. Mr. LOISEAU, before leaving, wishes to dispose of his patents in the United States for \$30,000, and will undertake to build new works within four months capable of producing 300 tons per day of 10 hours, at a cost ranging between \$40,000 and \$45,000 according to the location selected.

THE only provisions in the somewhat one-sided Spanish-American treaty that are likely to affect the mining interests of this country are those that "mineral and mineral ores, unrefined," and "iron, cast in pigs, and all useless articles of iron and steel," produced in Cuba or Porto Rico, are to enter the United States free of duty. We presume that this means iron and copper ore, pig-iron, and wrought and steel scrap. Practically, the only item of importance is the iron and copper ore. So far as the former is concerned, it will be a pleasant thing for the Bethlehem and Pennsylvania steel companies, owners of the Juragua Iron Company, since it means that there will be an end to the seventy-five cent duty that they now pay. There will be rejoicing, too, among the owners of other iron ore lands in Cuba, who have found it a difficult matter to interest American capital, however earnestly their agents labored. Some weeks ago, a party of gentlemen went down to look at one property, and another one is now brought to the notice of American iron and steel makers.

The following is the schedule of Class C, "Metals and all manufactures in which metal enters as a principal element," in which the duties to be levied on American manufactures in Cuba and Porto Rico are specified :

First Group.—Gold and Silver.

20. Gold and silver coin. Free.

Second Group.—Iron and Steel.

- 21. Iron cast in pigs, and all useless articles of iron and steel. Free.
- 22. Iron cast in pipes and ordinary manufactures. Free.
- 23. Same, in fine manufactures or those polished, with coating of porcelain or part of other metals. Free.
- 24. Iron forged or wrought and steel in bars of all kinds, plates, axles, tires, springs, and wheels for carriages, rivets, and their washers, and anchors and chains for vessels. Free.
- 25. Same, in wire, nails, screws, nuts, and pipes. Free.
- 26. Same, in ordinary manufactures and wire cloth manufactured. Free.
- 27. Same, in fine manufactures or those polished with coating of porcelain or part of other metals, not expressly comprised in other numbers of this schedule, and platform scales for weighing, 100 kilograms, \$5.
- 28. Tin plate in sheets. 100 kilograms, \$2.
- 29. Same, manufactured. 100 kilograms, \$5.
- 30. Needles, pens, pieces for watches, and other similar articles of iron and steel. Kilogram, 50 cents.
- 31. Knives, table and carving, razors, penknives, and scissors for sewing. Kilogram, 15 cents.

Third Group.—Copper, Nickel, and their Alloys.

- 32. Copper, bronze, brass, and nickel, in lump, bars, ingots, and useless objects. 100 kilograms, \$2.
- 33. Same metals in plates, nails, pipes, wire, and wire cloth, unmanufactured. 100 kilograms, \$5.
- 34. Same, manufactured, and all alloys of common metals in which copper or nickel enters, in articles varnished or not. 100 kilograms, \$13.
- 35. Same, manufactured in gilt or silvered articles. 100 kilograms, \$35.

Fourth Group.—Other Common Metals.

- 36. All other common metals and alloys of the same, in lump, bars, ingots, and useless objects. 100 kilograms, \$1.50.
- 37. Same, in plates, sheets, wire, nails, and pipes. 100 kilograms, \$2.50.
- 38. Same, manufactured in articles varnished or not. 100 kilograms, \$5.
- 39. Same, manufactured in gilt, silvered or nickel articles. 100 kilograms, \$15.

The consumption of these articles is not very heavy in Cuba, and the benefit derived from the concessions made is not likely to be very great.

THE SOURCES OF OUR IMPORTS AND THE DESTINATION OF OUR EXPORTS.

Mr. JOSEPH NIMMO, Jr., Chief of the Bureau of Statistics, has just issued his annual report, giving a statement, by countries and customs districts, of the imports and exports of the United States for the fiscal year ended June 30th, 1884. These tables give some very interesting indications in relation to the sources from which we import and the destination of the articles that we export.

Turning first to the metals, we find that, during the fiscal year, 13,07 net tons were imported, 8009 tons coming from the British East Indies, 2699 tons from England, 1593 tons from Australia, and 638 tons from the Netherlands. New York received 11,826 tons, Boston 534 tons, and San Francisco 631 tons, thus showing that the business is practically controlled by this city.

There were imported in ore 2,559,833 pounds of fine copper, of which 2,244,685 pounds came from Canada, 10,928 pounds from Mexico, and 4220 pounds from Germany. Of this quantity, 2,234,642 pounds entered through the customs district of Vermont, Vt., that being the quantity of copper contained in the pyrites, chiefly from the Capleton mines, imported for the manufacture of sulphuric acid and the subsequent extraction of the metal. The imports of ingot and old copper footed up to 361,606 pounds, of which 248,746 pounds came from Canada, 22,226 pounds from the British West Indies, 22,904 pounds from Mexico, and 23,424 pounds from Cuba. Of this quantity, 248,088 pounds entered Vermont, Vt., 81,090 pounds New York, and 22,250 pounds San Francisco. The entire re-exports of foreign copper were 367,662 pounds of fine copper in ore from Boston to England. The exports of foreign ingot

PRINCIPAL SOURCES OF IMPORTS OF IRON AND STEEL.

COUNTRY.	Iron ore. Gr. tons.	Pig iron. Gr. tons.	Iron scrap. Gr. tons.	Bar iron. Net tons.	Steel rails. Gr. tons.	Cotton ties. Net tons.	Steel ingots and blooms. Gross tons.	Sheet, plate, and taggers. Net tons.	Tin plate. Net tons.	Wire rods. Net tons.	Wire and rope. Net tons.
Argentine Republic.....	.....	.....	2,395	.....	20	.....	.....	.....	.....	.....	.....
Belgium.....	.....	4,406	1,356	1,825	.....	2	563	.....	.....	26,166	1,024
Chili.....	.....	.....	2,567	.....	78	.....	.....	.....	.....	.....	458
France.....	4,566	524	40	.....	.....	.....	3	.....	.....	973	.....
French Possess. in Africa.	56,488	.....	3	.....	.....	.....	.....	.....	.....	.....	.....
Germany.....	.....	9,366	5,573	810	6,992	14	2,249	26	.....	20,654	78
England.....	7,355	163,748	12,764	5,570	.....	17,518	18,400	7,200	253,167	16,277	1,875
Scotland.....	.....	96,200	200	890	.....	.....	62	37	15	52	82
Ireland.....	.....	4,049	1,390	.....	.....	.....	.....	.....	.....	.....	.....
Nova Scotia, N. B., and Prince Ed. I.....	.....	.....	1,218	8	294	.....	.....	.....	.....	29	2
Quebec, Ont., Man., and N. W. Terr.....	27,033	1,609	4,357	6	.....	.....	2	38	765	8	8
British Columbia.....	2,092	.....	179	.....	.....	.....	.....	.....	.....	.....	.....
British East Indies.....	.....	.....	6,694	.....	.....	.....	.....	.....	.....	.....	.....
Greece.....	12,530	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Italy.....	57,664	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Netherlands.....	.....	1,391	2,484	.....	.....	.....	.....	.....	.....	8,553	.....
Portugal.....	6,299	.....	286	.....	.....	.....	.....	.....	.....	.....	.....
Russia.....	.....	.....	.....	.....	.....	.....	.....	1,919	.....	.....	.....
Spain.....	374,943	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sweden and Norway.....	.....	1,872	.....	33,116	.....	.....	1,141	.....	.....	24,155	35
Turkey in Asia.....	4,875	.....	6	.....	.....	.....	.....	.....	.....	.....	.....
Total.....	553,806	283,172	46,506	43,216	7,384	17,534	22,432	9,233	253,947	96,891	3,568

and old copper were 41,159 pounds : 21,835 pounds from San Francisco to England, and 18,670 pounds from New Orleans, sent to Mexico.

The exports of copper ore were 19,307 tons, valued at \$2,930,895. Of this quantity, 1949 tons went to France, 463 tons to Germany, 16,760 tons to England, 58 tons to Ireland, and 77 tons to Canada. The exports of ingot copper during the fiscal year footed up to 16,939,080 pounds, valued at \$2,505,279. Of this, France took more than one half, or 9,963,893 pounds, England following with 3,918,774 pounds, Germany with 1,346,686 pounds, the Netherlands with 1,014,559 pounds, and Belgium with 651,171 pounds. Copper sheets to the amount of 105,680 pounds were exported, of which quantity 50,748 pounds went to Canada, 34,009 pounds to Colombia, and 18,078 pounds to Cuba. Of the entire exports of ingot copper, 16,483,059 pounds left from New York, 69,031 pounds from Baltimore, 78,851 pounds from Boston, 50,646 pounds from New Orleans, 143,147 pounds from San Francisco, 99,000 pounds from Vermont, Vt., and 14,346 pounds from Philadelphia. Of the sheets, 44,985 pounds were shipped from Detroit, and 44,193 pounds from New York.

The movement in spelter may be gathered from the following details: The imports in the fiscal year aggregated 2682 tons, valued at \$190,632. Of this quantity, 331 tons came from Belgium, 165 tons from Denmark, probably re-shipped, 2089 tons from Germany, and 83 tons from England. Out of the whole imports, 2497 tons entered New York, San Francisco receiving 173 tons. The exports of domestic spelter have dwindled down to 63 tons, and the shipments of ore and oxide to foreign countries to 239 tons.

The imports of bituminous coal were 820,266 tons, valued at \$2,558,164, the principal countries supplying the quantity being England, 219,429 tons; Scotland, 51,557 tons; Canada, 114,895 tons; British Columbia, 203,176 tons; and Australia, 221,792. New England ports received 112,016 tons, Boston taking 45,142 tons, and Portland, Me., 36,930 tons. New York received 55,427 tons, and the following Southern ports the quantities named: Galveston, 31,998 tons; New Orleans, 2742 tons; and Beaufort, S. C., 1758 tons. Pacific coast ports, of course, import the heaviest quantities, San Francisco taking 507,655 tons; Humboldt, Cal., 1793 tons; Oregon, 3020 tons; Wilmington, Cal., 55,283 tons; and Willamette, Oregon, 26,983 tons.

Our exports of bituminous coal footed up to 646,265 tons, valued at \$1,977,959, of which 501,410 tons went to Canada, 79,981 tons to Cuba, 16,833 tons to England, and 13,076 tons to Brazil. This coal was shipped in the following quantities from the customs districts named: Baltimore, 36,947 tons; Cuyahoga, Ohio, 228,069 tons; Detroit, 126,798 tons; Philadelphia, 38,131 tons; Sandusky, Ohio, 45,059 tons; Yorktown, Va., 46,683 tons; Miami, Ohio, 42,120 tons; and Minnesota, Minn., 21,875 tons.

Our exports of anthracite aggregated 649,040 tons, valued at \$3,053,550, of which Canada took the bulk, 601,891 tons, 10,689 tons going to Mexico, and 21,580 tons to Cuba. The shipments were made from the following customs districts: Champlain, New York, 83,120 tons; Genesee, New York, 116,826 tons; New York, 66,455 tons; Oswego, New York, 294,520 tons; and Philadelphia, 50,056 tons.

Glancing over the table of iron imports, it will be noticed that iron ore comes to us chiefly from Algeria, Canada, Sardinia, and Spain, the Cuba imports not having as yet made their appearance in the official records. In the aggregate, the quantity of iron imported is very heavy. England, of course, sends us the largest quantity of the pig-iron imported, Scotland following with close on 100,000 tons. Scrap-iron comes to us from all quarters of the globe, and it is probable that the fact would be rendered more striking still if the source of the old material appearing under the imports from England were known. Scrap steel, which we have not included in the above table, has entered to the extent of 8060 gross tons, of which 4184 tons came from England, 1164 tons from Scotland, and 2206 tons from Canada. The bulk

of the bar-iron we get is the high-grade material from Swedish forges. England supplies the bulk of the cotton ties and steel rails and steel ingots. How small the quantity of Russia sheet-iron consumed in this country is, may be gathered from the fact that it was less than 2000 net tons. Tin plates, of course, come to us almost exclusively from England, the only country that produces more than its current demands. In wire rods, Belgium, Germany, England, and Sweden compete sharply for our trade, the imports from the Netherlands being only goods shipped from Dutch ports and really manufactured either in Belgium or Germany. The totals that we give are the footings of the original report. They are larger than those that would be obtained by adding our figures, because we have omitted a number of minor countries.

Turning to the tables classifying the imports by customs districts, we find that Baltimore took 259,714 tons of iron ore; Cuyahoga, Ohio, 9091; New York, 29,240; Oswego, N. Y., 13,436; Perth Amboy, N. J., 21,539; and Philadelphia, 209,754 tons. The bulk of the pig-iron, 178,674 tons, came to New York, 19,417 going to Baltimore, 27,232 tons to Boston, 3778 tons to New Orleans, 29,592 tons to Philadelphia, 16,305 tons to San Francisco, and 4732 to Willamette, Oregon. Of scrap, 15,428 tons entered New York, 17,526 tons San Francisco, and 6867 tons Philadelphia. Southern ports received the bulk of the steel rails, 479 tons going to Beaufort, N. C., 2611 tons to Galveston, 1644 tons to Mobile, 1531 tons to New Orleans, and only 469 tons going to San Francisco. The same of course, is true of cotton ties, Charleston, S. C., receiving 950 tons; Galveston, 2674 tons; Mobile, 848 tons; New Orleans, 9383 tons; and Savannah, 1285 tons. Of the bar iron, Boston received 20,590 tons, while 18,947 tons entered New York, 1107 tons Philadelphia, and 2268 tons San Francisco. Baltimore, Boston, New York, and San Francisco received fairly equal quantities of steel ingots, blooms, and billets, the figures being 4335, 5990, 6869, and 4184 tons, respectively. Wire rods were shipped to the following ports in the quantities named: Baltimore, 1242 net tons; Boston, 13,256 tons; New Orleans, 2566 tons; New York, 77,659 tons; Philadelphia, 1652 tons; and San Francisco, 516 tons. Tin plates entered Baltimore to the extent of 28,822 net tons; Boston, 13,200; Chicago, 5435 tons; Milwaukee, 542 tons; New Orleans, 5421 tons; New York, 144,606 tons; Oregon and Willamette, Oregon, 2800 tons; Philadelphia, 39,648 tons; Portsmouth and Falmouth, Maine, 6493 tons; and San Francisco, 6486 tons.

CORRESPONDENCE.

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

The Manhès Plant at Butte.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your issue of November 22d, the following article appears: "On the 7th inst., the Manhès converter for Bessemerizing copper matte, built under the direction of Dr. E. D. Peters, Jr., the well-known copper metallurgist, was started at the works of the Parrot Silver and Copper Company, at Butte City, Montana. We understand that it has been running admirably, beyond the most sanguine expectations of the projectors, and that the first lot of blister copper, made in twenty minutes on an average from 70 per cent matte from the cupola, assayed 98.9 per cent of copper. This is certainly a very encouraging result, and Dr. Peters, M. Manhès, and the leading spirits of the company, among whom is Mr. Franklin Farrel, are certainly to be congratulated."

This is inaccurate, and I ask you to print the following statement of facts relating to the construction and starting of the Manhès converters:

The work was done under my direction, and was executed after plans that I brought from France, and not, as stated, under the direction of Dr.

Peters, Dr. Peters having nothing whatever to do as regards that part of the construction of the new works, or of conducting the operations.

I, as collaborator with Messrs. Alexander and Auguste Bergognon, directed and superintended the same. The first ingots of copper made in twenty minutes assayed 98.9 per cent of copper made from matte of 63 per cent.

I trust you will be so kind as to insert this rectification in your next issue.

Respectfully,
F. VERNIS.
Ingénieur de la Société Anonyme de Metallurgie du Cuivre.

We have received from Dr. Peters the following letter:

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I hasten to correct an error in your issue of November 22, which has just been brought to my notice.

In speaking editorially of the starting of Mr. Farrel's new works in Butte City, you give me the credit of the successful Bessemerizing process that forms a portion of these works. This is a mistake, as my labors and responsibility terminate with the production of a high-grade matte. This is run into converters and brought up to blister copper in a very short time by M. Manhès's method, which has been carried out in all its detail by three French gentlemen, MM. Vernis and the brothers Bergognon, whom Mr. Farrel brought over for this purpose, and with whose results he has reason to be well satisfied. Yours truly,

DORCHESTER, Dec. 8, 1884. EDWARD D. PETERS, JR.

[These letters fully explain themselves. In justice to the gentlemen who accomplished the work and to Dr. Peters, it is only right that we should acknowledge that our eagerness to give news has this time led us into an error that must be annoying to M. Vernis, and more so even to Dr. Peters. Knowing that Dr. Peters was erecting new works for the Parrot Silver and Copper Company, we assumed that the Bessemerizing was also under his charge. Having heard of its success from outside sources, we gave the credit for it to him, carefully—from what now appears was a mistaken sense of delicacy—refraining from communicating with him on the subject. The error was all our own, and we trust that its frank acknowledgment will be accepted as a proof of our sincerity in desiring to set right a wrong inadvertently done.—EDITOR ENGINEERING AND MINING JOURNAL.]

The Henderson Patent Gas-Furnace.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The results obtained from this furnace render a statement of the particulars wherein it differs from the Siemens regenerative furnace of interest to all who use furnace heat in manufacturing.

The distinguishing character of Henderson's is in providing a gaseous fuel containing carbon and hydrogen in certain proportions, mixing heated air therewith in quantity properly regulated to produce complete combustion and a homogeneous flame previous to its admission into the chamber of the furnace; in burning the mixture and causing the homogeneous flame to impinge upon the material exposed to it; and, when steel is produced, in effecting the purification of the metal with economy of fuel, reduction of waste, labor, and other expenses.

In the Siemens furnace, the quality and quantity of the gases are uncertain, owing to the way in which they are made; they are imperfectly mixed and used in the heating-chamber, which causes a large waste of metal and fuel, with increased expense for labor and repairs, and with the production of quality inferior to that where the homogeneous flame is used.

Henderson's furnace is direct acting, or with the gas-producer attached to the heating chamber by a neck; the gas-producer is without a grate, and the ash and clinker are fluxed with lime and form slag, which runs out from the bottom of the producer at different intervals. The producer is always kept full of coal charged through a bell and hopper, underneath which is an iron skirt extending several feet down into the producer. This serves as a retort, so that destructive distillation of the coal takes place in the skirt or retort during its passage (occupying five hours), the fuel leaving as coke, which is decomposed by air-blast, introduced through tuyeres at the bottom of the hearth, into carbonic oxide. The gases from the retort and those made by the air mix in the space between the retort and the walls of the producer, and pass thence into several vertical flues in the neck of the furnace at about 2400 degrees Fahr. temperature. There they are mixed with heated air introduced through numerous tuyeres in such a manner as to produce thorough admixture and perfect combustion in the flues, the expansion caused thereby creating slight pressure. The gases then pass directly into the heating-chamber underneath; the consumed gases being delivered vertically into the chamber upon the material to be heated, such as pig-iron. This makes it possible to keep the bottom of the hearth hot while the melting is in progress. The air used for making and burning the gas is generally at from half a pound to one pound pressure to the square inch. That for making the gases is in measured volume supplied by a small blast-cylinder, and they are burned by the air supplied by another similar engine. These arrangements, in conjunction with the use of flux and the retort-skirt in the producer, make it possible to produce a measured supply of gases of known and uniform composition at all times, without regard to atmospheric pressure, size of fuel, or ash in the producer. By the use of a measured supply of heated air to burn them from the other air-measuring cylinder, the exact chemical proportions are obtained, in order to produce either a reducing neutral or an oxidizing flame, as may be required. In order to facilitate repairs, the roof of the furnace is movable, by placing the brick in clamps. The hearth is also movable by raising and lowering it by an hydraulic ram, the joint between the roof and hearth being sealed by a water ring plate supporting the roof and dipping into a sand-box on the outside of the hearth, which is revolved by spur-wheel gearing on the side. With this construction, the furnace can be repaired without stoppages, and a uniform temperature be given to all parts of the hearth. The spent gases are introduced by the outlet flue into an adjoining chamber, and contain enough heat to heat for rolling the ingots that have been made in the first chamber, and for heating the pig and scrap for melting. The waste heat of this chamber is then passed to an adjoining boiler furnace arranged with air-heating pipes along the side-walls, in which pipes the air for burning the gases is heated. The gases of combustion finally leave the

flues of the boiler at about 100 degrees Fahr. temperature. Thus there is no loss of heat or fuel except by radiation, and complete control of the operations of the furnace is always kept automatically by mechanical methods.

The trial furnace at Bellefonte, Pa., uses, on an average, 280 pounds of gas-coal per hour, making four charges with pig-iron and ore, and eight charges with one fifth pig-iron and four fifths wrought-iron or steel scrap in twenty-four hours, with enough heat for four-ton charges, and to heat the ingots for rolling, and preheat the metal for melting, heat the air-blast, and partially raise the steam required for pumps and blast. Another point of great importance developed by the trials at Bellefonte is the improvement made in the quality of the metal. Carnegie's pig-iron used for rails and rail crop ends gives soft steel or ingot iron superior in quality to that produced from Motala Swedish charcoal pig-iron and blooms (containing 0.02 per cent of phosphorus), made at the Motala Iron-Works, in Sweden, in the Siemens furnace by the Martin process, to wit:

Henderson with "Carnegie."		Siemens with Motala.	
Average of 6 tests.		Average of 6 tests.	
Bar 1 1/4 round.	Pounds.	Bar 1 1/4 round.	Pounds.
Elastic stress, per sq. inch	39,068	Elastic stress, per sq. inch	29,886
Ultimate stress, per sq. inch	63,491	Ultimate stress, per sq. inch	57,739
Extension in 8 inches	25.3 per cent.	Extension in 8 inches	29.1 per cent.
		Plates.	
		Pounds.	
		Elastic stress	30,800
		Ultimate stress	62,054
		Extension	24.4 per cent

The Siemens furnace is provided with gas-producers with grates, and is regulated by draught, the combustion being controlled by valves. The gases are of irregular quality, and contain a considerable amount of carbonic acid, the grates often giving trouble from clinker, and there is always more or less waste of coal from small pieces dropping through them. The gases after production are passed through a cooling-tube a considerable distance, and cool, so as to remove the tar from them by condensation before they enter the furnace. The loss of heat from the production of carbonic acid, coal dropping through the grate, and the cooling, amounts to about one half of the fuel. The cooled gases are introduced then to the regenerative part of the furnace and pass through it into the heating-chamber, first heated by kindling-wood, and after several days the brick-work becomes sufficiently hot to ignite them as they enter the heating-chamber. Air is then admitted to them through separate flues, and the combustion takes place in the furnace at from one half to two thirds of the distance from where they enter. The combustion is not complete, since Professor Morrell, of Johnstown, Pa., states, from analyses he has made, that they contain a considerable amount of free oxygen. They then pass out over open brick-work, the heat being absorbed thereby and used again for preheating air and gases, when the current is changed and the heating is done from the opposite side. During the passage of the air and gases from the inlet flues to the place on the hearth where they mix, the metal or material is cooled and oxidized by them, thus prolonging the operation and wasting metal when they are treated. The regulation is watched by the workmen, and, if there is neglect, great loss occurs. Even with the best care, the working is irregular, as it is affected by changes of the barometer and the condition of the gas-producers. There can be no heating for rolling from waste heat, but it must be done in a separate furnace, with the expenditure of 350 pounds of coal per ton, and about as much more for preheating the materials for melting.

The waste of metal in a Siemens steel-melting furnace using pig-iron and scrap ranges in this country from 12 to 20 per cent, and occasionally reaches 25 per cent; the number of charges being from three to four in twenty-four hours; with pig-iron and ore, two charges are made in twenty-four hours.

In the Henderson furnace, with pig-iron and scrap making wrought-iron or steel, the waste is from 3 to 4 per cent; and with pig and ore, there is a gain of from 2 1/2 to 5 per cent.

The best work that has been done by the Siemens furnace that has been published is that of the Steel Company of Scotland, where 1784 pounds of pig-iron, 500 pounds of scrap-iron and steel, 50 pounds of ferro-manganese and spiegeleisen, 667 pounds of iron ore, and 1665 pounds of coal are used to make a ton of steel. The Siemens steel melting-furnace requires frequent repairs, which are costly and require several weeks, and for some purposes, such as steel castings, another furnace is kept in reserve for use while repairs are made. Although a great improvement upon the ordinary reverberatory furnace with a grate, it gives only a small part of the useful effect of the fuel obtainable by complete combustion and utilization of the fuel and the attendant economies of saving waste, labor, and repairs, and improvement in quality of product.

The Henderson furnace uses less than one half the coal to produce soft steel or ingot iron that is required to make the coke to melt the same weight of pig-iron in a cupola, and with less waste of metal; and by producing complete combustion, obtains results in heating-furnaces analogous to and as valuable as those that were obtained by Argand by complete combustion for lighting purposes. OMEGA.

A LARGE PEARL.—A pearl weighing ninety-three carats, and valued at \$17,000, has been shipped from Guaymas, Mexico, to London. It is believed to be the largest in existence. It was purchased for \$90 from an Indian, who found it at Mulleje, Lower California.

THE NATURAL BRIDGE IN VIRGINIA.—Sixty tons of rock are reported to have fallen, on December 1st, from the Natural Bridge in Virginia; but the curved lines of the bridge were not disturbed. This is said to have been the first fall of rock from the bridge since it was struck by lightning in 1789.

GIRARD COLLEGE.—The latest addition to the buildings in the Girard College grounds at Philadelphia is the structure just completed, and opened December 9th, in which the students are to be educated in mechanical pursuits, and made skillful workmen as well as good scholars. The new building is provided with machinery adapted to the various useful trades to be taught there, and will accommodate about 1000 pupils.

OFFICIAL STATEMENTS AND REPORTS.

HELENA MINING AND REDUCTION COMPANY (ALTA-MONTANA), WICKES, MONTANA.

The first annual report of the Helena Mining and Reduction Company is an interesting document from more than one point of view. The company is the successor of the Alta-Montana Company, which in the summer of 1883 found itself in debt, on liens and mortgages, to the extent of \$250,000, besides which amount the directors of the old company had advanced from \$500,000 to \$700,000. When in this pitiable plight, Mr. S. T. Hauser, of Montana, the president of the present company, and Mr. D. C. Corbin, of this city, took hold of it, and in the brief period of a little more than a year, with the intelligent assistance of the superintendent, Mr. J. Longmaid, converted a ruined concern into a profitable undertaking. The first step was to negotiate with the corporation of the Seligmans of this city, owners of the adjacent Gregory, with the Northern Pacific Railroad for the construction of a branch road to Wickes, the two concerns advancing money for the grading, to be reimbursed in freights over the branch and main line. Simultaneously mine and plant were given a thorough overhauling, which, from Mr. Longmaid's description of its condition when he took the management in September, 1883, it sorely needed. It appears that the mine was in a very bad condition and the works were fast approaching a complete ruin. In the Comet mine, 1348 feet of drifts, cross-cuts, and rises were driven, of which 439 feet were in ore. On the Alta mine, the developments were 2171 feet, disclosing 633 feet of ore-bearing ground; and although 20,877 tons of ore were taken out of the Comet mine, 12,938 tons out of the Alta, 4197 tons out of the Rumley mine, and 429 tons out of the North Pacific and Custer mines, the reserves increased from 24,000 in September, 1883, to 65,000 tons in September, 1884. The greater bulk of the ore produced by the Comet and Alta mines is concentrating ore, the former producing 20,655 tons, yielding 4787 tons of concentrates, and the latter 12,497 tons from which 4782 tons of concentrates were made. The Rumley mine turned out 3478 tons of milling ore.

In addition to putting the mine into shape, tracks were repaired, and the construction of a Huson tramway from the Comet mine to the works was begun, which it is estimated will save \$3000 per month. The works were entirely remodeled, and special arrangements were made to provide against scarcity of water, which during the current year hampered operations, but is now fully overcome. From the old Comet and Wickes concentrators, the best machinery was selected, 3 new jigs, new trommels, and 2 new percussion-tables added, bringing that part of the plant to a capacity of 120 tons per day. The old concentrator at Wickes was abandoned, and at a more suitable site, at Corbin, a 140-ton plant was put up to work the Alta ore. It has been running since the beginning of this year, and has treated 12,947 tons, yielding 4782 tons of concentrates. It is equipped with two Blake crushers, four sets of rolls, thirteen jigs, four double percussion-tables, and two Frue vanners, and is run by an 80 horse-power engine, to which steam is furnished by two 52-inch tubular boilers, 16 feet long. A condenser is also provided for warming water by exhaust steam. In the smelting department, four of the old roasting-furnaces were torn down and four 49 by 15-foot furnaces put up, two new ones were built, and two of the old ones were thoroughly repaired, thus carrying the roasting capacity up from 25 to 60 tons per day. One of the old blast-furnaces was remodeled, and the other replaced by a new one, and two new blowers were added, making the smelting capacity 75 tons a day. Six charcoal kilns were built with a capacity of 25,000 bushels per month, and additional arrangements were made by which the charcoal, it is estimated, can be delivered at the furnaces for from 9 to 10 cents a bushel, a saving of 4 cents a bushel. The mill was repaired, ten new stamps added, new boilers put in, which effect a saving of 140 cords of wood, worth \$4 a cord, per month, and a furnace for melting the bullion was built. These improvements have cost in the aggregate \$190,667.

Mr. Longmaid estimates the cost of mining at \$3.81 and of concentrating \$1.59 per ton at the Comet mine, and \$5.10 and \$1.10 respectively at the Alta mine. These figures differ somewhat from those given by Mr. J. W. Buskett, the secretary, on the page following, who makes them \$3.78 and \$1.24 for mining and concentrating at the Comet, and \$5.10 and \$1.41 at the Alta. In the same way, there are differences in the cost of amalgamating, Mr. Longmaid putting it down at \$12.46 and Mr. Buskett at \$13.54 for 4558 tons; and in the cost of smelting, Mr. Longmaid saying \$14.70 for both, and Mr. Buskett \$16.25, the latter specifying \$11.12½ for smelting and \$5.12½ for roasting, the smelter having treated 8003 tons. These differences, we presume, arise from Mr. Longmaid's making special allowances, while Mr. Buskett, we take it, divides the amounts expended by the quantities treated. However that may be, it would be interesting to know which is nearer correct.

Financially, the company appears to be doing very well. It expended \$190,667 in permanent improvements, has \$63,277 worth of wood, coke, and supplies on hand, paid out \$5971 for tools and improvements, and \$21,000 for the development of its mines, having a balance on hand of \$62,533. The profit thus invested was therefore \$344,000, of which President Hauser says \$269,560 was made in the six months since May 1st. He estimates that the monthly profits will be from \$45,000 to \$55,000. He recommends that a dividend of \$36,000, or 6 cents per share, be paid. The second has indeed been since declared. During the eleven months from December, 1883, to October, 1884, the company produced 2016 tons of base bullion, valued at \$586,326, retort valued at \$154,761, matte valued at \$32,579, and sold concentrates for \$154,774, and ore for \$12,612, making a total value of \$941,033.43. During the six months from May, 1884, to October, 1884, both inclusive, the product was 1715 tons of argentiferous lead, valued at \$489,260, retort valued at \$96,274, 268 tons of matte valued at \$28,750, and 554 tons of concentrates valued at \$60,576, making a total of \$673,837.52. The cost of production was \$292,111.14, and the freight and refining \$112,165.98, being a profit of \$269,560.40, or in the different months as follows: May, \$77,692; June, \$45,669; July, \$38,371; August, \$42,183; September, \$22,974; and October, \$42,670.

AMERICAN ELECTRICAL EXHIBITION.—The exhibition opened at Boston, December 8th, and promises to be one of the most important held in this country.

NEW PUBLICATIONS.

FOURTH ANNUAL REPORT OF THE STATE MINERALOGIST OF CALIFORNIA. By HENRY G. HANKS, State Mineralogist, Sacramento. Published by the California State Mining Bureau.

Mr. Hanks has in the fourth report, now before us, continued the faithful work that marked his earlier efforts. He has an introductory chapter, general in character, on the agricultural, commercial, and manufacturing resources and interests of the State, containing a good deal of statistical matter, which has been gathered by Mr. Henry Degroot. The body of the work is, however, taken up by an alphabetical catalogue of the minerals of California, with special references to those that possess a known economical value. The descriptions are popular, and Mr. Hanks goes into questions of assaying and of manufacture to an extent that will be highly appreciated by those for whom the work is specially written—the great mass of readers who have no professional training, and are yet eager to learn. The State bureau is to be congratulated on having so earnest and industrious an officer.

REPORT OF THE DIRECTOR OF THE MINT UPON THE PRODUCTION OF THE PRECIOUS METALS IN THE UNITED STATES DURING THE CALENDAR YEAR 1883. [By HORATIO C. BURCHARD.] Washington: Government Printing-Office. 1884. 8vo, pages, 858. (Indexes.)

We have examined Mr. Burchard's usual annual report, just issued, with some curiosity, hoping to find in it traces of improvement, which it sorely needed. It makes the pretension of being a review of the precious metal mining industry, and as such has an enviable field. We fully appreciate the fact that Mr. Burchard has only limited means at his disposal, that his staff in the office and in the field is necessarily a small one, and that a high standard of work requires the collection of information in a different way than is now possible. We are not initiated into the mysteries of the methods by which Mr. Burchard collects his data. We can only judge of their character from the work produced. In the main, it appears to be the result of an extensive correspondence and of a diligent use of the scissors. With discretion and judgment, we are sure even those sources of information could be made to yield a fairly accurate and harmonious sketch of progress in the development of our Western mining resources. Unfortunately, even ordinary editorial judgment is lacking. The report bristles with inaccuracies, gross errors, and is painfully uneven in its treatment of different localities. When Mr. Burchard's correspondent happens to be a well-informed, judicious man, the report contains much that is of value; but when a person intent upon "whooping" his district, a lot of prospect-holes are given a prominence that simply smothers the good work of others. We do not know how much of the work of editing Mr. Burchard does himself. We are charitable enough to assume that his many other duties force him to delegate it to subordinates. If that is so, we strongly urge that his hands be strengthened in such a manner that he will be put in a position to do really creditable work, or that the collection of statistics of the production of the precious metals be transferred to the Geological Survey, which will be able to handle it with more discretion. The hash of 667 pages is unworthy of the government and unworthy of Mr. Burchard. We can not help feeling that the latter is conscious of it, and that he will heartily indorse one of the alternatives we suggest, that of providing him with the means of improving what might be a valuable service to a very important industry.

Mr. Burchard has been more fortunate this year in procuring contributors of a higher standard on topics connected with the mining and treatment of precious metal ores. Mr. Walter A. Skidmore's paper on the Condition of the Mining Industry of California in 1883, with Reference to the Production of the Precious Metals, is popular in tone, and yet it will be found very instructive to engineers. Mr. R. L. Dunn contributes a brief paper on Drift Mining in California, which we reproduce elsewhere. Mr. C. A. Stetefeldt briefly reviews the progress that has been made in the construction of dry crushing silver mills and the treatment of so-called dry and base silver ores, in the West of the United States. He brings out more clearly and directly than we have yet seen them in print, the advantages of rolls for dry crushing as compared with stamps, and gives the leading points of the Russell process. Mr. H. M. Howe has an elaborate paper on the Metallurgy of Argentiferous Copper Compounds, in which he deals in a somewhat obscure way, for such a publication as Mr. Burchard's volume, on the different methods of working silver-bearing copper material. It is an excellent compilation, in its way, but contains very little that is new to metallurgists. Mr. Howe adds a table "showing the effects of certain substances in silver and some of its compounds," against the form of which we must earnestly protest. Mr. Howe, when he examines Mr. Burchard's report, will probably, to his chagrin, find that space is no object, and the infinite labor he has put into the table we speak of, and which he forces every reader to go over again, involves a waste of time that so impairs its utility that there will be few who will not shrink from using it. Mr. Howe designates certain facts by Greek letters, thus: α dissolves it slightly; $\alpha\alpha$ dissolves it; $\alpha\alpha\alpha$ dissolves it copiously; ϵ completely; π solubility decreases on dilution, etc. Turning to the table, we find for sulphide of silver, for instance, under the head Zn, Fe, Pb, Ni, Co, Cu, information disguised in the following cabalistic manner: Fe δ Ag ϵ λ η η Cu₂S; Fe and Zn δ Ag μ , θ HCl; Cu and Pb δ Ag ζ ; Cu δ Ag μ , θ H₂O. Duly translated after a struggle of seven minutes by actual count, we learn that "iron forms or causes the formation of silver completely when molten;" that is, in igneous fusion, the reaction is prevented by sulphide of copper; iron and zinc do not dissolve its silver when solid; the reaction occurs only in hydrochloric acid: copper and lead form or cause the formation of silver when molten—that is, in igneous fusion, silver partially; copper forms or causes the formation of silver when solid; the reaction occurs in the presence of water. We do not know whether Mr. Howe has read a proof of the table, and our translation may be wrong; but after all, it does not matter much whether it is right or wrong—nobody but Mr. Howe is ever going to use it. We can not close without mentioning a little feat by the person who prepared the index to the volume. All of the processes mentioned by Mr. Howe, many of which are copper extraction processes, pure and simple, like the Déby, Doetsch, Longmaid, Monnier, and others, are conscientiously labeled "processes for treating silver ores"!

NATURAL GAS.

Mr. John Fulton, mining engineer of the Cambria Iron Company, in an address before the Cambria Scientific Institute, on the geology of salt, petroleum, and gas, made the following remarks on natural gas :

The salt and petroleum industries have brought to light a third valuable element—natural gas—which, until recently, was regarded as a troublesome and undesirable associate. Immense quantities of this valuable heating and illuminating gas have been permitted to go to waste. In 1870, the gas from a well near Titusville was used for heating purposes. About ten years ago, it was used in Pittsburg for heating and steam-generating purposes. At Beaver Falls, natural gas has been used for five or six years in cutlery-works, but lately the supply failed. During the past two years, its use has been greatly extended from the discovery of large producing wells at and near Pittsburg. Some of these have been utilized in supplying heat for the large iron and steel-works in this section of the State.

The study of natural gas and its application to a wide range of useful purposes in heating and lighting have been fully initiated. It is difficult now to estimate the rapid expansion of this new industry or to outline the limits of its usefulness. The recent discovery of large gas-producing wells at Tarentum and vicinity has contributed to the assurance of a large supply of the gaseous fuel, but its persistency is yet on trial. Whether the life of gas-wells shall exceed or fall short of the life of oil-wells has yet to be determined. The extent of the gas territory may be taken as equal to that of oil and salt, inheriting all the peculiarities of rich and poor areas, so common to its associates.

Professor Lesley, the State Geologist, writes : " It is certain that petroleum is not now produced in the Devonian rocks, by distillation or otherwise. What has been stored up we can get out. When the reservoirs are exhausted, there will be an end of it."

When we reflect on the measureless time during which the ancient flora and fauna of the oil and gas series have been submitted to distillation and other chemical operations, it seems impossible to conceive any of the original matter escaping these dissolving forces until the present time. It seems evident that the production of oil and gas has long since ceased. As gas is associated with salt and petroleum, it occupies the same sandstone and limestone horizons or reservoirs.

The vertical range of gas beneath the ocean level appears to be deeper than that of oil, but the great yield of gas is from the oil sands.

Mr. Carl has pointed out the fact that all deep wells, deep beneath the ocean level, have mainly proved failures for oil. The productive oil-wells are shallow, seldom penetrating over from 200 to 400 feet beneath ocean level, while gas-wells are found from 400 to 800 feet under sea-level.

The large Westinghouse gas-well is about 480 feet below ocean level; the Murraysville and Leechburg, about the same level.

Nothing more can be said of the genesis of natural gas than has been said of the genesis of petroleum. Gas is one member of the family of the oil series, just as cannel coal is one member of the family of the coal series.

The elementary constituents of this gas, from an average sample from the Leechburg well, by Professor Sadtler, are as follows :

Carbonic acid.....	0.35	Marsh-gas.....	89.65-C. H. 4
Carbonic oxide.....	0.26	Ethyl-hydride.....	4.39
Illuminating hydrocarbons.....	0.56		
Hydrogen.....	4.79		100.00

A thorough test was made last spring, by a committee appointed by the American Society of Mechanical Engineers, to ascertain the relative heating capacities of natural gas and of Pittsburg coal. It was found that one pound of coal evaporated nine pounds of water from a temperature of from 60 to 62 degrees, and one pound of gas evaporated from 20 to 31 pounds of water under similar conditions. Practically, one pound of gas is equal to two pounds of coal.

There are 23½ cubic feet of natural gas to one pound weight, or 42½ pounds in 1000 cubic feet, the commercial unit.

This estimate, at the recent reduced rate of 20 cents per 1000 cubic feet, makes the cost 4.7 mills a pound, or \$10.52 a gross ton of natural gas.

As coal has one half the calorific value of gas, its cost, at half gas rates, would be \$5.26 a gross ton.

But the expenses of using coal in firing boilers, loading and disposing of ashes—48 cents a ton—would leave for value of coal at boilers, \$4.78 a gross ton. But the cost of coal, firing, and taking care of ashes, at some large iron-works will average only \$1.25 a gross ton, against \$5.26 for its equivalent of natural gas.

Equating the value of the latter to the cost of coal, would reduce the price of natural gas to 9½ cents per 1000 cubic feet.

The following table exhibits the life of several typical gas-wells :

LOCALITY.	Year.	Flow of gas per day. Cubic ft.	Pressure per square inch.	Remarks.
Coburn Well, Fredonia, N. Y.	1871	4000	19 lbs.	Oct., 1877—Still flowing.
Harvey, Butler Co., Pa.....	1875	.....	250 lbs.	1876—Pressure 120 lbs., dying.
Leechburg	1871	Large flow.	70 lbs.	Still giving gas—1884.
Newton, Crawford Co., Pa.....	1872	5,000,000	350 lbs.	March, 1877—Flow small.
Burns, Butler Co., Pa.....	1875	Large flow.	300 lbs.	Decreased rapidly.
Delameter.....	1875	Large flow.	300 lbs.	Decreased same year to 60 lbs. pressure.
Fairview.....	1874	Large flow.	125 lbs.	1876—22 lbs. pressure.
Erie Car-Works.....	1870	Large flow.	70 lbs.	1877—17 lbs. pressure.
East Sandy.....	1869	Large flow.	90 lbs.	Three years no gas.

Eleven wells drilled in Butler County by Spang, Chalfant & Co., are reported as follows :

No. 1, in use nine years, and is still a good well ; No. 2, four years in use, diminishing, three miles distant from any other gas belt ; No. 3, yield insignificant ; No. 4, pressure diminished from 1½ to 0 in one week ; No. 5, failed after four years' use ; No. 6, in use six years, gradually failing ; No. 7, failed after five years' use ; No. 8, good yet, drilled in 1883 ; No. 9, dry hole ; No. 10, small well ; No. 11, a good well, gas struck recently.

These wells have been supplying the mills of Spang, Chalfant & Co. some years with varying success, being able to supply the entire plant at times, and then the wells failing ; and before others could be drilled, the gas supply was insufficient, compelling the reduction of machinery or return to coal.

From the foregoing, it will be seen that the lives of gas-wells are governed by laws similar to those of oil-wells. Just how they will compare for length of life has not yet been made out ; for in both cases the earliest drilled wells have afforded the largest supply, as they drew from a wide radius of undrilled territory. Afterward, the life of gas-wells, unless protected from drilling in their proximity, will be exhausted in a much shorter period than the older and more isolated wells. The past quarter of a century has unfolded the world-wide range of usefulness of petroleum. Natural gas is only in its infancy. We know little yet of these strange substances, except in their application in the industries of our time and in domestic uses.

PROGRESS IN GOLD MINING IN CALIFORNIA.

From W. A. Skidmore's able review on the progress in gold mining in California, published in Mr. Horatio Burchard's annual report, we abstract the following passages :

Drift Mining.—This mining industry is prosecuted in the high regions of the western slope of the Sierra Nevadas, where the ancient channels are buried under superincumbent volcanoes, ash, and lava. It is the leading industry of Forest Hill Divide, in Placer County, and is extensively carried on in the counties of Sierra and Plumas ; also on a small scale in El Dorado County. The term "drifting" alludes to the method or process of extracting or washing the gold. The method of extracting is in many respects similar to that pursued in coal mining. A shaft or slope is sunk, or a tunnel run (if the nature of the ground will permit). When the pay gravel is reached, it is cross-cut from rim to rim, and gangways are run at right angles, laying off the ground in blocks. These are called "breasts." The main tunnel is always carried well ahead of the gangways. Pillars are left to support the main tunnel, which follows as nearly as practicable the gutter of the channel. The breasts are supported by temporary posts and by the "stacking" of the larger boulders. As breast after breast is worked, the ground is abandoned and left to settle. Tunnels are sometimes run too low or too high ; in the latter event, the work must be commenced anew and at a more favorable point. If too low, an uprise shaft is raised until the gravel is tapped, when a main gallery is run above the tunnel bed and the ground worked as above described, the gravel being dropped to the main tunnel by chutes.

The main tunnel runs through the center and the gangways diverge on each side until the rim or limit of pay is reached. The main gallery or tunnel is usually from 10 to 12 feet on bottom, from 8 to 9 feet high, and from 3 to 4 feet wide on the top ; while the breasts are from 3 to 5 feet in height. Hence the area covered by the gallery and gangways bears a proportion in cubic contents to the whole ground worked.

In some counties, the material is so strongly cemented as to require crushing by stamps or other mechanical appliances before washing, but on the Blue Lead of Sierra County this is not necessary. Here it is washed by projecting a stream of water under great head or pressure upon the loosened dirt. The gold, by reason of its great specific gravity, is caught in the riffled flumes, and the tailings pass to the lower streams, where they are retained for future treatment by means of dams, etc. The result of this class of mining is based on the yield per car-load, which is usually equal to 20 cubic feet, weighing 1½ tons, corresponding to 15 cubic feet of material in place. The cost of mining and washing is about \$1.33 per car-load, and the yield varies from \$2 to \$5 per car-load. Expansion after breakage of ground is an important factor in the measurement (or approximation) of drift gravel. Nine cubic feet of ground in place, when broken, will fill a box holding 12 cubic feet. Hence an estimate based on cubing the superficial feet and height is erroneous and calculated to mislead, as it would fall far below the actual output in car-loads. The method of extraction and washing is so simple as to require no further description. The skill required in this class of mining is to follow the ancient channels, which always requires expensive prospecting directed by judgment and experience.

Claims of this nature rarely present any exterior evidence of their existence or any surface indication of their line of continuance. They are usually located on theory predicated on the trend of channel in developed claims or on the contour of rim bed-rock. A point having been selected, a prospect-shaft is sunk to bed-rock and drifts extended in various directions. The position of the channel being determined, perhaps by the sinking of several prospect shafts, a tunnel is run through the rim to intersect the channels and operations carried on commensurate with its extent. Some of these tunnels, with their continuation on the channel, are more than 6000 feet in length. The cars are usually run in and out by mules ; but in one instance, the Bald Mountain or Sierra Company, steam is used, the locomotive drawing 60 cars each trip. The channels are subject to disturbances, and sometimes are temporarily cut off. These breaks are usually termed "lava flows ;" but in my opinion, the material displacing the channel gravel is not lava. It is sedimentary magnesian pipe-clay, the result of some extinct stream of more recent age than the blue lead cutting across the channels and filling it with this material. In other words, it is like a wall or dam interposed across the stream, which must be cut through. This feature is no novelty on the ancient channels of Sierra County. The Bald Mountain Company encountered one that proved to be 500 feet in thickness, and materially retarded its progress northward. But on the other side, the blue lead was found intact.

The writer visited a mine of this class in Sierra County last spring, and quotes from memoranda made on the ground the following statistics : Working outlay of Ruby Mining Company, January, 1880, to April, 1883 :

Main tunnel construction.....	\$62,874.36
Improvements, buildings, roads, flumes, etc.....	11,751.23
General expense connected with working.....	9,404.57
Prospecting work.....	8,204.14

The work embraced at date, April 22d, 1883, 2400 feet of main tunnel

driven through solid bed rock, 1217 feet of drifts on channel, and 150 feet of rises. Nearly all of this work was done before the mine commenced to yield a profit. As this in some measure is a representative mine, I append the statement of cost and profit during the period of my visit. This is presented for the purpose of showing cost of operation of this class of mines, where the ground is opened and the gravel can be washed; but if the gravel was cemented and required crushing or pulverizing by mechanical appliances, the cost per car-load would be at least \$2 per ton.

RECORD OF RUBY MINE FROM APRIL 16TH TO 22D, 1883.

Running expenses of the mine:	
Labor—50 men at \$3.....	\$150.00
Outside men and management.....	25.00
Powder, fuse, caps, steel, iron, light, timber, and incidentals.....	29.00
Per day.....	204.00
Per week of six days.....	1,224.00
Running expenses for Sunday.....	30.00
Full week.....	1,254.00
The result was: Car-loads of pay dirt.....	709
Car-loads of waste dirt.....	200
	909
The cost per car-load was.....	\$1.34
Yield:	
Head boxes cleaned up, 161 ounces at \$17.50.....	\$2,817.50
Lower boxes not cleaned up, estimated 1-7 of head.....	402.50
	3,220.00
The pay per car-load was.....	\$3.64
Profit net for week.....	19.66

The Bald Mountain Company, adjoining the Ruby on the south, was more fortunate in opening its ground at very little expense. It commenced paying dividends within one year after ground was broken. The operations of this company are described in former reports. For the fiscal year prior to my visit, the company had paid \$61,200 in dividends from 107,300 car-loads.

Drift Mining in Forest Hill Divide.—The banks and bars of the Middle Fork of the American were noted for their richness in the early days of river and placer mining from 1849 to 1863. The product of the river claims would now be considered fabulous. Those who were not so fortunate as to acquire claims on the river followed up the gulches and ravines, working them by "rocker," "long tom," and "sluices," until the source of the river gold was discovered, 2000 feet above the river-bed, at the line of contact between the bed-rock slate and the overlying capping of volcanic material. The original locations were made in squares; but subsequently the mining laws were amended, and each locator was entitled to a certain frontage, with side-lines extended back to the apex or the water-shed line of the ridge. The frontage, as regulated by the mining laws of Forest Hill District, was only 75 feet, the locations extending back to the center of the ridge. These claims were opened by tunnels, some of which attained a length of half a mile or more. The ground worked out yielded at the rate of \$1,000,000 per mile of channel. The highest yield was in 1866, when the product was \$440,000 from the Forest Hill group alone. The yield sometimes ran up to \$10 per car-load, and equaled from \$300 to \$500 per linear foot of channels.

The Forest Hill Blue Lead of Placer County is evidently the remnant of an ancient river, now covered with many hundred feet of volcanic matter. It may be divided, for purposes of description, into two geographical sections, the lower and upper. The lower section presented itself on the sides of the ridge at Michigan Bluff, Bath, and Forest Hill, and terminated at Peckham Hill, where it was washed away when the great cañon of the Middle Fork of the American River was eroded. Its length between Michigan Bluff and Peckham Hill, allowing for the sinuosities of the channel, may be estimated at from 18 to 20 miles, the greater portion of which has been partially worked out. It is probable that the side exposure at Bath and Forest Hill was caused by the breaking off of a bend or elbow of the ancient river, which had its source higher on the divide.

The term "divide," in general use in the mountain regions of California, is synonymous with "ridge," and is used to designate the high land between two converging rivers.

The source and termination of this channel or system of channels is purely a matter of theory. Its rims of slate rock are well exposed and are sometimes more than a mile apart, and its current must have been more than a thousand feet wide at stages of high water. The ancient channels of this region consist of detached fragments of the original deposit, cut off, in continuity, by the deep cañons of the present rivers.

The stratification of this channel was well exposed by the air-shaft of the Breege & Wheeler claim, between Bath and Forest Hill, as follows:

Volcanic matter.....	Feet.
Quartz gravel.....	280
Compact quartz sand.....	12
Sand and gravel (soft ground).....	30
Pay gravel of the "upper lead".....	70
	8 to 10
Total.....	400

At this point, the upper strata were drifted to a width of 400 feet. The upper stratum or "lead" was worked by Breege & Wheeler for more than twenty-five years. Below this occurred poor strata for a depth of 150 feet, when the lower stratum or bed-rock was reached, which proved richer than the upper. At no time since the discovery, have operations been totally suspended on this claim, though there were periods when the channel was temporarily lost. At date of writing, a large force is at work, and there is renewed activity in many neighboring claims.

The Mayflower, situated west of the Breege & Wheeler, which was formerly extensively worked as an hydraulic claim, but now worked as a drift claim, presents some interesting features. At a depth of about 200 feet, and below the hydraulic ground, there is found what is called by miners a "false bed-rock." It consists of compact, gritty material, 140 feet in thickness, and lies horizontally. Below it was found the "lower

lead" of blue gravel, which in the Breege & Wheeler (Paragon) ground at Bath, on the opposite rim, proved so rich. This intermediate formation is the product of volcanic action filling the ancient stream. Then occurred a period of quiescence, and subsequently the waters flowed very nearly on the course of the former bed of the primitive channels, and formed what is now known as "the upper" lead. This was again succeeded by the volcanic flow that effectually closed the ancient river, compelling its waters to cut out a new channel, which was the origin of the present fork of the American River. This lava now forms the capping of the Forest Hill divide.

The Washington Company is engaged in sinking a prospecting shaft on the line of the Forest Hill channel, and should its operations be attended with success, many other claims will be opened in 1884. More than one hundred mines have been worked on the channel delineated on the accompanying geographical map. Most of them have had their day. The production of gold from this channel may be safely estimated at \$1,000,000 per mile in the aggregate. The production for any given distance worked has been greater at the upper end of the channel than at the lower—in other words, decreasing down-stream. Taking the Forest Hill group alone, I find it stated by J. Ross Browne, United States Commissioner of Mining Statistics, that up to the date of his report of 1868, the Forest Hill group had yielded about \$10,000,000. This amount must have been produced between 1852 and 1866; for I find from official sources that the yield of 1866-70 was as follows:

1866.....	\$440,000	1869.....	200,000
1867.....	300,000	1870.....	260,000
1868.....	250,000		

This was from the Forest Hill group alone, and does not include Bath District.

Since 1870, the yield has gradually decreased, and no accurate statistics are accessible. The bullion has been taken out by private conveyance of late years, and there is no record by Wells, Fargo & Co.'s Express. The ground is opened by means of tunnels, inclines (here called slopes), and shafts. Where there had been exposure from denudation, the hydraulic process was adopted, as at Bath, Dardanells ground, below Forest City, and Todd's Valley on one rim, and on the other at the Mayflower and the heads of the various forks of the Brossby Cañon. These are undoubtedly side presentations of the channel. As the hydraulic washing progressed into the hill, the superincumbent volcanic matter became thicker, and tunneling was resorted to; further hydraulic operations on the Middle Fork side, therefore, will not be profitable hereafter. Where there is no exposure, the ground is opened by shafts. This method is uncertain and precarious, as the best may not be selected. The surface indications by which the miner is guided are not wholly reliable. There are usually "sags" or depressions in the surface of the ground, which are supposed to indicate the line of the trough or gutter of the channel. In sinking inclines on the rim, there are frequently encountered masses of partially carbonized wood, beds of leaves, sand-bars, etc., showing that at times there were great floods, followed by a sudden subsidence of the waters.

Methods of Working Gravel.—The treatment of the auriferous gravel depends upon its texture. Where the material is compact but not cemented, it is readily treated by washing. The gravel is dumped into a shaped bin having a riffled gutter in the bottom. A stream of water is turned on from hose and pipe, and the gravel is run through several hundred feet of riffled sluices charged with quicksilver. The pipe has generally a 2-inch nozzle, and the water is projected under a head or pressure of from 50 to 100 feet. The sluices are usually from 18 to 20 inches deep, set on a grade of from 4 to 6 inches to the rod, sometimes less. The material passing over the sluices deposits itself in the cañon, or natural outlet, and is sometimes washed again in a supplemental line of sluices. This material, called "tailings," readily slacks after exposure, and is sometimes washed a second and even a third time. This method is to be commended for its cheapness. The mine usually produces enough water for this method of treatment. Where the gravel is cemented, it is necessary that it be crushed by stamps, or kindred appliances. The Excelsior and Paragon claims each have a 10-stamp mill. The greater portion of the yield of the last claim is from its mill. The cost per car-load at the latter claim for milling and mining is nearly \$4. This, however, includes the dead-work account. The metallurgical treatment is exceedingly simple. It is merely amalgamation in battery, supplemented by a short line of riffles.

At the Centennial mine, near Yankee Jim's, there is in use an ingenious device that takes the place of the stamp-mill. The gravel is hoisted through an incline or slope 200 feet in length and dumped into a bin, whence it passes through an automatic feeder into a revolving cylinder of boiler iron, shod the long way with railroad track. The cylinder (which is an old boiler) is 20 feet long, 3 feet in diameter, set on a grade of 1 inch to its length. It runs on bearings in the manner of a Bruckner revolving furnace. The gravel in passing along its course falls about thirteen times. The result is, that the gravel is broken and cleaned. To the lower end of the boiler, is attached a flanged set of bars, revolving with it. The bars are 3 feet long and 1½ inches apart. The material reaching this "grizzly," being effectually broken and cleaned, separates itself—the finer portions containing the pay dirt dropping into the feed-box of the crushing apparatus, while the coarser (pebbles and cobbles) are raked into a waste car. Thus the crusher (in this instance, two Huntington batteries) has no superfluous work. The owners assure me that the machine would run from thirty to thirty-five car-loads of 20 cubic feet per twelve hours, and that gravel paying \$2 per car-load would pay expenses. The motive power was steam.

Very extensive drift mining operations are conducted higher up on the ridge at Sunnyside, Damascus, Murky Hill, Last Chance, and elsewhere, and within the past year many miles of ground have been located in this high region at the Hog's Back, New Basin, and Deep Cañon. This region has an elevation above sea-level of 6000 feet, and is well watered and timbered, and the building of a "summer road" from the Summit Station of the Central Pacific Railroad is contemplated. During the last year, some 10 or 12 miles of locations have been made, but the season was too late to admit of a detailed examination.

Quartz Mining.—The business of quartz mining in California has recently undergone such improvement as will be likely to insure for it better results than have attended it in the past—silver mining promising

at the same time to become soon an important factor in bullion production. The work of rehabilitating the old and partially deserted mines will go on and perhaps be accelerated. Some virgin ground will be opened and worked. The mills now running will be kept in operation; some will be enlarged, and many new ones put up. With reduced expenditures, there will come a closer working of ores growing out of some improvements in the mechanisms and some in the metallurgy of the business; and thus out of these gains there may be expected to arise a steady and long-sustained increase of bullion production. Gold-bearing quartz is now profitably worked in California, yielding a total of not over \$5 per ton; of this grade of quartz, there are great quantities in California eligibly situated for treatment. Modern improvement and appliances have materially reduced the expenses of extracting and reducing gold ores. With a multiplicity of stamps, water-power, giant powder, power-drills, rock-breakers, self-feeders, concentrators, and the use of gravity in handling ores, low-grade ores can now be profitably reduced. The cost of mining varies in different districts according to the condition of the mines, width of ledges, character of country-rock, etc. No two districts are precisely similar, but the rate of labor does not vary materially in California. I have selected the operations of a representative low-grade mine, to show the relative cost of different classes of work, trusting that the example will induce other miners to keep like accurate and systematic records for public information and benefit. I am prohibited from mentioning the name of the mine, and will merely say that the country-rock is granite, the ledge matter easily broken, the ledge of fair width, and the rates of labor \$3 per day. Under these conditions, the relative cost was as follows:

SUMMARY OF OPERATIONS OF A REPRESENTATIVE LOW-GRADE QUARTZ MINE. Statement of Costs.

ITEMS.	Cost.	Cost per foot.	Cost per ton.	Number of feet.	Number of tons.	Tons per foot.	Feet per ton.
Tunnel 7½ by 10, cross-cuts, Levels 8 by 8, opened through tunnel.....	\$17,419.22	\$19.77	\$3.31	881'00	5,264	5.97	0.167
Winze 5 by 7½.....	30,472.88	13.61	2.80	22'38	19,915	4.88	0.205
Winze levels 8 by 6.....	1,254.52	17.92	6.15	70'00	204	2.91	0.343
Rises 5 by 6½.....	347.68	14.48	3.86	24'00	90	3.75	0.267
Cross-cuts 6 by 4½ in. vein matter.....	6,213.90	7.40	2.95	8'39	2,112	2.52	0.397
Stopes.....	4,524.28	5.26	2.68	8'60	1,690	1.96	0.509
	9,588.36		2.36		4,053		

Ratio of Costs. [Assume these items to cost 100.]

ITEMS.	Tunnel.		Levels.		Winze.		Winze levels.		Rises.		Cross-cuts.		Stopes.
	Feet.	Tons.	Feet.	Tons.	Feet.	Tons.	Feet.	Tons.	Feet.	Tons.	Feet.	Tons.	
Tunnel.....	100	100	69	85	91	106	73	117	37	89	27	81	71
Levels.....	146	118	100	100	132	220	107	138	54	105	37	95	34
Winze.....	110	54	79	46	100	190	81	63	41	48	29	44	38
Winze levels.....	137	86	94	72	124	159	100	100	51	76	36	69	61
Rises.....	267	112	184	95	242	209	196	131	100	100	71	91	80
Cross-cuts.....	376	124	259	105	341	229	257	144	141	110	100	100	88
Stopes.....		140		119		261		164		125		114	100

My informant, in commenting on his record, says: "I have been surprised at the figures found in the ratio, and they are not such as are commonly accepted; for instance, if it costs 100 to stope, it only costs in tunnel, 140; levels, 119; winze, 261; winze levels, 164; rises, 125; and cross-cuts, 114. By guess, I should have said tunnel 400 at least."

There is really no standard line of demarcation between the classes of gold-bearing quartz known as "high grade" and "low grade." About ten years since, all ores producing by milling process less than \$10 per ton were classed as low grade, and no ore producing less than \$20 per ton was regarded as "high grade." Now, ores producing \$10 per ton are considered as high grade where water can be utilized as the motive power; and many ledges are yielding a handsome profit where formerly great losses were inevitable. This is due solely to the general adoption of labor-saving machinery and the introduction of water instead of steam. In this State, particularly on the mother lode, the vein in places expands from 50 to 100 feet in width, or at least it is metal-bearing for that width, inclusive of the slates, giving an average value per ton of from \$4 to \$6. In many places, it can be worked by open quarry to a considerable depth, and by adit level to a much greater. The great saving is in labor, as a large mill can be run at but little more expense than a small one.

A mine of this class well known to the writer has recently attracted much attention. It is situated in Tuolumne County, on the section of the mother lode beginning at Rawhide and running to the bank of Wood's Creek, below Jamestown. For several miles of the lode, the rock worked in bulk will yield in the mill from \$3 to \$6 per ton, and everywhere in this section it can be mined at an expense of \$1 per ton.

One of the largest low-grade properties in the State is that of the Alabama mine, situated in the belt above referred to. Mr. Harris, the owner, on application, furnished the following details of his operations:

"Record of the operations of the Alabama quartz mine of Tuolumne County, California, 1883.

"Mining.—Employ three miners at \$3 per day, and five surface-men at an average of \$1.50 per day; cost of mining per ton, including dead-work, 40 cents; average yield per ton, from \$3 to \$3.50, containing also 1 per cent sulphurets, which are not saved.

"Milling.—Forty stamps, run by water-power; weight of stamps, 750 pounds; 8-inch drop; 90 drops per minute. Cost of mill, \$24,000. There are neither concentrators nor pans. Capacity per twenty-four hours, 80 tons. Cost of mill treatment, 70 cents per ton.

"The mine is worked by open cut and tunnels, without a shaft. The formation is mixed slate and quartz, and may be termed siliceous slates. It lies contiguous to the great mother lode (which is here compact white quartz) on the hanging-wall or eastern side. The greatest depth attained in the workings is 66 feet. The total cost of mining and milling is \$1.10 per ton. This is without doubt the lowest record of profitable mining of low-grade ores presented in California.

"The mill was constructed with an especial view to saving all the labor possible. Nothing that can be done by machinery is done by hand. The power for the mill is furnished by a Knight water-wheel, which is run by water brought from the Tuolumne Water Company. Water costs \$23 per day."

The Patterson mine, of Tuttletown, Tuolumne County, is on the mother lode. It is worked by shaft and has attained a depth of 500 feet. Under these conditions, by careful management and close treatment of the ores, it is realizing a handsome profit to its owners. Mr. W. F. Drake, the superintendent, furnished the statement of operations of the mine and mill. From an examination of his figures, it will be observed that Mr. Drake has demonstrated that low-grade ores can be worked with profit by skillful metallurgical treatment. His views on the subject, recently published, are worthy of reproduction. He says: "The best regulated mills lose a great deal in this age of scientific advancement that should not be lost. Some mill-men advocate fine screens, say No. 60. My experience is, that the loss is greater by reducing in stamp mortars the ore to such fineness; for the gold and mercury then become more floured, and pass off in the slimes, thereby increasing the loss, which no copper plates will catch, even if electro-plated with silver or gold.

"I have given practical attention to the reduction of gold ores for the past thirty years, and find myself following the old system, with very few improvements, but not as a matter of choice, it is so hard to introduce any thing new, prejudice going always against one. I hardly dare to adopt a plan that is far surer and safer, because it would be at once considered a 'hobby.' So let us unite, exchange ideas, and see what can be done to lessen the evil. The matter must be faced, and I feel sure can be successfully combated. We have tried the old system long enough. Of course, there are legions of patented mills, contractors, amalgamators, etc.; but so far, what do they amount to, if there is no general system, pronounced by trial of time and in all conditions to be perfect? My idea of the matter I will suggest in a few words. Crush your ore coarse enough not to bruise up your sulphurets too fine, so that they may be readily caught, say by a Frue concentrator, which is as good a machine as is made for my purpose. First of all, the most important point, do away entirely with stamp-mortar amalgamation. After the base metals have been saved by concentration, pass the residue through pans, and there amalgamate. I prefer my own pans, as they are self-discharging. They grind and amalgamate perfectly, and do not flour the mercury, reducing the pulp to thin paste. Then let the overflow of slimes pass into wooden settlers with revolving agitators; then, by careful manipulation, at least 90 per cent will be saved. It is not too much, perhaps, for me to say that our mill is as perfect a gold-saver as the old appliances permit. From assays made, I am not losing a very great percentage, but there is no reason why that loss may not be saved. I trust the remarks I have made will be taken up by others, and their opinions fully expressed with the one object in view of a common good. I have lately visited all the principal mills in Calaveras and Amador counties, and failed to find any thing but the old system in vogue."

By way of contrast, and with the view of showing the advantages of water-power and labor-saving machinery in the treatment of gold-bearing ores, the following is a statement made by Prof. B. Silliman, July, 1867, of the operations of the Rawhide mill, of 20 stamps, steam-power. The mill and mine are situated within two miles of the Alabama, and have not been worked since the period of his report:

MILLING COSTS—RAWHIDE MILLS, JULY, 1867.

Engine:	
One engineer.....	\$6.00
One engineer.....	4.00
Four and one half cords of wood, at \$4.....	18.00
One fireman and helper.....	2.50
Oil, etc.....	.50—\$31.00

COST AND POWER.

Stamps:	
One Manas rock-breaker.....	2.75
Two battery-feeders, at \$3.....	6.00
Hauling ore.....	3.50
Shoes and dies.....	3.00—15.25
Pan and amalgamators:	
One amalgamator.....	5.00
Two pan-men, at \$3.....	6.00
Two tank-men, at \$2.50.....	5.00
One assistant.....	3.50
Quicksilver.....	4.00
Lights, oils, chemicals, etc.....	1.50
Wear and tear of shoes, dies, and pans.....	7.00—32.00
Add sundry contingencies.....	1.75
Total.....	\$80.00

Or at the rate of \$2 per ton on a working capacity of 2 tons to stamp. With the addition of superintendence and extraordinary repairs, the cost would be at least \$2.50 per ton.

The principal quartz-mining counties of California are Amador, Calaveras, El Dorado, Mono, Nevada, Placer, Plumas, Sierra, and Tuolumne. The number of mills in these counties will aggregate 150 and the number of stamps about 2000—many of the mills having from 20 to 60 stamps, and a few as many as 80. While there are no complete statistics with regard to this branch of the mining industry, it will be safe to assume that 2000 stamps, on an average, are daily engaged in crushing quartz. Allowing a capacity of 2 tons per day to the stamp, and an average run of 385 days to the year, the output of quartz would be about one and one third million tons per annum, and this estimate would closely conform to the gold product usually credited to this industry; say five or six millions out of a total of eighteen millions, the remainder being from hydraulic and other classes of mining.

The principal low-grade mines of the State are situated in the counties of Plumas and Sierra, and are owned in England. Through the courtesy of the resident manager, Mr. William Johns, I am enabled to pre-

sent a statement of the cost of milling and mining of two mines, which have been profitably worked for nearly thirty years. This is preceded by the returns from a large low-grade mine in Southern California. The Green Mountain, of Plumas, a notable low-grade mine of great value, failed to transmit returns.

The quartz-mining districts of Auburn and Ophir are situated in the foot-hills of Placer County at an elevation of from 800 to 900 feet above sea-level. The controlling rock structure of the district is a belt of granite between belts of metamorphic slates. The ledges are, as a rule, narrow and rich. Quartz mining has been continuously prosecuted, with varying but generally successful results, since 1854. There are now about fifty producing mines in the two districts, employing nearly five hundred miners. Only a few of these locations, however, have attained depth below the water-line. Among the mines noted for their past record are the Crater, Saint Patrick, Peter Walter, Bellevue, and Green, most of which are still worked. The greatest depth attained in these districts is less than 1000 feet. Most of the operations are reasonably profitable, and the quartz industry has every prospect of permanence.

Grass Valley District is situated 26 miles due north of Auburn and Ophir. Quartz mining was commenced here as early as 1851, and still forms the principal occupation of the place. The records of the Allison Ranch, the Massachusetts Hill, North Star, and Eureka mines are among the most noted of any in the State for production. It is claimed that the first quartz mill in the State was erected at the Allison Ranch mine on Wolf Creek. This decision is, however, disputed by residents of Amador County, who allege that the first stamps dropped were on the Herbertville mine, near Amador City.

The mines of Grass Valley occur in various formations. The Allison Ranch was in granite, the Massachusetts Hill and North Star in slate, the Eureka in serpentine and slate. Of the principal producing mines now worked, the Idaho, a continuation of the Eureka, is in the contact of the slate and serpentine; the Empire and the Magenta in slate; the New York Hill in diorite. With the exception of the Idaho, all are narrow ledges, but are unusually rich, coming under the classification of "high grade." There are now in constant operation three custom and four company mills, aggregating 100 stamps.

The Idaho Company has, during the past year, at a large outlay, substituted water under pressure as a motive power instead of steam. For this purpose, several miles of ditch were dug and two miles of No. 14 pipe, 32 inches in diameter, laid. The pipe is double riveted and lead jointed. It purchases 300 inches of water, at 16 cents per inch, delivered under a pressure of 550 feet. This power more than suffices to run the 50-stamp mill and all its accessories, machine-shops, etc., and also for the pumping and hoisting, which is done to a depth of 1200 feet. The power is applied to the newly-invented Pelton wheel of the "hurdy-gurdy" class. It uses six of these wheels, the largest having diameters of from 6 to 8 feet. These water-wheels have attracted special attention in the mining regions of this State, and are designed for small supplies of water where high heads can be attained. They are rapidly superseding the use of steam as a power. The change at the Idaho was made at an expense of \$55,000, but it is believed that that amount will be saved in a two years' run.

The year has been characterized by active prospecting and the reopening of some partially developed mines. The western continuation of the Eureka, and the eastern continuation of the Idaho chutes are sought by prospecting-shafts, with a reasonable showing of success.

Of the mines abandoned for several years, the Albion Ranch and the North Star offer strong inducements for reopening. The Magenta, for some years shut down, has been reopened and several profitable crushings made. The shaft had, January 1st, 1884, attained a depth of 400 feet, and the vein found strong, permanent, and rich.

Nevada Mining District adjoins Grass Valley on the north. There is not, however, any similarity either in the rock structure or the ores of these districts. The principal mines of Nevada District are situated within the limits of a granite belt, or near the point of contact between granite and slate. The ores, as a rule, carry a greater proportion of sulphurets, and the mill treatment is consequently more expensive. The almost universal use of the improved concentrators and the introduction of chlorination-works at the mines, as a part of the plant, have brought the working of hitherto so-called refractory ore to a high degree of perfection, and results of 80 per cent of the assay value are now attainable. In harmony with this advance, the cost of mining and milling has been greatly reduced by the adoption of water under pressure as a substitute for fuel and steam. The consequence is, that this branch of mining is enjoying a career of unexampled prosperity. Quartz mining commenced here as early as 1850-51, and continued until 1877, when it became nearly stagnant by reason of the failure of many so-called "processes," which were tried at great expense and all proved failures. The persistence and energy of the owners of one of the large mines, however, overcame all obstacles. A nearly perfect system of metallurgical treatment was finally evolved, and nearly all the abandoned mines were reopened and fitted out with water-power. At the present time, there are twenty-five mines working below water-level, employing nearly five hundred miners. There are in operation ten company mills and three custom mills, aggregating 200 stamps. With only one exception, these mills are run by water-power under varying heads of pressure. The largest mine, the Providence, runs its hoisting and pumping works and its 40-stamp mill with 140 inches of water delivered under a pressure of 392 feet, at a cost of 16 cents per twenty-four hours. Under such conditions, the cost of mining, pumping, and milling in the district for mines 500 feet in depth may be assumed to be \$5 per ton; and this in most cases will include dead-work. The cost of chlorination is included in the term "milling," where the company owns its own chlorination-works. The cost of chlorination of the concentrated sulphurets is from \$20 to \$25 per ton at custom works, and from \$9 to \$13 at company works. This would be equivalent, in the latter case, to a cost per "rock ton" of from 33 to 40 cents, if based on the percentage of sulphurets usually found in the mines of this district. The practical working results of concentrated sulphurets in chlorination-works, where there are facilities for leaching the silver from the chlorination pulp, is from 88 to 90 per cent.

The following statement of expenses connected with the working of a mine with a 10-stamp mill—the whole plant being run by steam-power

—is gleaned from the books of the Murchie Gold Mining Company, of the district:

ITEMS OF MINING EXPENSE—STEAM-POWER.	
Superintendence, including book-keeping and assaying, per day...	\$12.00
Mine foreman (for day time), per day.....	4.00
Mine foreman (for night time).....	4.00
Blacksmith.....	3.50
Blacksmith helper.....	1.50
Engineer.....	3.25
Lander.....	2.50
Fireman.....	2.00
Mill expenses:	
Amalgamator, per day.....	4.00
Two millmen.....	5.00
One Chinaman.....	1.50
Screens.....	\$0.80
Quicksilver.....	.40
Fuel, per cord.....	3.50
Powder, per pound.....	.23
Candles, per pound.....	.18
Steel, per pound.....	.14
Iron, per pound.....	4.5
Fuse, per 100 feet.....	.67½
Mine timbers (foot).....	.05
Lagging, 6 feet each.....	.05
Poles, 6-inch, 20 feet.....	1.00
Oils, gallon.....	1.00
Charcoal, bushel.....	.12
Steel-wire rope (foot).....	.50

The cost of fuel and the necessary labor attending the use of steam-power at the above mine is \$24.50 per day, the consumption of fuel averaging 200 cords per month. The segregated cost of milling is \$1.50 per ton. But with water-power, a saving of 75 cents per ton could be effected on a 40-stamp mill. The record would thus stand approximately:

Mining, per ton.....	\$3.50
Milling per ton.....	.75
Chlorination of ore, per ton (rock broken from the mine).....	.35
Estimate dead-work to ton of ore.....	.40
Total.....	\$5.00

The capacity of a 40-stamp mill may be estimated at 28,000 tons per annum.

Nevada District having reserves of \$10 ore, the outlook for the future is promising.

The metallurgical treatment of ores in Nevada District does not naturally differ in the various mines. The works of the Providence Mining Company approach as near perfection in efficiency and economy as any plant in California. This mine has a length of 7000 feet, and is worked through three shafts. The drain tunnel is now 4000 feet in length and the deepest working of the mine by incline shaft 1100 feet. The hoisting, pumping, and milling are done by water-power, the company using 140 inches (miner's measurement), under a pressure or head of 392 feet, for which they pay 16 cents per inch. This would be equivalent to 330,400 cubic feet, or about 2,500,000 gallons per twenty-four hours. The total cost for power is therefore from \$32 to \$40 a day. The ore is landed on the mill floor, where it passes through the rock-breakers and drops to the feed-platform. Here it passes to the batteries, thence (after amalgamation in battery) over silver electro-plated sluices to the Frue vanners, of which there are sixteen, or four to each battery of 10 stamps. The product of the Frue concentrators goes to the drying-floor and thence to the roasting-furnaces. These are circular and constructed with three floors, the ore dropping from floor to floor at the proper stage of roasting. There are two furnaces with a capacity of three tons each per twenty-four hours, then follows the chlorination-vats, eight in number; and finally the leaching tubs for the extraction of the silver. The total drop from the rock-breaker floor to the leaching-floor is 120 feet.

This system, though not absolutely perfect, is the best that has been devised for this class of ores. No measures have been taken for the treatment of tailings, but the owners of the property have liberally afforded every opportunity to the numerous experimenters in the line of utilizing tailings, but so far without mutual profit.

The Providence mine is prolific in many grades of ore, and its annual product may be gauged by the owners according to their necessities. They have large bodies of low-grade ore that afford a fair profit at \$7 per ton, and choice spots containing telluride ores averaging \$1 per pound. Also masses of heavy sulphureted ore averaging from \$50 to \$100 per ton. This latter class of ores is treated separately by crushing through a segregated battery, without concentration, settling the residue in a tank and mixing it with the concentrators of the Frue vanners with which it is merged in the treatment by chlorination.

Amador County still maintains its prominence as the second mining county of the State. The companies operating in that county are close corporations, and rarely make public the details of their business. The principal mines are on the line of the mother lode. The ore is not of high grade, rarely exceeding \$10 per ton, but the mines are generally worked with profit. Among the prominent mines are the Keystone, Empire, and Pacific. The latter company is a large producer. The mill of 60 stamps is considered a model one for effectiveness and economy. When Prof. Thomas Price was appointed purchasing-agent for the great mining company at Transvaal, in South Africa, he examined several mills in this State, and, after comparison, he decided to build a duplicate of the Pacific mill.

NATURAL GAS FOR PICKLING.—Mr. William Metcalf, in the discussion of his paper on natural gas, which we printed in our last issue, said: I will mention another application of this gas that I heard of the other day. I did not include it in my paper because I had no opportunity of seeing it for myself. It is certainly very peculiar, and if it is any thing like what is reported, it is another adaptation of the gas. It is in pickling, or rather doing away with pickling. All who are familiar with the manufacture of very thin sheets of metal, either iron or steel, know the great difficulty there is in pickling the scale off, in order to get a fine finished surface. They know the danger of the acid penetrating through the metal and destroying it. It is a difficult thing to do well, and the operation is one that must be done carefully, and is one that every body that has it to do will be glad to get rid of. I am told that a gentleman at Leechburg, now applying for a patent on the process, in annealing fine sheets, brings the annealing-box up to the required heat by use of the natural gas, and then by a pipe, connected into the box, when the metal is hot enough, turns in a stream of the natural gas on to the material and allows it to pass through, keeping the box hot for some little time, and then allowing it to cool gradually, when the whole mass of sheets come out perfectly clean, as clean as tin, but not as bright, but entirely clean, and singular to say, though the sheets are very thin, and packed closely in heavy boxes, this gas in some way gets in all among them and they come out perfectly clean and free from scale. This is another application of the gas that will certainly be of great benefit if it proves to be practicable, and there is no reason why it should not be.

STAMPS VERSUS ROLLS.

Mr. C. A. Stetefeldt has contributed to Mr. Horatio Burchard's last volume on the statistics of the production of the precious metals, a paper reviewing recent progress in the milling of silver ores. We quote from it the following part, which relates chiefly to the question now so widely discussed as to the comparative merits of stamps and rolls for crushing. Mr. Stetefeldt, we presume, speaks specifically of Krom's design of rolls, because figures on their work were available to him, although, of course, rolls are built for practically the same purpose by other manufacturers.

The stamp-battery still remains the most troublesome part of the mill plant. It is true the battery of to-day is far superior to that of twenty years ago, not only in efficiency and durability, but in auxiliary appointments. The dusty chamber in front of the battery, where the pulp accumulated, and which had to be entered by a laborer to load a car, has given way to elegant conveyers and elevators, which remove the pulp continuously and take it to the roasting-furnaces. Dust-chambers now connect with the battery-housing, into which the dust, formerly escaping from every opening and settling upon machinery, is drawn by a suction-fan, to be regained, and finally mixed with the pulp before it enters the roasting-furnaces. Machinery has also been perfected for the separate crushing and feeding of the salt, this being of advantage in some respects.

The first decisive departure in pulverizing ores dry was made by the introduction of Krom's rolls at the Bertrand mill, Nevada, in 1882. While rolls had been generally used for pulverizing ores for the purpose of concentration, it remained for Mr. Krom to construct rolls suitable for producing pulp for subsequent treatment by roasting and amalgamation or lixiviation. By providing the rolls with steel tires, running them at the high speed of 100 revolutions per minute, with pulleys only, and constructing them in a most substantial manner generally, he succeeded where others had failed. Leaving, for the moment, the purely economical question out of view, I will consider the physical difference that exists between pulp produced by each of the two machines. If pulp produced by rolls, or by stamps, is sifted through the same size of screen, the ore particles from the former are more uniform in size than those from the latter. The pulp from the rolls contains much less of such fine material as will pass, say, through a No. 100 wire screen, down to impalpable dust. Based upon experience in raw amalgamation, it was formerly assumed that the production of an impalpable powder was essential to success, even in case the ore had to be roasted before amalgamation. Hence it was the general practice to crush through a No. 80 or No. 60 screen in the older mills of Nevada. While this practice was gradually abandoned, and crushing through No. 40, and finally No. 30, screen was in most mills adopted, the subject was never fully investigated until recently. It has been found that for chloridizing-roasting, great fineness of the ore is entirely unnecessary, and that it is actually injurious in the amalgamation of roasted silver ores. Of course, the character of the ore has always to be taken into consideration. In the lixiviation process, a large percentage of fine material interferes seriously with rapid filtration, and unnecessarily lengthens the time of working a charge. From this, it follows that ore pulverized by rolls is mechanically in a more favorable condition than if stamps have been used.

I turn now to the question of economy. A discussion of the subject that is complete and thorough, and compares the efficiency of rolls and stamps under varying conditions, is not possible at present, because the available statistics concerning rolls are confined to those from the Bertrand mill, Nevada. Prior to the introduction of Krom's rolls in this mill, they were used in works only erected for the concentration of ores by Krom's dry system. Sufficient evidence, however, has accumulated to prove the superiority of the rolls beyond any doubt. Their introduction at the Mount Cory mill, Nevada, will soon bring additional proof. It seems to me that the application of rolls is most favorable in such cases in which the silver is extracted by lixiviation and the character of the ore permits comparatively coarse crushing without interfering with good roasting.

A comparison between rolls and stamps will be made from the following premises, for the correctness of which I must ask the indulgence of the reader. I assume that the crushing capacity of two sets of Krom's 26-inch rolls is equal to that of a 30-stamp battery with stamps of 850 pounds dropping from 7 inches to 8 inches 94 times a minute. Mr. Clark, superintendent of the Bertrand mill, states that he can crush, with two sets of rolls, 100 tons of ore in twenty-four hours, to such a fineness that all will pass through a No. 16 screen, consuming not over 4 cords of wood for power. The ore has a quartz gangue, and is by no means an easy crushing ore. The fuel required for running 30 stamps would be about 6 cords of wood in twenty-four hours, taking into consideration the construction of engine and boilers and quality of wood. For some remote locality in the West, the following prices are assumed, namely: Freight at 3 cents per pound; lumber at \$50 per thousand feet; wood at \$6 per cord; wages of carpenters at \$4.50 per diem, and of millwrights at \$6. Certain items of construction will be about equal, namely: Conveyers, elevators, revolving screens, and dust-chambers. Revolving screens are also used in connection with a well-appointed battery, in order to separate coarse material resulting from a breakage of battery screens. The building, however, for rolls will be much smaller than that for the battery, and a saving of not less than \$1500 will be effected in its construction. Finally, the rolls requiring less power, a saving of at least \$1250 will be made in providing and setting up engine and boilers in a mill with rolls.

Cost of Erecting a 30-Stamp Battery.—The plant, including hard-wood screen frames and guides, wooden pulleys on cam-shafts, Tulloch's feeders, and all necessary bolts, weighs 90,600 pounds, and costs in Chicago \$5850, according to a statement from Messrs. Fraser & Chalmers. The framework takes about 36,000 feet of lumber, and the expense of setting up the battery is estimated at \$4000. Hence the total cost of constructing a 30-stamp battery is:

Plant at foundry.....	\$5,850
Freight.....	2,718
Lumber.....	1,800
Cost of setting up.....	4,000
Total.....	\$14,368

To this has to be added, in order to compare with rolls:

Extra cost of building.....	1,500
Extra cost of engine and boilers.....	1,250
Total.....	\$17,118

Cost of Erecting Two Sets of Krom's 26-inch Rolls.—The amount of lumber required for setting up the rolls alone is merely nominal. From this, it follows also that the labor of placing the rolls must be trifling. The weight of one set of 26-inch rolls is 12,000 pounds, and the cost in New York, \$2250. There is one self-feeder required, and its weight is estimated at 2000 pounds; cost at \$200. From these figures, I deduce the following:

Plant at foundry.....	\$4,700
Freight.....	780
Cost of setting up.....	700
Total.....	\$6,180

Difference in favor of rolls, \$10,938.

Wear and Tear of Stamps and Rolls.—In comparing the wear and tear of stamps and rolls, we can not very well express this item per ton of ore crushed, because the capacity of the pulverizing machinery is a function of the hardness of the ore and of the fineness of the pulp produced. A more correct method will be to take figures per running time of twenty-four hours. Making estimates from this stand-point, it is supposed that the wear and tear in running the machinery at full capacity is a nearly constant quantity, while the capacity is variable, as stated above. The wear of rolls is principally confined to the steel tires; that of the battery, to a great number of parts. With rolls, the steel tires can be consumed to within less than one half inch of their thickness, while with stamps the shoes and dies have to be exchanged after only two thirds, or less, of their weight has been worn, leaving other parts out of consideration. Another point should not be overlooked. The complicated construction of the battery causes considerable expense in skilled labor for repairs, which in the case of rolls is merely nominal. Advocates of the battery have argued that its great advantage is the continuance of its operation if one battery of five stamps gets out of order, while both sets of rolls, or three sets, as the case may be, have to be stopped if repairs are needed for one set. But it is just the solid construction of Krom's rolls that reduces stoppages from this cause to a minimum. How often it is necessary to hang up stamps for repairs is too well known to require any statistical proof.

Wear and Tear of Krom's Rolls.—As to statistics of wear and tear of Krom's rolls, I am confined at present to those from the Bertrand mill. Mr. R. D. Clark states that two sets of steel tires have been worn out in crushing, in round figures, 20,000 tons of ore. As stated previously, the full capacity of the rolls is in twenty-four hours 100 tons, the ore being sifted through a No. 16 screen. In the beginning, however, the ore was crushed much finer, namely, so as to pass a No. 20 screen, and the daily capacity of the rolls was much less. Taking this into consideration, the actual wearing capacity of the tires can not be estimated at less than 250 working days. The cost of this wear is as follows: Two sets of steel tires cost at New York \$764, their weight being 3264 pounds. With freight at 3 cents, the total cost of these steel tires is \$862.

Wear and tear of steel tires in twenty-four hours.....	\$3.45
Wear of other parts, screens, lubricants, and supplies.....	1.75
Wages for repairs.....	1.25
Total.....	\$6.45

Wear and Tear of Stamps.—I have been favored with statistics from three of the most prominent mills in the West, namely, the Manhattan, Nevada; the Ontario, Utah; and the Lexington, Montana. Taking into consideration the somewhat abnormal conditions of the Manhattan mill, in so far as the weight of stamps there is 1000 pounds, and the number of drops per minute greater than in either of the other mills, and that the statistics from the Lexington are those from the first year's run, where certain breakages are reduced to a minimum; finally, that freight in these localities, on account of direct railroad communications, is less than I have assumed in my premises, I arrive, by making such allowances, at the following figures for wear and tear of a 30-stamp battery per twenty-four hours' running time:

Cost of all parts subjected to wear and breakage, screens, supplies, and lubricants.....	\$11.50
Wages for repairs.....	5.50
Total.....	\$17.00
Wear and tear of rolls.....	6.45
Difference in favor of rolls.....	\$10.55

Interest and Amortization.—In comparing the expense of running rolls and stamps, interest and amortization on the excess of capital required in the original construction of the plant for stamps can not be neglected. Considering the short life of most silver mines in this country, this item can not be taken at a lower rate than 15 per cent per annum. If we take the running time of a mill at 350 days in the year, and consider that the mill with stamps will cost \$10,938 more than one with rolls, the interest and amortization amount to \$4.68 per day.

Summary.—From the above, we find the following daily saving in a mill with two sets of Krom's rolls, as compared with 30 stamps:

Wear and tear and repairs.....	\$10.55
Interest and amortization.....	4.68
Fuel, 2 cords of wood, at \$6.....	12.00
Total.....	\$27.23

If no great accuracy can be claimed for this estimate it is the best that can be given at present, and it is sufficiently correct to prove the economy of rolls beyond any doubt. Mr. Krom and Mr. Clark claim a much greater saving in favor of rolls than that stated above. The future will demonstrate the correctness or fallacy of this view. Even if we consider two sets of rolls equal in capacity to only 20 stamps, there still remains a considerable margin in favor of rolls.

THE injunction suit of W. P. Rend & Co. against the Columbus, Hocking Valley & Toledo Railroad was settled December 9th by agreement.

FURNACE, MILL AND FACTORY.

The Mechanicsburg Machine Company, Mechanicsburg, Ohio, has made an assignment to Pearl J. Burnham. The liabilities are estimated at \$150,000, with nominal assets of \$100,000. The failure of the company caused the assignment of John C. Baker, its president, and Jasper N. Shane, its superintendent. Several other failures are expected to follow.

The Underground Electric Company, with a capital of \$25,000, has been incorporated by Joseph B. White and Henry Franz.

The old mill operated by the Mahoning Valley Iron Company, at Niles, Ohio, shut down December 5th.

Reports from Pittsburg state that the project to restrict the production of pig-iron by banking the furnaces for a month or more has been allowed to die quietly. Instead of further restrictions, reports have been received at the office of the Pig-Iron Association in that city, that a number of furnaces will blow in during next month.

The Lowe Water-Gas Company has been incorporated by George C. Furman, Henry F. Kilburn, and Thaddeus S. C. Lowe, with a capital of \$25,000.

The managers of the Albany & Rensselaer Iron and Steel-Works at Troy, New York, contemplate enlarging the corporation and building blast-furnaces on the island opposite the works, producing pig-iron for use in their works. The projected expenditure is about \$600,000. The recent visit of New York capitalists to the works was with the intention of enlisting New York capital in the project. Erastus Corning will retain a large interest.

The Harlan & Hollingsworth Company, of Wilmington, Del., has just closed a contract for building two large iron ferry-boats for the New York Ferry Company.

The Citico furnace, Chattanooga, Tenn., is filling an order for 5000 tons for a Philadelphia foundry.

The Collier White Lead Works, at St. Louis, Mo., will shut down December 13th. The concern has a capital of \$1,000,000 and employs 500 men. The stoppage is caused on account of overproduction and dullness.

The J. I. Case Plow Company, of Racine, Wis., has made an assignment.

The Ferndale rolling-mill, near Catasauqua, Pa., has been closed.

The Eastern Pig-Iron Association, composed of furnace proprietors in the Lehigh and Schuylkill valleys and Southern New Jersey, will hold a meeting in Philadelphia, Pa., about December 20th.

The Sharon Iron Company's mill, Sharon, Pa., has resumed operations with indications of a steady run through the winter.

The Warren Foundry and Machine Company, in Philipsburg, N. J., has received a large increase of orders, and December 9th started the idle parts of its works, giving employment to a large number of suspended hands.

Joseph M. Wales & Co., Boston, Mass., dealers in iron and steel, have gone into insolvency.

It has been decided to run the Plattsburg, New York, blast-furnace this winter.

An execution has been issued by James H. Reed, trustee, against F. B. Laughlin, owner of the Stewardson Furnace, for \$90,000, in accordance with a judgment confessed December 6th.

The Western Nail Association met at Pittsburg, Pa., December 10th, and reaffirmed the card rate. The question of rate-cutting created a lively discussion, but no definite action was taken. The trade was reported dull, and stocks still light.

The Briarfield nail mill, at Briarfield, Alabama, intends to increase its machinery.

The Baldwin Works, Philadelphia, has just shipped a schooner load of locomotives, valued at \$79,290, to Rio Janeiro.

The Norway Furnace at Bechtelsville, owned by the Pittsburg & Reading Coal and Iron Company, but operated by the firm of Messrs. Gable, Jones & Gable, of Pottsville, has been leased by them for another year from December 4th.

The Norway Steel and Iron Company, at South Boston, has started up its Siemens-Martin furnaces for the manufacture of steel, thus giving employment to over 500 men.

The Thomas Iron Company, Pennsylvania, it is said has made another reduction in pig, and 40,000 tons have been sold for delivery in 1885 at \$18 for No. 1 and \$17 for No. 2. This is the lowest since the break in 1878, when Lehigh fell to \$17. Five thousand tons of steel rails have been sold down to \$27 at the works and 7500 tons at private terms.

The Kemble Coal and Iron Company, of Fayette County, Pa., is to be reorganized under the name of the Kemble Iron Company.

LABOR AND WAGES.

A company of miners who intend to find employment in the coal mines of the Lehigh Valley, Pennsylvania, arrived from England, December 8th.

The wages of the employes of the Atlas Foundry, of Pittsburg, Pa., have been reduced seven and a half per cent.

The Railroad Coal Trade Tribunal met in Pittsburg, Pa., December 8th, and unanimously decided to continue the present rate of mining—three cents a bushel—until further notice. The settlement of the question without recourse to an umpire gives general satisfaction.

A cablegram from Paris, France, announces that, at the meeting of workmen, resolutions were adopted urging the refusal of all payments of rent under 500 francs, demanding a reduction in the number of hours required for a day's work, and urging the expenditure of 500,000 francs from the public funds to relieve the immediate distress of the needy classes.

A reduction of 15 per cent in the wages of the coal miners of Belleville, Ill., a district in which there are some 150 mines, is reported.

The Springdale Foundry and Machine-Works, at Catasauqua, Pa., has made a reduction of ten per cent.

The West End Iron Company, below Philipsburg, New Jersey, has made a reduction of from ten to twenty per cent.

The men employed at the Swazye mines, near West End, Pa., were reduced from \$1.10 to 90 cents a day, while machine runners who received \$1.40 will now be paid \$1.10.

Long & Co.'s mill, at Pittsburg, Pa., which has been idle for three weeks on account of the falling off in their orders, have notified their employes that steady work will be given them all winter at a reduction of 10 per cent.

Reports from Utah state that a deputation of the Colorado Coal and Iron Company strikers is said to be heading toward the Pleasant Valley coal mines for the purpose of inducing the miners there to strike.

A reduction of 7½ per cent has been made in the wages of the employes at the Atlas Foundry, Pittsburg, Pa.

Most of the miners in the Big Vein Company's mine, of the Elk Garden region, who struck last week to secure payment by actual weight instead of average by cars, went to work December 8th, it is said, on the company's terms, and the strike is considered over.

At a few of the iron mines in Michigan, the wages were reduced 10 per cent on the first of the month. The cause assigned is the low price at which ore is selling.

Pittsburg advises report a secret movement on foot among coal miners of the Monongahela Valley to renew the strike that so signally failed a few weeks ago. Although greatly dissatisfied with their wages, the men have since been working at a reduction. The shipment of nearly 10,000,000 bushels of coal to lower ports within the past three days, caused by a rapid rise in the rivers, has greatly

encouraged the miners, who believe that a demand for an advance to three cents a bushel in the mining rate at this time would be conceded by the operators.

A large number of Hungarian and Italian miners who left Pittsburg to work in the Hocking Valley mines have returned.

At a meeting of the machinery molders at Pittsburg, Pa., to take action on the 15 per cent reduction ordered in their wages, it was decided to take no united action on the reduction, but to leave it to the individual members. This virtually amounts to accepting the new scale of wages.

The employes in F. M. Davis's foundry and machine-shops, Denver, Colo., struck, owing to a reduction of 10 per cent.

The removal of the scales from the mouth of the Koontz mine to the dump, by the New Central Coal Company, Maryland, caused a strike. The miners conferred with Mine Inspector Denis Sheridan, who ordered the company to remove the scales to their former position, which the company declined to do. Work was resumed December 9th with the scales at the dump, on the advice of the mine inspector, and the matter will rest until the next session of court, when the inspector proposes to take legal steps to enforce his order.

RAILROAD NEWS.

A decision was filed December 8th, in the case of the Schuylkill River East Side Railroad Company, to the effect that the road can not cross the city of Philadelphia at this grade, according to the present laws. This decision is important, from the fact that it will probably keep the railroad out of Philadelphia, and thus prevent the Baltimore & Ohio from making the connection that gives a through line from New York to Baltimore.

Mr. Fleming, in his report on the Denver & Rio Grande Railroad, says that the future of the road depends on the mineral output along its line. The road needs \$700,000 to put it in fair condition for safe operation, and beyond that needs about \$3,000,000 for permanent improvements in the next four or five years.

The many contests and injunctions between the new Pennsylvania Schuylkill Valley Railroad Company and the Philadelphia & Reading Railroad Company at Reading, Pa., have been decided. The court gives the Pennsylvania Schuylkill Valley Road free right of way through Reading for its proposed line to Pottsville. The decree also permits the new road to lay its sidings in the street to points where manufacturing establishments can be reached. As soon as the decision was rendered, the Pennsylvania Schuylkill Valley Company set nearly 200 men at work laying tracks, and by evening they had laid tracks along nearly the entire river front of the city.

A petition was filed in the United States Circuit Court at Reading, Pa., December 10th, on behalf of the receivers of the Philadelphia & Reading Railroad Company, praying that the Pennsylvania Schuylkill Valley Railroad Company be restrained from interfering in any manner with the operations of the former company.

The coal pier of the Norfolk & Western Railroad Company, at Lambert's Point, which is said to be the finest in the country, will be ready for the shipment of coal about January 1st.

It is reported that the Baltimore & Ohio Railroad will secure the Central Railroad of New Jersey in case the Philadelphia & Reading does not make the dividend good within the required sixty days.

The Pennsylvania, Slatington & New England Railroad is to be finished speedily. It is said that the contracts have already been given out, and the steel rails have been bought and paid for, the company having raised \$400,000.

The Salt Lake & Fort Douglas Railroad Company has been incorporated in Utah, with a capital of \$500,000. The contemplated railroad will extend from some feasible point of connection with the Denver & Rio Grande or Utah Central, thence easterly via Fort Douglas to the stone quarries in Red Butte Cañon, to Emigration Cañon, and to the mouth of Big Cottonwood Cañon.

COAL TRADE NOTES.

ARIZONA.

Arizona papers state that some parties have recently examined the coal-fields on the Indian reservation, with the view of purchasing them. It is understood that, if the claims are purchased as represented, the rights of the United States government to the eight thousand acres covered by these claims are to be ignored, and the purchasers will hold them under the "Reavis grant," until the question of the validity of their title thereunder shall be settled in the course of adjudication, and that meanwhile the mines will be opened up and worked for all they are worth.

CANADA.

PROVINCE OF MANITOBA.

Great excitement has been caused in Wapella, by the discovery of coal within one and a half miles of the town.

It is announced that supplementary letters patent have been issued to the Nova Scotia Coal Company, granting power to reduce the value of shares from one thousand to one hundred dollars each, and to increase the capital stock from one million six hundred thousand to two millions and a half.

PROVINCE OF NOVA SCOTIA.

The two new engines in the Drummond slope, Westville, for hoisting coal have been started and worked satisfactorily. It is expected the output will now be largely increased.

COLORADO.

The Colorado Coal and Iron Company has begun the erection of twenty-four additional coke-ovens at Crested Butte. When completed, this will give them a capacity for making 1000 tons more of coke each month.

DAKOTA.

NATURAL GAS.

Advices from Mitchell, Davison County, state that a vein of gas was struck at a depth of sixty-five feet.

ILLINOIS.

The engine-house and offices of the Centralia coal mine, at Centralia, were burned December 9th. The fire did not get into the mine, and the workmen below escaped uninjured. The total loss is \$10,000; insured for \$5000.

MISSOURI.

The Rich Hill Coal Company, of Rich Hill, which has usually put out 2000 cars per month, is arranging to increase to 3000 cars.

MONTANA.

It is stated that the Union Pacific Railroad Company's coal interests at Bozeman are so far developed as to be capable of producing 200 tons a day. The company has 400 acres of coal lands, and is now erecting new coke-ovens.

NEW YORK.

So many complaints of short weight in coal are made by consumers in Brooklyn that a city weighing firm is investigating the matter by weighing the coal, after it is dumped. Several dealers are charged with selling from 1778 pounds to 1951 for a ton. They say that full weight is put in the carts.

Last summer, while Leander Ladd was boring an artesian well on his farm, near Cortland, the drill, at a depth of 60 feet, passed through a brittle black deposit eight feet thick, which has been pronounced to be anthracite coal of good

quality. A shaft is sinking, and if coal is found in quantity corresponding with its quality, immediate steps will be taken to open mines on adjoining farms.

NORTH CAROLINA.

Youngstown, Ohio, capitalists are said to be prospecting through the mineral regions of this State, with the view of developing the coal and ore resources of that section.

OHIO.

Boston exchanges report that the Central Ohio Coal company's mortgage will be foreclosed.

NATURAL GAS.

The Youngstown Gas-Light and Fuel Company has been incorporated with a capital of \$50,000, for the purpose of developing the natural gas territory in Butler County, Pa., owned by the incorporators, who live in Youngstown. The company will also drill a number of wells in Youngstown and vicinity, believing that gas can be found in paying quantities. This organization is entirely distinct from that which will be formed by the capitalists who held a meeting in Youngstown December 3d. The latter project is in the hands of a committee whose report, if favorable, will result in the organization of a company with a capital of \$500,000, to develop the Phillips Brothers' territory.

OIL.

On the Pierce farm, four miles north of Warren, a twenty-five barrel well of lubricating oil was struck December 4th. This is a new field in the once famous Mecca District, and is operated by a Pittsburg company.

PENNSYLVANIA.

ANTHRACITE.

An explosion in the slope of Henry Clay shaft, at Shamokin, December 8th, caused the death of four men.

The locomotives, engines, cars, horses, mules, and personal property of the Pennsylvania Anthracite Coal Company, at the Dun colliery in Old Forge, and at the Greenwood colliery in Luckawanna township, have been levied upon by the sheriff at the instance of the New York, Susquehanna & Western Railroad Company, whose claim amounts to \$53,000.

BITUMINOUS.

East End and Bagdad collieries, at Leechburg, are not running more than half time. The No. 2 mine of the Leechburg Coal Company has not been doing any thing for over four months; its No. 3 mine has been working from 60 to 80 miners during the same time, but did not have full-time, and a reduction in shipments and in price of mining and number of men is now spoken of.

The Waverly Coal Company has resumed control of the Smithton mines, and will operate them soon.

The Enterprise coal-works, near Little Washington, have been leased by Clemmons & Co., of Pittsburg.

COKE.

Extensive improvements have been made at the Imperial coke-works at Montour Junction.

The Frick Coke Company is about to erect a new engine and fan at the Trotter works. The fan will be 25 feet in diameter and the engine 100 horse-power.

NATURAL GAS.

The Fuel Natural Gas Company, Pittsburg, claiming to have exclusive privileges, has begun proceedings against all other gas companies to prevent them from laying pipes in Alleghany County.

A company has been organized for the purpose of drilling for gas or oil on a tract of land owned by Christopher Borner of the Twenty-fourth ward at Street's Run, Pittsburg. The land is on the gas belt, and those interested expect to strike gas at 1500 feet.

TENNESSEE.

A correspondent of the Atlanta Constitution writes from Chattanooga that since November 10th there has been a constant increase in the iron business throughout this section. Work has been resumed at five ore-banks in North Alabama, and fully 300 coke-ovens have been fired up, owing to the increased demand from the furnaces. Ore has been advanced 10 per cent within ten days.

GENERAL MINING NEWS.

ARIZONA.

GRAHAM COUNTY.

ARIZONA.—The output for November was 640,000 pounds of black copper, average fineness 97½ per cent. The company expects to blow in additional furnaces the latter part of this month. At present, it is running three furnaces. At the different groups, work is progressing as usual, and there is nothing of especial importance to report.

DETROIT.—The company is running but one furnace at present, a 90-ton Fraser & Chalmers water-jacket. The furnace was blown in but 26 days. The total output for November was 500,000 pounds; average fineness, 98 per cent. The mines, particularly the Yankee, are looking better than at any time in their past history, and from their present appearance there is every reason to believe that they will continue to produce largely for a long time to come. The company has about completed a rope tramway to connect the workings on the Lower Yankee with its railroad system. The tramway is 1000 feet in length. The engine is already in place, and ore-shipments will be begun soon.

MARICOPA COUNTY.

George W. Webb has bonded his gold mine and canal at Gila Bend for \$50,000.

PIMA COUNTY—QUIJOTOA DISTRICT.

PEERLESS.—The Burleigh drills and other machinery for this company have arrived, and are getting into position. The company expects to be ready to begin operations in about two weeks.

CALIFORNIA.

The Supreme Court of California has affirmed the decision of the lower court, that published stock quotations are not proof of actual value.

MONO COUNTY—BODIE DISTRICT.

Reports for the week ended December 1st:

BODIE CONSOLIDATED.—During the past week, 168 tons of ore were worked at the mill; the average assay value of the pulp was \$41.75 a ton; 12 per cent is lost in the tailings.

CONSOLIDATED PACIFIC.—The working force has been increased, and it is the intention to run in other parts of the mine which have been neglected in the efforts to push the drifts north.

MONO.—The recent strike has widened out several inches and assays high. The ore-vein is cut 125 feet in on the Mono ground from the boundary line of the Bodie. The ore can be taken out of the Lent shaft at only the cost of running the works.

NEVADA COUNTY—GRASS VALLEY DISTRICT.

Reports state that the outlook for Grass Valley is better than it has been before for the past fifteen years. Every custom mill in the district has all the crushing it can do, and the number has increased.

ALLISON RANCH.—There is talk of resuming work on this mine.

EMPIRE.—The company is having surveys made for the purpose of bringing water with which to run the machinery.

IDAHO.—The mine is looking well in its lower levels, and the company is running for the 1600-foot level.

NEW YORK HILL.—The body of ore found in the south drift paid \$160 per load for crushing. The company is running the drift north from the 1300 level, and is prospecting in other parts of the mine.

NORTH STAR.—The work of erecting the pumping machinery is nearly finished.

PEABODY.—At a recent meeting, the number of shares was increased from 3000 to 30,000. The company has in contemplation the erection of new works.

UNION HILL.—Work is to be resumed.

SAN BERNARDINO COUNTY.

SUE.—This mine is attracting attention on account of the strikes recently made. The developments consist, besides the tunnel, of six or eight openings on the ledge, which extends the entire length of the mine. The ledge uncovered by these openings is from four to six feet wide. It contains spar, some base, but mostly free-milling ore.

SIERRA COUNTY.

ALASKA.—A large force is at work at the mines, the water is under control, and a pump with a capacity of 100,000 gallons every twenty-four hours is to be erected. The twenty-stamp mill is running constantly with good results; the yield of the ore being more than sufficient to meet all of the expenses of the mine. The milling capacity is to be doubled as soon as circumstances will warrant the increase.

RAINBOW.—Progress in the tunnel is made at the rate of about fifty feet a week. It is now in 2100 feet. Stringers to the ledge have recently been encountered, and it is expected that the main ledge will be reached in another 150 feet.

CANADA.

NEWFOUNDLAND.

LITTLE BAY COPPER MINE.—Owing to the low price of copper, orders have been sent from the mining company that has leased Little Bay Copper mine to suspend underground operations for the present. The surface work will go on as before, but the effect will be to throw about 300 or 400 miners out of work. It appears that, owing to the low price of copper, operations at the Little Bay have failed to be remunerative. The mine itself is as productive as ever.

PROVINCE OF NOVA SCOTIA.

ESSEX.—The superintendent writes, under date of December 3d, I have finished cleaning up the ore last month; retorted the amalgam; and have from the nugget 15 ounces of gold, from 18 tons; and 43 ounces of gold from 33 tons south lead. I had four tons from south lead that was by itself. I retorted the amalgam, and weighed out, and had 23 ounces of gold; nearly 6 ounces per ton; with the specimens I have sent you, it would be over 6 ounces. This ore is a fair sample of the south lead 40 feet east and 46 feet west. At the bottom of the stopes, it was taken out all along east and west. The rain has put us back some; but we have every thing clear now, and are raising ore from the south lead.

HALL-ANDERSON.—The company has begun to ship bullion.

SALMON RIVER.—It is said that the company intends to increase its milling capacity by twenty stamps.

COLORADO.

ARAPAHOE COUNTY.

ATLANTA & SAN FRANCISCO MINING AND REDUCTION COMPANY.—Articles of incorporation have been filed. The capital stock is \$1,000,000. The directors are F. K. Dessette, D. H. Simmons, and A. K. Robinson. The principal business office will be kept in this county.

CHAFFEE COUNTY.

MARY MURPHY.—The result of the last run of the Alpine smelter by this company was a clean-up of \$13,500 worth of bullion, produced at an expense of but little over \$5000. The furnace was kept in operation twenty-one days; but during the last three days, no ore was fed in while awaiting the arrival of lead and coke. During the eighteen days, 314 tons of ore were run through the furnace, an average of a little more than seventeen tons a day. The company is so well pleased with the result that it proposes to erect large works of its own in the spring and work the property to its fullest extent.

RARUS.—A body of mineral three feet wide has been struck. The ore is steel galena interspersed with silver glance.

CLEAR CREEK COUNTY.

Extensive improvements are making at the new smelting-works at Idaho Springs, and great results are anticipated.

DOLORES COUNTY.

LITTLE MAGGIE.—The mine will be idle until the present difficulties are adjusted, and other arrangements are made.

PASADENA REDUCTION COMPANY.—The company is now ready to buy ores and sample and settle for them promptly.

GILPIN COUNTY.

DENMARK.—This mine, on Bobtail Mountain, is to be worked in a much more active manner than ever before.

DENVER.—The 40-stamp mill in Nevadaville, which has been undergoing repairs, has started up. Twenty stamps are adding. The improvements to the main shaft, underground and on the surface, are all complete.

HINSDALE COUNTY.

CROOKES MINING AND SMELTING COMPANY.—A meeting of the company was to have been held in London, England, December 2d, to hear the report of Mr. Dixon, who lately examined the company's property here and the result of the summer's work. Action will then probably be taken in regard to the resumption of work. The Ulé employés have been paid for September.

LAKE COUNTY.

The Leadville Herald reports the following:

BIG PITTSBURG.—The Dillon-Blonger lease will increase its output materially as soon as the machinery now erecting is ready for use.

CHRYSOLITE.—Manager Clark is in New York in conference with the officers of the company. The result of the operations at the Kearney mill will be submitted to them, and a decision arrived at as to the advisability of continuing operations.

IRON.—The company has reduced wages 50 cents a day. It is understood that, upon the recovery of the lead and silver markets, wages will be restored.

LITTLE CHIEF.—Work has been resumed on the various portions of the mine. The leases have been awarded.

WHITEHILL GOLD AND SILVER MINING COMPANY.—This company has been incorporated under the laws of the State of Maine, with a capital of \$300,000, to work property on Fryer Hill.

OURAY COUNTY.

BROOKLYN.—The Brooklyn is developing into a mine of no small proportions. A large body of chloride ore has been opened up, and a car-load has been placed on the dump. The property consists of four claims: Pus Graham, Burlington, Brooklyn, and Keystone.

PARK COUNTY.

LONDON.—About the first of the year, a small force of men will be put at work in the levels of this mine, to get them into shape for next season's operations.

SOVEREIGN.—The company has been reorganized as a stock concern on a basis of \$10,000,000 capital. Alma is named as the principal head-quarters of the company, and W. H. Grose as the local manager.

PITKIN COUNTY.

ASPEN.—The smelting company has ordered the machinery and materials for another furnace, which is now on the way to Aspen. The furnace will be built about 16 feet lower down the bank than the one now in operation, which will greatly reduce the cost of handling the ore. The new stack will be in operation within sixty days. If the litigation on the Vallejo mine should be settled, both stacks can be kept running all winter.

SAN JUAN COUNTY.

ECLIPSE.—This mining and smelting company signifies its intention of running the concentrator and smelter another season, and also working its mines. The company owns the Mountain Queen.

SUMMIT COUNTY.

But few of the mines in the vicinity of Kokomo and Robinson will continue operations during the winter.

DAKOTA.

FATHER DE SMET.—The report for the week ended December 1st, shows ore extracted from the first, second, and third levels 2550 tons. Ore milled, 2550 tons. We have started a west cross-cut on the third level from a point north of Italian winze on south end line of Father de Smet. Lode advanced two feet on company account.

GEORGIA.

Reports in the New York *Tribune* state that recent discoveries in the gold mining regions of Georgia, in Carroll, Murray, and Dablonoga counties, are such as to revive the interest that was turned away by the California discoveries of forty years ago. The mines near Villa Rica are now yielding large sums daily. The Clopton thirty stamp-mills will be running this winter. The Falls City mine is yielding rich returns. The most extensive work, however, is done by the Ernestine Company, composed of Louisville people, who have invested a very large amount in machinery. It is said that \$50,000 more will be invested in machinery near Dablonoga and Nicolsville, so well known to miners of forty years ago. Over 200 stamps are in operation. The sensation of the Georgia gold belt, however, is connected with the Legal Tender mines, in Cahutta Mountain, six miles from Spring Place. A company has been formed, the lands on which the mines were discovered were purchased on conditions, and work has begun. The mountain has been penetrated only fifteen or twenty feet, and tunneling has just begun. The first assays that were made averaged \$2.40 a ton, the second assay averaged \$10, and the third and last assay made shows an average of \$100 per ton of ore. It is asserted that three other mines have been struck equal to the Legal Tender mine, and men are buying machinery to begin work at once.

IDAHO.

COURIER.—This mine has been sold to Salt Lake City parties for \$5000.

GRAND PRIZE.—A strike has been made.

KETCHUM SAMPLING-WORKS.—This company has been incorporated under the laws of Utah with a capital of \$12,000. The object of the corporation is to conduct a general ore-handling and sampling business in Utah and Idaho territories.

MAMMOTH.—The mine has been bonded and a body of ore has been struck. A smelter is to be erected in the spring.

WASHINGTON.—Articles of incorporation have been filed by this company in Utah. The capital stock is \$1,000,000. The mines to be operated are the Washington and No Name claims.

MARYLAND.

On a farm located about one mile from Gambrill's station, in Anne Arundel County, ore rich in zinc has been found.

MICHIGAN.

COPPER MINES.

The November output—25 days—of the mines mentioned is as follows:

Calumet & Hecla.....	2043	Huron.....	125
Quincy.....	450	Copper Falls.....	63
Franklin.....	289	Peninsula.....	60
Atlantic.....	180	Hancock.....	38
Allouez.....	150		

PHENIX.—At the recent execution sale of the effects of this copper company, in Keweenaw County, Mr. J. H. Chandler, trustee, purchased the property for the judgment creditors.

IRON MINES.

The iron shipments from the ports of the Lake Superior iron regions during the season just closed were as follows:

	Tons.
Marquette.....	926,989
L'Anse.....	64,420
Escanaba.....	1,360,687
St. Ignace.....	89,916
Total.....	2,442,012

MINNESOTA.

According to press dispatches, a vigorous hunt for gold and silver in the North Shore region, tributary to Duluth, is in progress. The list of gold-seekers is now large, and includes some wealthy men and some miners of long experience. The records of the land-office here show that, in the last four months, over 30,000 acres of government land have been taken up, at \$1.25 an acre, by gold and silver speculators. The work will go on all winter. The number of mining companies incorporated is already large, and more may be looked for as the weeks go by.

MONTANA.

LEWIS & CLARKE COUNTY.

BOSTON & MONTANA.—Hoisting-works and other improvements, which cost about \$50,000, are to be erected at the Gloster Mine.

MADISON COUNTY.

MOHEGAN.—The new ten-stamp mill and concentrator that have been erected near Red Bluff to operate on ore from this mine are ready for operations.

PEDRO.—It is stated that this mine has been sold to Rev. Hugh Duncan and General Manager H. H. Knippenberg, of the Hecla Consolidated Mining Company, of Glendale, for \$4500.

SILVER BOW COUNTY.

BERLIN.—This mine, situated near Melrose, is producing some very rich ore. Mr. A. Wartenweiler, in consideration of a one-fourth interest, is putting up a shaft-house, blacksmith-shop, machinery, and every thing necessary to work the mine in proper shape. A double-compartment shaft is sinking, which has attained a depth of thirty feet. About fifteen men are at work in and around the mine. As soon as a depth of fifty feet is reached, a large force will be put to work drifting and stopping.

MARGARET ANN.—The 15-stamp mill is ready for operations. The mill is a dry crushing silver mill, with Howell chloridizing furnaces. It will be prepared to work all classes of ores in this district, except copper smelting ores. It is understood that the new mill will also work custom ores.

NEW MEXICO.

The concentrating-works at Silver City started up for a trial run, and if every thing works satisfactorily, they will continue running on custom ores.

SILVER HILL.—The company is erecting a ten-stamp mill in addition to its present works.

NEVADA.

ELKO COUNTY—TUSCARORA DISTRICT.

GRAND PRIZE.—The recent increase in the weekly shipments is attributable to the improvement in the dimensions of the ledge and the quality of ore in the workings, some 500 or 600 feet south of the old shaft. The ore-body is on what is known as the south ledge, and the recent development is between the 200 and 300-foot levels. The ledge in the stopes is from four to eight feet in width in many places, and nearly all a good quality of milling ore. The stope is about 120 feet in length, and has been raised from the 400. As it is all virgin ground above, below, and to the south, it is impossible to estimate the extent of the ore connection in any of those directions. The appearance of the mine is more favorable than it has been at any other time since the dividend-paying period.

EUREKA COUNTY.

RICHMOND.—A reduction in wages has just been made, as follows: The smelters were reduced from five to four dollars a day, feeders from four to three and a half dollars a day. The employes in the refinery have been reduced fifty cents on each man. The present pay for refinery hands is four dollars a day.

HUMBOLDT COUNTY.

PARADISE VALLEY.—The company mill has been destroyed by fire. It is thought that it will not be rebuilt this winter, as it will be impossible to haul the materials received for its construction from the railroad to the valley after the rain and snow-storms once set in. The mill cost \$60,000, and was insured for \$20,000. A body of ore—the richest ever struck in the mine—was recently uncovered.

LINCOLN COUNTY.

DAY.—Manuel Eyre has begun suit against Abraham K. Grim and others, directors of the Day Silver Mining Company, to recover \$1000 damages for losses alleged to have been sustained by plaintiff by reason of the neglect of the defendants to post the accounts and reports of the company as required by law.

STOREY COUNTY—COMSTOCK LODGE.

At a meeting of the directors of Sierra Nevada, Union, Mexican, Ophir, and Consolidated California & Virginia, held at San Francisco, December 3d, it was decided to suspend all operations in the mines below the 2700 level for the present.

At the present time, Ophir has been but slightly prospected below the 2500 level. Mexican is in virgin ground above the 1465 level, but has been slightly prospected at the 2700 level. Union is in virgin ground above the 1450 level, and the pump can take care of water at the 2700 level.

Under the new arrangement, the workings will be confined exclusively to prospecting between the Union and Consolidated Virginia, and by thus stopping the pumps below the 2700 level and also the compressed-air pump, it is estimated that the running expenses will be reduced one third in all the mines.

The mines south of Consolidated California & Virginia will not be affected by the shutting down of the lower levels in the north-end mines.

The discovery of rich ore on the 250 level of the Keyes mine has created great excitement, large boulders of black sulphuret ore having been taken from the vein, assaying high. The vein from which this is taken has increased from nine inches to two feet in width in a distance of only three feet, and it is the opinion of miners that the vein is the top or cone of a genuine bonanza. The shaft will be sunk 50 feet deeper as speedily as possible, and a drift be run in to ascertain the depth of the ore-body and to give an opportunity for stoping out the ore.

NEW YORK.

TILLIE FOSTER IRON MINE.—A decision was rendered December 6th in favor of the city of New York in a suit that has been pending between the city and the Tillie Foster iron mine, in which damages of over a million of dollars were claimed against the city. The suit was brought about by the following circumstances: In 1873, the city decided to construct a storage reservoir in connection with its Croton water system by erecting a dam across the middle branch of the Croton River in Putnam County, joining an artificial lake covering about six acres of land. About fifty acres of the land taken by the city for this purpose were owned by the Tillie Foster iron mine, and were located near the mine. The entrance to the mine is on a hill, and so situated as to be surrounded on three sides by the water of the reservoir. The underground workings of the mine extend about 500 feet, and have been carried to a depth of 600 feet. It was claimed by the company that the effect of the reservoir in such close proximity to the mine, and surrounding it on three sides, would be to increase the water entering the mine to such a degree as to render it practically unworkable, and so deprive the owners of the profits to be realized from it, which would be unusually large, and the damage was fixed at \$1,389,375. The case was taken to the Supreme Court and a commission appointed to determine the compensation that ought to be made by the city. The commission awards the claimants \$10,117.40, the value of the fifty acres actually taken by the city, and over which there was no controversy, and disallows entirely the claim for damage to the mine.

OREGON.

Black sand in large quantities is found on the ocean beach near the entrance to Yaquina Bay. This sand is said to contain unknown quantities of gold, but of such fineness that all efforts to mine it have as yet proved unsuccessful. It is now learned that a company has been formed to attempt, with improved machinery, the extraction of the gold from this sand.

UTAH.

The Salt Lake *Tribune* gives the output of bullion for the territory, excluding all ores, and without reckoning a number of concerns that have made no report, for the eleven months ended November 30th, as \$5,247,022.

BEAVER COUNTY.

CAVE & CARBONATE.—Messrs. Godbe & Co., owners of these mines, intended to reduce the wages of the miners from \$3.50 to \$3 December 1st.

SALT LAKE COUNTY.

NORTHERN CHIEF.—According to the Salt Lake *Herald*, remittances continue to be received from the Eastern officials, and the local indebtedness has been almost entirely cleared up. No operations will be commenced before spring.

OLD TELEGRAPH.—Mr. G. Lavagnino, agent for the French company owning this property, states that it will erect furnaces in the spring at West Jordan. A small force of men will be operated during the winter in the mine by the company.

WEBER COUNTY.

DALY.—This company, incorporated with a capital of \$3,000,000, owns the Solace, Daly, Alice Ryan, part of the Central, part of the Sample, part of the New York, part of the Trainer, part of the Silver Cliff, part of the Ottawa, part of the Minooka, part of the Sandy Hook, part of the Bonny Ida, part of the Elkhorn part of the Sandy, part of the Scrap, part of the Little Maggie, part of the Dakota, and the Scrap mill-site claims.

FINANCIAL.

NEW YORK, Friday Evening, Dec. 12.

The mining market has presented considerable activity, and has shown an increase of business as compared with last week. The prices have been firm generally, though in a few instances they were irregular.

The most notable stock has been Horn-Silver. In our review of last week, we mentioned that the price of the stock was gradually recovering from the recent decline. This week, the price has again taken a downward course, and has been the lowest on record, and rumors are afloat that it will go still lower. On Thursday, the stock sold as low as \$3.75. The quotations to-day, however, show a slight advance. The sales have amounted to 12,505 shares.

The Chrysolite Mining Company has declared a dividend of \$50,000 out of the company's reserve fund. A sufficient amount to insure the safety of the company against contingencies is still in the treasury. The company will shortly issue the annual report, which will give full information on this subject, as well as on the result of the experiments made in the treatment of the ore at the Leadville gold and silver mill and the future course of the company. The sales amounted to 5222 shares; the price ranged from 80c. @ \$1.10. Two thousand six hundred shares of Amie Consolidated changed hands. Iron Silver and Breece record about the same business.

Of the California stocks, Consolidated Pacific records the largest business at prices ranging from 90c. @ \$1.10, and sales amounting to 3350 shares. Bodie Consolidated shows a small business. The stock opened and closed at \$2.10, but during the week reached \$2.80. The official report for November shows that the company has cash on hand \$144,596.86. Standard Consolidated price has been lower, at from 62 @ 57c. Plymouth Consolidated continues to be a strong feature in the market. The price has ranged from \$15 @ \$15.63. Official advices show that the company's production this year will exceed one million dollars.

Of the Comstock stocks, Consolidated California & Virginia and Sutro Tunnel show the largest business. The price of the former has been lower, closing at 35c.; the price of the latter has ranged from 10 @ 12c. The Tuscarora stocks show little business. One thousand shares of Eureka Consolidated changed hands at prices ranging from \$2.65 @ \$2.75. The time for exchanging the certificates of the State Line mining companies Nos. 1 & 4 and 2 & 3 has been extended to December 19th. The sales this week amounted to 60,078 shares, as against 48,945 shares for the preceding week, showing an increase of sales of 11,133 shares. A complete summary of the market will be found elsewhere.

MEETINGS.

American Coal Company, No. 110 Broadway, Room 5, New York City, annual meeting of stockholders and election of trustees, December 26th, between twelve M. and one P.M.

Arizona Queen Gold Mining Company, No. 240 Broadway, Room 12, New York City, annual meeting of stockholders, January 12th, at two o'clock P.M. After the annual meeting a special meeting of the stockholders will be held, and the question of securing the indebtedness of the company by mortgage and to raise money to patent a portion of all of said mines will be voted upon, and the appointment of an agent to execute the mortgage deed.

Globe Copper Company, No. 32 Pine street, New York City, special meeting of stockholders for the purpose of acting upon the question of the sale of all or any part of the real estate of the company, January 15th, at twelve o'clock M.

Silver Eagle Gold and Silver Mining Company, No. 25 Chambers street, Room 33, New York City, special meeting of stockholders for the purpose of electing trustees and to alter and amend by-laws, January 5th, at twelve o'clock M.

DIVIDENDS.

Adams Mining Company, of Colorado, has declared a dividend (No. 6) of \$15,000, being ten cents a share, payable December 20th.

Chrysolite Mining Company, of Colorado, has declared a dividend of \$50,000, being twenty-five cents a share, payable December 20th.

Contention Mining Company, of Arizona, has declared a dividend of twenty-five cents a share.

Helena Mining and Reduction Company, of Montana, has declared a dividend (No. 2) of \$36,000, being six cents a share, payable January 20th. Total to date, \$72,000.

Homestake Mining Company, of Dakota, has declared a dividend of \$31,250, being 25 cents a share, payable December 26th. Total dividends to date, \$2,593,750.

Navajo Mining Company, of Nevada, has declared dividend No. 11, of twenty-five cents a share, payable December 13th.

Silver King Mining Company, of Arizona, has declared dividend No. 45, of twenty-five cents a share, payable December 13th.

St. Joseph's Lead Company, of Missouri, has declared a dividend of \$20,000, being twenty cents a share, payable December 20th.

Dividend No. 6 of the Paradise Valley Company has been rescinded, on account of the destruction of the company's mill by fire.

ASSESSMENTS.

COMPANIES.	States.	Amount per share.	Delinquent in office.	Day of sale.
Alta.....	Nev....	\$0.25	Jan. 9	Jan. 28
Belmont.....	"	.20	Dec. 15	Jan. 12
Best & Belcher.....	"	.50	Dec. 30	Jan. 19
Caborea.....	Mex....	.05	Dec. 1	Jan. 3
Champion.....	Nev....	.10	Dec. 29	Jan. 19
Consolidated Amador.....	Cal....	.30	Jan. 5	Jan. 21
Consolidated California & Virginia.....	Nev....	.30	Dec. 10	Jan. 3
Copper Mountain.....	Cal....	.05	Jan. 13	Feb. 10
Crocker.....	Ariz....	.25	Dec. 2	Dec. 23
Excelsior Water & Mining Grand Prize.....	Cal....	.50	Dec. 3	Dec. 24
Lewis Consolidated.....	Nev....	.30	Dec. 30	Jan. 28
Mexican.....	Ariz....	.03	Dec. 22	Jan. 19
Ophir.....	Nev....	.50	Dec. 17	Jan. 8
Savage.....	"	.50	Dec. 15	Jan. 6
Scorpion.....	"	.10	Jan. 9	Jan. 30
Union Consolidated.....	"	.50	Dec. 9	Dec. 30

PIPE LINE CERTIFICATES.

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

Trading during the week has been limited in volume and in range of fluctuations, 74 3/4 c. being the highest, and 70c. the lowest, prices closing to-night at 72 1/4 c., an intermediate point. The Boyd well, in the heart of the Thorn Creek development, opened at 80 barrels per hour, increased to 160, and is now making 90 barrels. The total production of the district was increased by the output of this well, and to-day was 7790 barrels. The McBride well is to be torpedoed, and upon its character will depend the opinion of the trade as to the extension or limitation of the prolific belt of the Thorn Creek District. The Kennedy well, on the eastern frontier, shows some oil, and will be torpedoed soon. The refined oil market is 7 1/2 c., or 1/2 c. below the ruling figures of late. Charters are falling off. The general speculative and industrial situation is of such a character that purchases of oil certificates could not be recommended except upon breaks.

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

	Opening.	Highest.	Lowest.	Closing.	Sales.
Dec. 6.....	\$0.72 3/4	\$0.74 3/4	\$0.71 1/2	\$0.72 3/4	5,709,000
8.....	.73 1/4	.74 1/2	.72 1/4	.73 1/4	5,475,000
9.....	.73 3/4	.74	.72 3/4	.73 3/4	2,019,000
10.....	.73 3/4	.73 3/4	.71 3/4	.71 3/4	3,750,000
11.....	.71	.73 1/2	.70	.73 1/4	4,659,000
12.....	.73 1/4	.73 1/2	.71	.72 3/4	5,311,000
Total sales.....					27,523,000

Boston Copper and Silver Stocks.

[From our Special Correspondent.]

BOSTON, Dec. 11.

The market this week has ruled dull, and without any special feature. The transactions in copper stocks have been confined principally to Calumet & Hecla, which has shown a good degree of firmness, the stock being more readily taken at quotations, although a larger amount has been offered for sale than usual. Sales were at \$146 the first two days of the week, when an order to sell a lot of 30 shares at best price caused a decline to \$144, quickly followed by an advance to \$147, and closing to-day at \$145 bid, \$147 asked. Sales for the week about 250 shares. Quincy opened steady at \$32, but a lot of 50 shares was sold at \$30-

closing firm at \$30 bid, \$31 asked. Osceola sold at \$9, same as last sale. This comprises all the business of the week in copper stocks, the rest of the list being entirely neglected.

In silver stocks, Harshaw sold at 52 1/2 c., and Catalpa at 22 1/2 c. At the Mining Exchange, Bowman Silver sold at 12 @ 13c., assessment paid. Dunkin, in good demand at 23c. Breece sold at 18c. Consolidated Pacific advanced from 95c. @ \$1.05. Catalpa, in demand at 25 @ 26c. The meter stocks were steady at about last week's prices.

3 P.M.—At the afternoon Board, copper stocks were weak. Calumet & Hecla declined to \$144, sales, closing \$143 bid, \$144 asked. Quincy declined to \$28 on sales of about 50 shares, and was offered at that price, no bid. The decline is based on the rumor that the company had been selling ingot copper outside the pool, and to a lack of orders in the market to purchase. There was a disposition to sell Franklin as well as Quincy; but the market is in no condition to take stocks unless further concessions are made, and we look to see the whole list much lower before the close of the year.

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

NAME OF COMPANY.	CLOSING QUOTATIONS.					
	Dec. 5.	Dec. 6.	Dec. 8.	Dec. 9.	Dec. 10.	Dec. 11.
Albion.....						
Alpha.....						
Alta.....	.25	.25		.20	.20	.15
Argenta.....						
Bechtel.....						
Belcher.....	.60			.50		.60
Belle Isle.....						
Best & Belcher.....	1.00	1.00		.80	.80	.80
Bodie.....	2.25	2.50		2.25	2.00	2.10
Bullion.....						
Bulwer.....						
California.....						
Chollar.....	2.62 1/2	2.62 1/2		2.37 1/2	2.50	2.50
Con. Pacific.....	.95			.90	.90	1.00
Con. Virginia.....	.05	.35		.30	.35	.35
Crown Point.....	.75			.65	.65	.65
Day.....						
Elko Cons.....						
Eureka Cons.....					2.37 1/2	2.25
Exchequer.....						
Gould & Curry.....	1.12 1/2	1.12 1/2		1.00	1.12 1/2	1.00
Grand Prize.....						
Hale & Norcross.....	2.87 1/2	2.87 1/2		2.50	2.50	2.62 1/2
Independence.....						
Martin White.....						.40
Mexican.....	.35	.55		.20	.20	.25
Mono.....						
Mount Diablo.....	3.75	3.75		3.87 1/2	4.00	2.75
Navajo.....	3.00	3.00		2.75	2.50	2.37 1/2
Northern Belle.....						
North Belle Isle.....						
Ophir.....	.30	.30		.25	.25	.15
Overman.....						
Potosi.....	.90	.95		.85	.80	.80
Savage.....	.85	.90		.70	.70	.70
Scorpion.....						
Sierra Nevada.....	.95	.90		.75	.85	.75
Silver King.....						
Tip-Top.....						
Union Cons.....	.30	.80		.70	.65	.65
Utah.....	.70	.65		.60	.60	.50
Wales Cons.....						
Yellow Jacket.....	1.00	.95		.70	.70	.75

METALS.

NEW YORK, Friday Evening, Dec. 12.

Copper.—Interest centers in the English market, which has declined until to-day. Chili Bars were cabled £58 17s. 6d., and Best Selected £53 10s. It is surmised that the French syndicate that has bought or has an option on large blocks of Lake copper based on Chili Bars is manipulating the market. Chili Bars are, however, reaching figures that may become tempting to speculators on both sides of the Atlantic. We quote here for Lake 12c., and for other kinds 11 @ 11 1/2 c.

Tin.—Straits is quoted here 16 1/2 @ 16 1/4 cash, spot. Lead.—Early in the week, the largest firm in the lead business advanced its price to 3 70c., but Western refiners since then have sold about 200 tons here at 3 55 and 3 60c. Nothing but car-load lots of Common lead have been sold during the week, for which, however, 3 60 and 3 70c. have been paid. There has not, however, been a single sale of a 50-ton lot of Common lead, and the higher figures named are therefore entirely nominal. We quote nominally 3 55 @ 3 60c. Messrs. Everett & Post telegraph to us as follows from Chicago:

The market is rising, excited, and unsteady, and it is difficult to give exact quotations. Prices are advancing from a temporary flurry, but manufacturers are not buying freely as yet, having no confidence in the success of the manipulation. Prices are nominally 3 45 @ 3 50c.

From St. Louis, Messrs. John Wahl & Co. send us the following dispatch :

There has been considerably more inquiry for both hard and soft lead, in consequence of which sellers have been asking a little more, but only a moderate amount of business has been transacted. Sales will probably sum up to 200 tons of Chemical lead at 3.40c. Stocks in the hands of holders are only limited. Refined is very scarce, and there is apparently more offering. Buyers are now freely bidding 3.40c. for Corroding lead, but find no sellers.

Spelter.—The fight in the West is waxing hotter, and the largest producer is now offering here at 4½c.

Antimony.—There have been no new features.

BULLION MARKET.

NEW YORK, Friday Evening, Dec. 12.

DATE.	LONDON.		N. Y.		DATE.	LONDON.		N. Y.	
	Pence.	Cents.	Pence.	Cents.		Pence.	Cents.	Pence.	Cents.
Dec. 6	49½	107½	49½	107½	Dec. 10	49½	107½	49½	107½
8	49½	107½	49½	107½	11	49½	107½	49½	107½
9	49½	107½	49½	107½	12	49½	107½	49½	107½

BULLION PRODUCTION FOR 1884.

MINES.	States.	Month of November.	Year from Jan. 1st, 1884.	
			\$	\$
*Alice, g. s.	Mont.	949,041		
*Belmont.	Mont.	46,805		
*Black Bear, g.	Cal.	19,600		
Bodie, g.	Cal.	84,038	493,822	
*Bonanza King, g.	Cal.	191,891		
*Boston & Montana, g.	Mont.	362,489		
*Caledonia, g.	Dak.	73,511		
*Chrysolite, s. l.	Colo.	5,973	137,514	
*Consolidated Bobtail, g.	Colo.		79,030	
*Contention, s. g.	Ariz.		293,607	
*Deadwood-Terra, g.	Dak.		423,918	
*Derbec Blue Gravel, g. s.	Colo.		132,324	
*Father de Smet, g.	Dak.	18,276	410,195	
*Grand Prize, s.	Nev.		74,675	
*Head Center Cons.	Ariz.		1,273	
*Head Center & Tranquility.	Ariz.		20,329	
*Hecla Cons., g. s. l. c.	Mont.		972,952	
*Helena, g. s. l. c.	Mont.		941,036	
*Homestake, g.	Dak.	1,059,754		
*Hope, s.	Mont.		70,472	
Horn-Silver, s. l.	Utah.		2,143,987	
*Iron-Silver, s. l.	Colo.		606,472	
*Kentuck, g. s.	Nev.		22,411	
*Lexington, g. s.	Mont.		998,109	
*Little Pittsburg, s. l.	Colo.	1,397	79,091	
*Mammoth Bar, g.	Nev.		1,891	
*Moulton, g. s.	Mont.		604,188	
*Mount Diablo, s.	Nev.		24,820	
*Murchie, g. s.	Cal.		19,000	
*Navajo, g. s.	Nev.		382,589	
*New Pittsburg, s.	Colo.		51,224	
*North Belle Isle, s.	Nev.		5,874	
*Ontario, s. l.	Utah.	191,857	2,008,000	
*Original, s. C.	Mont.		29,724	
*Oxford, g.	N. S.	2,050	65,142	
*Paradise Valley, s. g.	Nev.		103,950	
*Plymouth Consolidated, g.	Cal.	86,918	945,828	
*Rooks, g.	Vt.		48,662	
*South Yuba, g.	Cal.		22,708	
*Stormont, s. l.	Utah.		133,503	
*Syndicate, g. s.	Cal.	10,006	111,276	
*Tombstone, s. l.	Ariz.		450,772	
United Gregory, g.	Colo.		7,174	

Total amount of shipments to date.....\$15,559,133

* Official + Assay value. † Not including value of lead and copper; G., gold; S., silver; L., lead; C., copper. No bullion produced. Silver valued by the different companies from \$1.05@1.29 per ounce; gold, \$20.67.

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate of discount, and it remains at 5 per cent. During the week, the bank gained £832,000 bullion; and the proportion of its reserve to its liabilities was raised from 38½ to 41½, against 43½ per cent at this date last year. The weekly statement of the Bank of France shows a loss of 8,206,000 francs gold and a loss of 1,244,000 francs silver.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Dec. 12.

American Pig.—The placing of large contracts alluded to in our last has continued, and the Thomas Iron Company has taken orders aggregating 50,000 tons at \$18 for No. 1 Foundry and \$17 for No. 2 which, if now quoted for several lots, smaller parcels being 50c. higher. Following the announcement of the figures, the Glendon and Andover companies put their price of Gray Forge down to \$16 at furnace. We quote: \$18@18.50 for No. 1 Foundry; \$17@17.50 for No. 2 Foundry; and \$16@

\$17 for Gray Forge. A little business has been done in Bessemer pig at \$18.50@19, and Spiegeleisen is nominally \$26.

Scotch Pig.—The lowering of the prices of standard American brands will effect a further restriction of the sales of Scotch pig.

We quote ex ship and to arrive: Langloan, \$21.50; Summerlee, \$20.75; Dalmellington, \$20; Gartsherrie, \$21; Eglinton, \$19.25@19.50; and Glengarnock, \$20@20.50.

Steel Rails.—The market is flat, the struggle for the survival of the fittest continuing. It is stated that there is a movement to sell the Troy works for a sum equal to the bonded indebtedness, \$800,000, the stock being practically wiped out. We quote rails \$27@28.

Old Rails.—We quote nominally, \$16@17.

Philadelphia. Dec. 12.

[From our Special Correspondent.]

The crude iron market is still more unsettled, in consequence of further reduction. Glendon and Andover irons have been reduced from \$18 to \$16, though the outside price has not been obtained for some time. Other companies are shading still more since Monday. How, it is impossible to say, owing to the fact that the transactions have been made rather quietly, but it is known that the quoted price has not been paid. Buyers are not in haste even now to make purchases, and brokers and agents of companies express some surprise and dissatisfaction at the spirit manifested by the market, which seems to be dissatisfied with any and every concession made. The orders heard of since Monday will foot up about 10,000 tons. On Monday morning, brokers were confident they would sell double that amount by the middle of the week. A great deal of interest is felt in what the other companies may do, and any hour may bring some developments. Yesterday, 323 tons of Alabama iron arrived from Savannah.

In foreign iron, there is nothing doing. Southern iron will encounter very decided opposition.

Muck-Bars.—Are occasionally asked for and about \$28 will be paid. Charcoal and anthracite blooms are in very poor request.

Manufactured Iron.—It is impossible to report any important transaction in merchant iron, owing to the indifference of buyers and the belief that seems to prevail that another drop in prices is probable. The basis for this belief seems to be the rumored decline in crude and pig-iron and the shading done on small lots. Present rates are 1.70@1.80c. for Refined, and 1.50@1.60c. for Common.

Plate and Tank-Iron.—A few hundred tons will be arranged for during the next few days, at about 2.10c. for Plate, and 2.50c. for Shell. The mills, it is announced, will shut down on Saturday. There are several requirements to fill. They will come along in January. Buyers would prefer to let matters stand as they are for the present, on account of the general unrest as to prices. The dullness is temporary. Some manufacturers are satisfied that a good deal of trade can be had as soon as buyers are satisfied that rock bottom has finally been reached.

Structural Iron.—A large amount of business has been quietly secured by Pennsylvania makers for bridge-work, as the result of negotiations that have been referred to, but the terms are private. It is known that extremely light prices have been taken; but the business amounted to a good deal, and the Phoenixville people who secured it have exceptional ability for doing good and cheap work.

Wrought Pipes.—Business has been dull for a week; but the orders on hand are sufficient to carry the mills along over the holidays, and some far into January. Angles are selling for 2@3.10c.; Tee iron, nominally 2.75c.; Beams and Angles, nominally 3@5c. It is impossible just at present to get bottom figures.

Nails.—Quite an improved demand for iron nails was developed in the local and near-by trade for small lots, but no general improvement has taken place or is probable. The quotations are \$1.75@2.10c.

Sheet-Iron.—No sales of moment have taken place.

Steel Rails.—Rail-makers have not done any thing of importance lately, at least nothing which they are willing to report, and in the absence of any of the trifling transactions, furnish quotations at \$28 and \$29.

Old Rails.—Holders of old rails have been obliged to reduce quotations. It is difficult to say what the prices are. Orders can be filled at \$17 for shipment-

There are others in hand for \$16, but business is not probable.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Dec. 12.

Anthracite.

As yet, nothing has been decided concerning the future relations of the coal companies to one another. There is undoubtedly a hostile feeling between some of them, and the future is looked forward to with some anxiety, and business naturally suffers. The market is flat and the prices nominal, some buyers succeeding in driving sharp bargains.

Some of the anthracite coal furnace men are growling, but the strongest of the blast-furnace companies are not members of the organization, and the movement is not regarded as a serious one.

Bituminous.

Business is very quiet, some fair bituminous coal selling at \$2.90@3. The miners in the Cumberland District are all at work, including those of the Koontz mine, where there was some trouble about removing the scales.

Philadelphia. Dec. 11.

[From our Special Correspondent.]

Vessels are now at Port Richmond for 10,000 tons, and besides this, there are 160,000 tons, of which nearly half are sizes not in very urgent request at this time. Demand is rather easy, and stocks likely to accumulate. Vessels are wanted for several New England ports and for New Orleans. The suspension to begin December 22d is already discounted. Next year's programme has been settled much more definitely by and in the newspapers than by the anthracite managers themselves. The inside talks and difficulties cover a good many things requiring extreme care and some time. Possibly the suspension plan will be continued awhile longer. The trade is in a transition state, and this is a bad time to adopt a system for the government of the trade. The fact is recognized that there are many new things likely to arise, new conditions and fresh factors. The whole thing has been gone over frequently by the managers, and it is a sort of 15 puzzle to solve. Many predict failure, but harmony will be the outcome. Broken coal is extremely dull. Small sizes for steam are selling at less prices than ever before offered. Chestnut and egg lots sold a little better. Manufacturing requirements were presented a little more freely this week, because of a growing belief that a good deal of business and corresponding improvement will take place in January. Disappointment may be the result, but the hope just now is quite strong, and is based on the argument that there has been a widespread restriction, that stocks are almost nil, and that the existing dullness can not in all reason last much longer. The local trade is quite good. The line trade is absorbing a fair supply. The interior manufacturers have been doing some buying. The shipments West are not any better. The canal closes to-day. Our people are talking over the desirability of the Spanish treaty; but there are many sides to it, and harmony of interests seems improbable. A coal export trade is certainly to be desired, and our iron manufacturers want cheaper ore. The pig-iron men want to save \$3 a ton on cost of iron, and believe the anthracite companies can help them if they want to. They refer to the 21 per cent profit on traffic as evidence of their ability to curtail traffic rates. A meeting will be held next Wednesday to take some united action in the direction of securing lower-priced fuel. The ore and furnace men complain that they are charged as much for short hauls as are charged for hauling ore from the seaboard into the interior of Pennsylvania, and that this policy acts as an injury to them and the industrial development of the region. Western Pennsylvania has cheap natural gas, while Eastern Pennsylvania, with its natural advantages, is deprived of competitive power. All the railroad companies are censured by the iron men for the part taken in making coal dear. The Reading people suffer, it is true, from the restrictive policy, and would welcome some other. The iron men argue that the advantages of reduction are offset by disadvantages, and refer to the estimated loss to the Reading of three or more million dollars. The iron men would like to have coal at Schuylkill Haven at \$1.70, and pay 90 cents freight for lump, making it \$2.60 instead of \$3.60. The production of anthracite over last year was very

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Table with columns for Name and Location of Company, Highest and Lowest Prices per Share at which Sales were Made (Dec. 6-12), and Sales. It is divided into Dividend-paying and Non-dividend-paying mines.

Tables giving dividends and assessments will be printed the first week of each month. Dividend shares sold, 43,928. Non-dividend shares sold, 16,150.

little greater than four years ago, and this year's production will exhibit a great falling off—due, as the iron men say, to abnormally high prices, while the production of bituminous iron advanced in the ratio of 20 to 27 in four years. These facts are stated not in an argumentative way, or with a design to reflect on railroad management, but merely to repeat statements and arguments and references made by buyers of coal and makers of iron and other products.

Buffalo. Dec. 10.

[From our Special Correspondent.]

No information can be obtained from the members of the coal and coke trade that differs materially from the statements made for the past two months relative to the local situation. Dealers offered to sell me ten tons of stove coal yesterday at last April's prices, and said that they had not raised their quotations, 'except on paper,' since that date. Further, the

proposed reduction in rates would in effect bring the present published schedule down to the actual selling schedule existing from said month of April. It is evident that matters connected with the coal trade are not so lovely as they appear on the surface.

Our docks and wharves look decidedly dismal. Occasionally, a vessel is moved to more convenient quarters, but nine tenths are moored alongside the docks, chained up for the season, in anticipation of freshets. Since my last letter, another sixty miles an hour gale has prevailed for nearly a whole day. The temperature since has been somewhat mild; just cold enough to be bracing and a little wintry.

Strenuous efforts are making to push the Red River of the North Canal project; claiming that it will do for Duluth, Minn., what the Erie Canal did for New York. If the proposed route is to benefit the grain and general merchandise trade, will not the coal interests also be large gainers? Answer, Yes! decidedly so; for what better commodity could be poured into the fertile valleys of the Northwest than the bituminous and anthracite products of the mines of Pennsylvania? The proposition is, to build 40 miles of canal and improve 265 miles of river channels, thereby connecting the whole river system of the Dominion of Canada, of several thousand miles in extent, with Lake Superior, and thence by the other lakes with Buffalo and the coal-fields that seek this port for an outlet.

The last arrival of coal at Duluth this season was the propeller N. K. Fairbank, on Monday, December 1st. She had on 640 tons shipped from Buffalo. Lake Superior navigation is closed as far as connection with the lower lakes is concerned; there are forty miles of ice in the Sault Ste. Marie River, and the channel is frozen too solid for the passage of vessels.

Nebraska farmers are burning corn for fuel, it is said. Bituminous coal is worth in that section of our country about 22 cents a bushel, while corn in many localities is not over 12 cents, and as two bushel of corn will produce as much heat as one bushel of coal, the farmer burns his corn instead of buying coal. When the railroads connecting Duluth with Nebraska are perfected, as they doubtless will be during 1885, the farmer will be able to ship his corn to that port and get our Pennsylvania coal in exchange. At present, his coal has to be hauled from Chicago, as a general rule.

Boston. Dec. 10.

[From our Special Correspondent.]

The market is dull and unsettled as regards anthracite coal. Unless there is some change in the plan of restriction for next year, a very unsatisfactory market may be expected. It was positively stated several weeks ago that there would be two weeks' restriction of mining in December. From the present aspect of affairs, there is not likely to be more than three days. This serves to destroy confidence in whatever utterances may come from head-quarters on this matter, particularly with parties who have bought on the strength of two weeks' restriction.

Of the various reasons given for this inconsistent action, it is probably true that the Reading Company's great need of money was chiefly instrumental in bringing about the new programme. Reading coal has been very popular in this market this year, never selling more readily, and the company has had difficulty in filling orders. Jobbers dealing in Reading coal outside of that company have more of this coal to sell than the company itself. They advanced the Reading large sums of money early in the season, and now are naturally pressing for the fulfillment of their contracts. Hence they have more of this coal to sell to transient trade than any one else. This tends to keep stove coal firm. But the demand for domestic sizes has fallen off of late, and only the actual scarcity of stove coal sustains the price. The buying is very properly on the hand-to-mouth basis. Broken and egg sizes are dull and nominally unchanged. The force of tinkering with the circular was not gone through with the first of the month. It seems to be generally admitted that coal circulars have had their day, so far as having any influence on the market is concerned.

We quote f. o. b. prices as follows:

At New York, Stove, \$4@4.15; Broken and Egg, \$3.50@3.65; Pea, \$2.40; individual coals, \$3.90 for Stove, \$3.25@3.50 for Broken and Egg. At Philadelphia, \$3.90@4 for Stove, \$2.20 for Pea, \$3.30@3.50 for Broken and Egg. Special coals, \$4.85@5 for Broken, \$5.35@5.50 for Stove.

There is a slow state of affairs in the bituminous branch of the market. Both Clearfield and Cumberland operators are rolling up a heavy production, the total output of the two districts exceeding that of last year up to December 1st, by 605,433 tons, and the aggregate production for the eleven months being

5,566,874 tons. Bituminous men believe that this excess of production has more than replaced that amount of anthracite coal, and further that the newly gained tonnage will be kept in the future. The strikes that threatened have been averted, as there seemed to be nothing left for the miners but to make the best of it. No trouble is expected on this score. Cargo lots are sold at \$3.55@3.70 delivered, according to quality.

There is a steady feeling in freights at last week's figures. We quote: New York, \$1@1.10; Philadelphia, \$1.15@1.25; Baltimore, \$1.20@1.25; Newport News, \$1.15@1.20; Richmond, \$1.25; Cape Breton, \$1.55@1.60; Bay of Fundy, \$1.30@1.40.

There is very little doing in the way of retail trade. December is particularly dull this year. Prices are unchanged. We quote:

White ash, furnace and egg... \$5.25@ 5.50
 " " stove and nut... 5.50@ 5.75
 Red ash, egg... 6.00
 " " stove... 6.25
 Lorberrry, egg and stove... 6.50@ 6.75
 Franklin, egg and stove... 7.50
 Lehigh, furnace, egg, and stove... 5.50@ 5.75
 nut... 5.75

Wharf prices, \$4.50 for Broken, \$4.85 for Stove.

The receipts of domestic coal at this port for the month of November have been 201,612 tons, or an increase of 34,484 tons over the November record of 1883. At last, also, the receipts since January 1st have reached a higher total than those of the corresponding eleven months of 1883. They are 2,954,086 tons, showing an increase of 3307 tons. The gain has been in Philadelphia and Baltimore. New York has lost in tonnage to this port quite heavily.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended December 6th, and year from January 1st:

Tons of 2240 lbs.	1884.		1883.	
	Week.	Year.	Week.	Year.
Wyoming Region.				
D. & H. Canal Co.	95,087	3,680,774	88,180	3,927,355
D. L. & W. RR. Co.	126,082	4,830,345	115,482	4,787,153
Penna. Coal Co.	34,211	1,240,671	34,805	1,425,811
L. V. RR. Co.	27,234	1,302,553	32,762	1,328,026
P. & N. Y. RR. Co.	3,932	210,485	5,982	206,890
C. RR. of N. J.	*	*	*	1,202,078
Penn. Canal Co.	2,573	430,708	535	486,663
North & West Br. RR.	25,152	779,182	15,092	484,944
	314,271	12,474,718	292,780	13,849,890
Lehigh Region.				
L. V. RR. Co.	116,013	4,375,380	122,978	4,787,530
C. RR. of N. J.	*	*	*	1,126,889
S. H. & W. B. RR.	1,137	138,571	1,898	39,379
	117,150	4,513,951	124,876	5,953,798
Schuylkill Region.				
P. & R. RR. Co.	254,948	10,630,545	244,525	9,327,330
Shamokin & Lykens Val.	*	*	*	950,363
	254,948	10,630,545	244,525	10,277,693
Sullivan Region.				
St. Line & Sul. RR. Co.	2,009	71,834	1,502	65,166
Total	688,378	27,691,048	663,683	30,146,547
Increase				
Decrease		2,455,499		

* Included in tonnage of the Philadelphia & Reading Railroad.

The above table does not include the amount of coal con-

FREIGHTS.
Coastwise Freights.
 Per ton of 2240 lbs.
 Representing the latest actual charters in December 11th.

Ports.	From Philadelphia.	From Baltimore.	From Elizabethport, Fort Johnston, South Amboy, Hoboken, and Weehawken.
Alexandria	.75@.90		
Annapolis			
Albany			
Baltimore	.58		
Bangor			
Bath, Me.	1.25	1.25	1.00
Beverly	1.25		1.00
Boston, Mass.	1.20@1.25	1.25@1.50	1.00
Bristol	1.10		
Bridgeport, Conn.		1.10	
Brooklyn	.85	1.05	
Buffalo, N. Y.			1.00
Cambridge, Mass.	1.25		
Cambridgeport	1.25		
Charleston, S. C.	.75	1.00	
Charlestown	1.25		1.00
Chelsea	1.25		1.00
City Point			
Com. Pt., Mass.			1.00
E. Boston	1.25		1.00
East Cambridge	1.25		1.00
E. Greenwich, R. I.	1.10		
Fall River	1.10		.70@.75
Jalveston	1.90	2.00	
Gardiner, Me.			
Georgetown, D. C.	.75@.90		
Gloucester	1.30		
Hartford			
Hackensack			
Hudson			
Lynn	1.35@1.40		
Marblehead			
Medford			
Milville, N. J.			
Milton			
Newark, N. J.		1.25	
New Bedford	1.05@1.10		.75
Newburyport			
New Haven		1.05@1.10	.60
New London			.70
New Orleans			
New-Berne			
Newport	1.25		.70@.75
New York		1.00	
Norfolk, Va.	.60		
Norwich			.70@.75
Norwalk, Conn.			.60
Pawtucket			
Philadelphia			
Portland, Me.	.95*	1.25	
Portsmouth, Va.	.60		
Portsmouth, N. H.		1.35	1.10
Providence	1.05@1.15	1.15	.70@.75
Quincy Point			
Richmond, Va.	.70		
Rockland, Me.			
Rockport			
Roxbury, Mass.	1.25		
Saco			
Sag Harbor			
Salem, Mass.	1.25@1.50		1.00
Saugus			
Savannah	.90	1.00	
Somerset	1.10	1.15	
Staten Island		.90	
Trenton			
Troy			
Wareham		1.25	
Washington	.75@.90		
Weymouth			
Williamsbg, N. Y.		1.05	
Wilmington, Del.			
Wilmington, N. C.		1.00	
St. Thomas, W. I.			

* And discharging. † And discharging and towing. ‡ 3c. Per bridge extra. § Alongside. ¶ And towing up and down. ** Below bridge.
 Vessels scarce. GEORGE W. JONES & Co. BALTIMORE.

sumed and sold at the mines, which is about six per cent of the whole production.

Total same time in 1879	25,023,416 tons
" " " 1880	22,388,866 "
" " " 1881	26,095,916 "
" " " 1882	27,655,179 "

The increase in shipments of Cumberland Coal over the Cumberland Branch and Cumberland & Pennsylvania railroads amounts to 204,135 tons, as compared with the corresponding period of 1883.

Belvidere-Delaware Railroad Report for the week end-d December 6th:

	Week.	Year 1884.	Year 1883.
Coal for shipment at Coal Port (Trenton)	4,773	117,232	124,191
Coal for shipment at South Amboy	26,264	637,158	562,797
Coal for distribution	23,653	784,857	782,852
Coal for company's use	4,128	176,454	151,815
Total	58,818	1,715,701	1,621,655
Increase		94,046	
Decrease			

Comparative Statement of the Production of Bituminous Coal for the week ended December 6th, and year from January 1st:

Tons of 2000 pounds, unless otherwise designated.	1884.		1883.	
	Week.	Year.	Week.	Year.
Cumberland Region, Md.				
Tons of 2240 lbs.	48,536	2,720,599	44,975	2,378,098
Barclay Region, Pa.				
Barclay RR., tons of 2240 lbs.	4,657	274,000	7,841	313,549
Broad Top Region, Pa.				
Huntington & Broad Top RR., of 2240 lbs	2,427	183,613		180,642
East Broad Top			701	40,882
Clearfield Region, Pa.				
Snow Shoe	4,339	171,670	6,906	242,175
Karthus (Keating)	1,659	52,633		
Tyrone & Clearfield	71,678	2,951,486	64,024	2,671,415
Allegheny Region, Pa.				
Gallitzin & Mountain	8,073	378,166	7,011	424,115
Pittsburg Region, Pa.				
West Penn RR.	6,222	267,406	7,584	368,792
Southwest Penn RR.	2,487	117,781	3,663	115,857
Pennsylvania RR.	3,150	257,030	10,214	580,017
Westmoreland Region, Pa.				
Pennsylvania RR.	34,383	1,241,924	28,237	1,310,668
Monongahela Region, Pa.				
Pennsylvania RR.	3,969	150,373		
Total	191,589	8,766,681	181,246	8,635,310
Increase		131,371		

WANTED IMMEDIATELY—A WELL-qualified Engineer or Railroad Technician, German preferred, to act as Representative for a Patented Side-Coupling of Railroad Cars, which shall be introduced into the U. S. A. Address offers to PETER MADSEN, at Berlin (Prussia), Neue Koenig Str. 15.

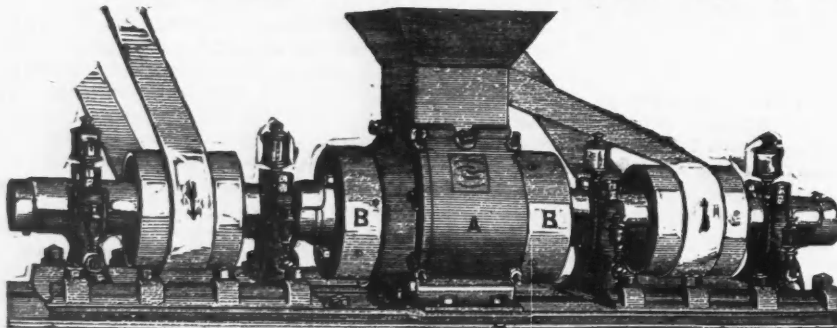
HOMESTAKE MINING COMPANY, MILLS
 Building, 15 Broad Street,
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DIVIDEND NO. 76.
 The regular monthly dividend, TWENTY-FIVE CENTS PER SHARE, has been declared for November, payable at the office of the company, San Francisco, or at the Transfer-Agency in New York, on the 26th instant. Transfer-books close on the 20th.
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