

ENGINEERING and MINING JOURNAL.

VOL. XXXII. No. 17.

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THE SCIENTIFIC PUBLISHING CO., Publishers,

P.O. Box 1833.

27 Park Place, New York.

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THE HON. WILLIAM M. EVARTS and Mr. TOWNSEND COX have been elected directors of the National Underground Electric Company.

We regret to announce the death, at Charlotte, N. C., of Professor HENRY W. ADAMS, of the Adams Mining and Reduction Works. The work, it is stated, will be carried on.

At last, Edison is about to do actual work, the laying of an elaborate system of conductors for the electric light having been commenced in the lower business district of this city.

MR. E. WINDSOR RICHARDS, the well-known engineer of BOLCKOW, VAUGHAN & Co., of Middlesbrough, England, to whom so much credit is due for taking up the basic process and introducing it at the new Eston Steel-Works, is now sojourning in this country. Mr. RICHARDS recently, by the extraordinary record of rolling steel rails at Eston, quite took away, for the moment, the breath of our steel men, until Captain JONES, of the EDGAR THOMSON Works, challenged his claims of doing the best work in that specialty. Mr. RICHARDS, we understand, will be present at the coming meeting of the American Institute of Mining Engineers at Harrisburg, and we hope will favor American metallurgists with an account of what he has done and how he does it.

THE long struggle between the farmers and the hydraulic miners in California threatens to assume a serious aspect. The latter have taken a step which they will find it difficult to justify, even on the grounds which they take. Though there has been an injunction against a number

of companies, enjoining them from depositing tailings or *débris* in the Yuba River or its tributaries, miners have commenced work on the Milton, Excelsior, Manzanita, and North Bloomfield hydraulic mines in defiance of the law. They urge in defense of their action that the Supreme Court has just decided that Judge KEYSER, who issued the injunction, is disqualified, because he was directly interested in the result. The miners argue that the injunctions granted by him are therefore null and void; but in order to guard against any interference, all the officers of the mining companies have resigned, so that there is nobody upon whom new injunctions could be served, except upon each individual miner, who would have to be tried separately.

For a short time, this state of affairs may be satisfactory to the mining companies; for no one will believe that the abandonment of their property to the miners is anything but a subterfuge; but in the long run, such a system can not be kept up.

A CURIOUS instance of the tendency in Germany to concentrate everything in the hands of the government is furnished by the proposal, recently seriously discussed at a meeting of the Chemical Society at Reichenhall, to have all the powder-mills of the country pass into the hands of the state, to be operated by it. It appears that the assassination of the Czar of Russia inspired some patriotic Germans with the idea that a necessary safeguard against such atrocities would be the purchase of all the powder-mills in Germany. A speaker at the meeting above referred to called attention to the fact that, while the consumption of blasting-powder is only 150,000 cwts., the production is 400,000, a large quantity being exported. This is a trade which the government would have to abandon, so that the payment of 30 millions of marks for the mills would prove a very poor investment. Then the seven dynamite manufactories would have to be acquired, which would call for three millions more, and here, too, an export trade of 700 tons would suffer very severely. After thus loading itself down with many unnecessary mills, it is asked, How can the guardians of the life of the sovereign prevent any would-be murderer from applying the simple processes of manufacture in some quiet corner of the empire to produce the small quantity which might do great mischief? Absurd as the whole matter will appear, even on a casual examination, it has been seriously put forward, and is as seriously and vigorously opposed.

BRITISH EXPORTS OF IRON AND STEEL.

MESSRS. W. W. & C. RICHARDSON, of London, furnish us with the following statistics extracted from the Board of Trade returns:

RAILROAD IRON EXPORTED TO	Month ended Sept. 30.			Nine months ended Sept. 30.		
	1879.	1880.	1881.	1879.	1880.	1881.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
United States.....	8,431	14,531	26,321	22,107	173,775	242,446
Russia.....	6,002	1,921	112	29,566	9,243	13,162
Turkey.....	10		184	1,023	51	4,580
British India.....	5,002	6,708	8,590	67,911	109,228	71,775
British North America.....	15,707	7,695	20,319	33,754	77,151	92,657
Egypt.....	16	32	10	1,481	3,939	4,971
Australia.....	2,183	6,616	7,268	46,852	63,266	66,989
Brazil.....	280	161	1,539	27,916	14,879	32,684
Spain and Canaries.....	892	683	254	12,420	9,563	9,957
Holland.....	761	11	755	3,702	2,051	1,111
Sweden and Norway.....	25	1,568	1,285	11,116	5,795	6,128
Chili.....	39	1,095	25	720	3,307	659
Denmark.....	94	13	21	4,718	19	120
Peru.....	102		3	2,298	751	996
Germany.....	3	3	33	3,346	323	270
British Possessions in South Africa.....	244	390	796	5,027	6,611	3,125
Italy.....	2,924	1,554	2,788	28,252	15,328	21,508
Other countries.....	5,037	6,348	10,616	24,891	45,719	60,635
Total.....	47,067	50,130	80,910	347,194	541,171	633,683
Total exports from Great Britain of iron and steel to all countries.....	287,067	297,013	376,517	1,980,120	3,002,498	2,822,417
Estimated total of iron rails.....	9,378	7,130	8,496	34,952	109,663	101,236
steel rails.....	31,241	36,150	60,631	254,394	367,836	450,924
Total of rails.....	40,619	43,280	69,127	289,346	477,699	552,160
Exports of the following to the United States :						
Pig-iron.....	32,036	26,661	43,046	76,643	564,042	308,893
Steel unwrought.....	551	1,304	12,832	4,360	32,974	89,443
Old iron for remanufacture.....	26,549	4,571	7,992	59,839	189,154	66,156
Tin plates.....	13,342	13,865	16,074	109,909	124,156	129,586
Hoops and sheets.....	798	2,184	5,322	3,042	38,168	29,304
Bar, angle, bolt, and rod.....	605	1,170	1,090	3,280	47,038	9,454

The shipments of all kinds of iron to all countries shows an improvement for the month as compared with last year, and the total exports for nine months are only about 180,000 tons less than for the same period of 1880. The shipments of railroad material are steadily increasing, showing an increase over 1879 of 272,814 tons, and over 1880 of 74,461.

The shipments of iron and steel to the United States, although much larger for the month than for September of 1880 and 1879, show a falling off as compared with August of this year. The present shipments, how-

ever, are at the rate of over 1,300,000 per annum. The shipments of pig-iron, most of which are Bessemer, continue large. Steel blooms are coming in large quantities. The total shipments of all kinds of iron and steel to the United States for the first nine months of 1879, 1880, and 1881 were 279,100 tons, 1,169,304 tons, and 875,322 tons respectively.

THE MINES AND METALLURGICAL WORKS OF PRUSSIA IN 1880.

Like most official statistics, those issued by the Prussian government appear tardily, and it must be left to individual enterprise promptly to furnish figures of production which, while not strictly accurate, are sufficiently close approximations to serve as a guide for the trades interested. Experience in England, France, and this country has proved that, in order to obtain statistical data that will be of immediate value in a commercial sense, it is necessary that trade organizations or journals undertake the work of gathering them at stated intervals. To producers and consumers, for instance, it is vastly more important to know on the 15th of January that the output of any mineral or the production of any metal in the preceding year has been about 90,000 tons than it would be for them to learn on the first of September following that the correct figure was 91,157 tons. We do not wish to disparage the work officially done, but desire to urge the necessity of the publication of preliminary reports.

The Prussian government annually gathers the mineral statistics with much industry, and publishes them in the *Zeitschrift für das Berg-, Hütten- und Salinen-Wesen*, from which we take the following data, all in metric tons, which in general show a very satisfactory progress during the last few years:

	1877.	1878.	1879.	1880.
Coal.....	33,672,025	35,500,167	37,684,648	42,172,944
Lignite.....	8,636,598	8,841,366	9,278,353	9,874,888
Asphaltum.....	26,000	26,000	26,000	29,000
Iron ore.....	2,753,486	2,955,872	3,153,091	3,679,319
Zinc ore.....	573,147	595,839	589,255	631,826
Lead ore.....	134,582	139,988	139,621	142,873
Copper ore.....	336,947	366,432	391,553	473,295
Manganese ore.....	5,289	4,407	5,005	9,753
Pyrites.....	100,920	95,751	100,427	112,238
Rock-salt.....	8,910	110,758	142,857	165,075
Salt from brine.....	227,561	218,303	230,731	244,988
Potash salts.....				446,007

The total number of workmen employed in all the mines of Prussia was 247,356, of which 155,006 worked in and above ground in the 403 collieries, 19,757 in 469 lignite mines, 23,259 in 733 iron mines, 13,616 in 70 zinc mines, 17,025 in 102 lead mines, and 10,546 in 19 copper mines.

The statistics of the manufacture of pig-iron are summarized in the following table:

	Production. 1880.	Iron ore smelted.	Limestone.	Cinder.	Fur- naces, blast.	In blast.
Charcoal pig.....	32,097	79,680	3,959	642	33	27
Coal or coke pig.....	2,015,992	4,655,526	1,401,732	388,033	199	154
Mixed fuel.....	4,582	10,210	2,132	.....	2	2
Total.....	2,052,671	4,745,416	1,407,823	388,675	234	183

As much as 496,796 tons of ores were imported from foreign countries; and of the total quantity smelted, 626,116 tons had been previously roasted; and as 388,675 tons of slag and cinder were put through together with 13,769 tons of scrap and 14,259 tons of other old metal, it will be seen how erroneous it is to attempt to obtain figures of average yield of ores by simply dividing the production of pig into the sum of output of home mines and foreign ores imported—a feat which has been recently accomplished in England. The total number of people employed in the blast-furnace works of Prussia was 16,922, of whom 942 were females.

It may be of interest to add that the 183 furnaces which were in blast during the year worked in all 8398 weeks. The product was distributed as follows: 110,585 tons of foundry pig, 697,388 tons of pig for the manufacture of Bessemer and open-hearth steel and spiegeleisen, and 1,207,916 tons of mill pig, the rest being used for making castings directly from the furnace.

The production of spelter and zinc during the year 1880 was 99,490 tons, of which Silesian works alone made 65,438 tons, while six establishments in Westphalia and the Rhenish Provinces turned out the remainder. Out of 592,344 tons of ore used, 19,163 were of foreign origin, and 61,507 were purchased by the smelting-works in a roasted condition. In addition to this, 7067 tons of various furnace products were treated, carrying the total to 599,412 tons of raw material.

Twenty-seven establishments in all made lead to the extent of 79,337 tons, about one half being produced in the Rhenish Provinces, while Silesia is credited with 12,931 tons. The quantity of ores smelted was 156,374 tons, of which 14,336 tons were imported. In addition to this, 10,122 tons of base bullion were worked into merchant lead. The production of litharge was 2548 tons.

Of copper, the output of the Prussian smelting-works was 13,604 tons from 481,135 tons of ore, 26,982 tons being imported. The main producing district was of course Mansfeld, which turned out 9814 tons. Besides this, there was produced in the Bonn government district 988 tons of blue vitriol.

Other metals were produced as follows: Silver, 138,939 kilograms; gold, 316 kilograms; metallic nickel 103 tons cadmium, 3327 kilo-

grams; antimony, 25 tons; antimony alloys, 240 tons; arsenical products, 265 tons; and sulphur, 1530 tons. The production of sulphuric acid was 105,176 tons, made from 85,388 tons of ores, of which 25,790 tons were of imported material. It may be of interest to add that the consumption of niter for producing it is returned as 461 tons.

There were in Prussia 640 foundries, partly connected with other works, which had a plant of 1215 cupolas, of which 913 were in operation during the year; 114 reverberatory furnaces, of which 83 were working; and 194 other furnaces of different kinds, of which 148 were used. These consumed 123,618 tons of pig and 111,092 tons of scrap, broken castings, etc., of home manufacture, and 150,283 and 8603 tons respectively, which were imported, a total of 393,596 tons. The principal items of production were 161,220 tons of machinery castings, 28,765 tons of hollow ware, 43,910 tons of pipe, 8153 tons of chilled castings, 1964 tons of malleable iron castings, and 104,767 tons of miscellaneous castings, a total of 348,782 tons.

In the manufacture of wrought iron and puddled, cement, and other steel, which are included in the general term of "weld-iron," 262 works were engaged, employing 40,820 persons. They possessed 1913 puddling-furnaces, of which 1405 were at work during the year; 2 rotary puddling-furnaces, 965 welding reverberatories, of which 690 were in operation; 448 reheating furnaces, of which 378 were working; 8 cementation furnaces, of which 3 were producers; and 288 furnaces of various descriptions, of which 251 did work. They consumed 1,335,874 tons of domestic and 4939 tons of foreign mill pig, 56,921 tons of muck bar, and 106,915 tons of old iron. They produced 62,071 tons of muck bar for sale, 245 tons of cement steel, 11,720 tons of iron rails, 7434 tons of track materials, 3118 tons of car-wheels, 4429 tons of tires, 28,940 tons of iron sleepers, and 1342 of fastenings for them, 291,762 tons of ordinary merchant bar, 111,968 tons of fine merchant bar, 43,401 tons of architectural iron, 93,102 tons of bridge and ship shapes, 7928 tons of forgings, 1087 tons of parts of machinery, 107,356 tons of plates, 47,251 tons of boiler iron, 30,557 tons of sheet, 7635 tons of tin plate, 208,522 tons of wire, 5165 tons of pipe and tube, and 22,439 tons of miscellaneous manufactures, a total of 1,096,478 tons.

In Prussia, 41 works were engaged in the manufacture of steel, or ingot iron, as the Germans call it, employing 19,672 persons. These works had 48 Bessemer converters, of which 35 were in operation; 43 open-hearth furnaces, of which 29 did work; 27 crucible steel furnaces, of which 13 were producing; and 250 crucibles, of which 100 turned out steel. In addition to this, there was an auxiliary plant of 96 cupolas, 23 reverberatory furnaces, 5 drying furnaces, 532 reheating furnaces, and 57 miscellaneous furnaces, of which respectively 68, 2, 3, 338, and 35 were in operation. The consumption of raw materials was as follows: 542,432 tons of domestic and 88,728 tons of foreign pig, 51,397 tons of spiegeleisen, 3341 tons of ferro-manganese, 4397 tons of wrought-iron, 17,118 tons of ingots, 138,837 tons of old and scrap iron for ingot steel manufacture, and 6069 tons of steel and 5925 tons of various material for crucible steel manufacture, a total of 858,244 tons of raw material. The production was 617,637 tons of Bessemer ingots, 89,369 tons of open-hearth steel, and 3359 tons of other kinds of steel. The total quantity of crucible steel made was 29,854 tons, while the quantity of "ingot iron" was 704,865 tons; of this, 28,355 tons of ingot iron and 7466 tons of crucible steel were sold directly. The rest was manufactured as follows: Steel rails, 394,528 tons; rail fastenings, 16,664 tons; axles, 12,719 tons; wheels, 20,844 tons; tires, 27,497 tons; sleepers, 24,944 tons; fastenings, 106 tons; merchant bar, 6078 tons; guns and projectiles, 10,363 tons; of ingots and billets, 26,040 tons; plates and sheets of various sizes, 3725 tons; wire, 10,800 tons; and various manufactures, carrying the total to 634,419 tons.

THE WORKS OF THE PENNSYLVANIA STEEL COMPANY.

The approaching visit of the American Institute of Mining Engineers to the works of the Pennsylvania Steel Company, at Steelton, three miles from Harrisburg, offers a fitting opportunity to give some details of one of our great modern steel mills, for which we are indebted to its officers. The building of the works was commenced in 1865. Their location on the lines of the Pennsylvania, Northern Central, Philadelphia & Reading, Cumberland Valley railroads, and the Pennsylvania Canal, furnishes ample facilities for obtaining supplies of raw materials and for shipping the product to market. The works command a market in Central Pennsylvania, and have convenient access to all points in all directions, limited only by cost of transportation and local competition.

The Blast-Furnace Plant.—In 1872 to 1875, two furnaces, No. 1 and No. 2, were built, and two new furnaces are now in course of erection. No. 1 is a 60-foot stack with 14-foot bosh and a cubical capacity of about 6000 cubic feet, while No. 2 is 72 feet high, has a diameter of bosh of 17½ feet, and a capacity of 14,500 feet. Each furnace has two nests of boilers, with six in each nest, which generate steam for three upright blowing-engines of 500 horse-power each, having blowing-cylinders 7 feet in diameter and a 4-foot stroke, the pressure of blast varying from 6 to 8 pounds. On its last blast, 7000 to 7500 cubic feet of air were delivered per minute to No. 1 at a temperature of 900 to 950 degrees Fahr., obtained from a Kent hot-blast stove. The quantity of air blown into No. 2 is about 15,500 cubic feet per minute, the air being heated to from 1100 to 1300 degrees Fahr. in three Whitwell stoves 18 feet in diameter and 55 feet high. The ores used are Perman, with 47 to 50 per cent of metallic

iron; Tafna, 57 to 59 per cent; Karegas, 47 to 49 per cent; Alviso, 50 to 54 per cent; and Cargan (Irish), 40 to 42 per cent; all of these being foreign ores; Cornwall ore, averaging 50 per cent; Pigg River and Rocky Mountain, both Virginia ores, running 50 to 55 and 40 per cent of iron, respectively; and Staten Island ores, holding 38 to 40 per cent. The limestone, which is obtained in the vicinity, contains from 80 to 90 per cent of carbonate of lime, 4 to 18 per cent of carbonate of magnesia, and 2 to 6 per cent of insoluble residue. In addition, Bessemer refuse, iron and spiegel shot, coal and coke from the cupolas, slag and small scrap from the pit, spiegel slag and open-hearth cinders are charged. The charge of No. 2 is 4480 pounds of a mixture ranging from one half anthracite and one half Connellsville coke to all coke; 2800 to 3600 pounds of limestone, according to the ore mixture; 6800 to 8000 pounds of ore, yielding 51 to 55 per cent of pig-iron; and 700 to 800 pounds of Bessemer refuse, yielding 25 to 50 per cent of iron.

The Old Bessemer Plant, completed in June, 1867, consists of two converters nominally 5-ton, but working actually a 7-ton charge. The composition of the pig-iron worked, which is partly purchased and partly made at the furnaces belonging to the works, runs from 1.5 to 3 per cent in silicon, from a trace to 0.05 per cent in sulphur, 0.04 to 0.10 per cent of phosphorus, and from a trace to 0.50 per cent of manganese. The average mixture aimed at is 2.5 to 2.7 per cent of silicon and 0.06 to 0.09 per cent of phosphorus. The iron is melted in three cupolas, of which two are in operation at the same time, while one is repairing. A new cupola goes on every 24 hours, so that each one melts 48 hours before it is dumped, the melting capacity per day being 240 tons for each, and the consumption of fuel one of coke to 12 to 13 of iron. They have a high from the center of tap-hole to the bottom of charging-door of 16 feet 6 inches, and from tap-hole to center of tuyeres of 3 feet 9 inches. The blast is furnished by one No. 5 and one No. 7 1/2 Baker blower, the pressure of the blast being 10 to 12 ounces. The melted iron is run into a ladle on a scale platform, mounted on a lift. As the ladle rises, it is turned to pour the metal into the runners leading to the converters. In this year, the best month's run of the vessels has been 10,921 tons (2240 lbs.) of ingot, while the best week's and day's work respectively has been 2715 and 520 tons. The blast is furnished by two horizontal condensing engines connected (built by Merrick, of Philadelphia), with one fly-wheel between them. The steam and blowing cylinders are in the same line, the former being in front. The blowing cylinders are 54 inches in diameter, while the steam cylinders are 40 inches, the stroke being 5 feet, the pressure of steam 55 lbs., and the pressure of blast from 20 to 25 lbs. The spiegel is melted in three cupolas, having a height of 9 feet 1.5 inches from the center of the tap-hole to the bottom of the charging-door, and 2 feet 9 inches to the center of the 3-inch tuyeres, of which there are four. Top casting has been adopted from a seven-ton ladle on a central crane. For the hydraulic arrangements, three Worthington non-condensing duplex pumps, with 7-inch plungers, are provided, which furnish a pressure of 320 pounds. They also supply the requirements of the open-hearth plant, the rail mill, the foundry, and the frog and boiler shops. The average composition of the Bessemer steel produced is as follows:

Manganese.....	0.80 to 0.90
Carbon.....	0.55 " 0.40
Silicon.....	0.04 " 0.07
Phosphorus.....	0.07 " 0.10
Sulphur.....	0.04 " 0.06

The Blooming Mill, Forge, and Rail Mill.—The ingots produced by the Bessemer converters are taken by a small locomotive to the blooming mill, built in 1876, which has four reheating furnaces capable of heating six ingots at one time. Gas is furnished for them by 12 stalls of Siemens gas-producers, which are fired with Clearfield or Broad Top coal. The ingots are charged into and drawn from the furnaces by hydraulic cranes, and are conveyed to the rolls on a car moved with an hydraulic windlass. The ingots, as they go to the blooming train, are 14 inches square at the base, 12 inches square at the top, and from 60 to 72 inches long. The mill, which was built by James Moore, of Philadelphia, has a three-high train of rolls, 34 inches in diameter, driven by an upright engine of 500 horse-power, with 44-inch steam cylinder and 51-inch stroke. With 55 pounds of steam, it cuts off at one half of the stroke, and runs at the rate of 45 revolutions per minute. The ingot is bloomed in 12 passes, a blooming table being provided in front and behind the rolls for handling the ingots. The capacity of the train has never been ascertained, for lack of ingots. It has, however, rolled 573 tons of ingots in 24 hours, and has a record of 2900 tons in one week, and 11,689 tons in one month, the 14-inch ingot being reduced to a 7-inch bloom from 16 to 20 feet in length.

The blooms are then loaded on buggies and are conveyed by an endless-chain railroad to the rail mill, where they are cut into lengths for one rail by a steam-hammer. Before the blooming train was erected, the ingots were hammered. The works now possess four hammers in all, one small two-ton hammer, used for making forgings, for billets and slabs; two Sellers four-ton hammers, one of which is used to cut up blooms and the other to make billets, slabs, etc.; and one large fifteen-ton hammer for large billets, slabs, etc. The cut blooms are heated in four reheating furnaces, with 12 stalls of Siemens producers. The rail mill engine is an inverted vertical high pressure engine, built by Pusey, Jones & Co., Wilmington, Del., using a Bulkley condenser. It has a 60-ton fly-wheel, a steam cylinder 38 5/8 inches in diameter, with a five-foot stroke. The steam pressure is 65 pounds on an average, cutting off at one half of the stroke. The engine runs at a speed of 80 to 85 revolutions per minute. The rail mill is a three-high train of 23-inch roughing and finishing rolls, six passes being required for the former process and five for the latter. The mill has a record of 94,143 gross tons for a year, 8800 for a month, 2270 for a week, and 448 tons for a day. The finished rails are delivered by the rolls to an improved Gustin apparatus, which handles the rails, passes them to the saws, and saws, hot straightens, and delivers them to the cooling beds by steam-power applied by frictional gearing. When sufficiently cooled, the rails are cold-straightened by two straightening machines, and they are then inspected before drilling, which is done by four drilling-machines constructed in the shops of the company.

The Open-Hearth Plants.—In 1875, an open-hearth plant was erected containing two 14-ton furnaces, 13 feet in clear between portes and 12 feet

in clear between inwalls, with a set of 8 Siemens gas-producers. The materials worked are rail and bloom ends, Lake Champlain blooms, steel borings, miscellaneous own and bought scrap, and English, Swedish, and American and own pig, the choice of materials, of course, depending upon the kind of steel it is intended to produce. The time required for melting a charge varies from 5 1/2 hours at the beginning of the campaign to from 12 to 13 hours at the end. The time for decarbonizing varies with the condition of the charge. For casting, 3 to 5 minutes are required from the time of tapping and from 1/2 to 1 1/2 hours are consumed from the time of tapping one heat to the beginning of charging for the next. The furnaces principally run on rail steel, the weight of the ingots, which are all top cast, ranging from 3200 lbs. downward according to the weight of the rails to be made. Hydraulic lifts and cranes are used for handling materials and product.

A new open-hearth plant of two 25-ton furnaces, having an estimated capacity of 180 tons per 24 hours, is now building, and will probably be ready to start in two or three months. The furnaces are placed in a brick building, 125 feet by 100 feet, with two L's of 21 1/2 by 21 feet, covered with an iron roof. The two furnaces have a stationary hearth, measuring 13 feet between portes and 16 feet 3 inches between inwalls, and they are provided with removable roofs and portes. There are five hydraulic cranes, so arranged as to be capable of handling ingots 18 to 20 tons in weight, and there are besides two hydraulic elevators. The metal will run from the furnace into a stationary ladle, mounted on columns, from which it flows through two large nozzles into two runners attached to a ladle moved on wheels on the edge of the pit. In these small lades there are two nozzles, through which the molten steel flows into the molds. The slag is run into cars in a pit placed between the furnace and the ingot pit. This is an arrangement which it is believed will secure the advantages of less repairs, ease of getting at any parts to be repaired, and greater economy of working.

The New Bessemer Plant.—To visitors, the most interesting part of the great plant of the Pennsylvania Steel Company will probably be the new Bessemer works which were run for two weeks; but as every thing was not ready for continuous work, work was stopped in order to complete and add and alter what might be necessary. Regular work, we understand, will not probably be done for two or three weeks, when the estimated capacity will be 630 to 650 tons per 24 hours. The buildings are of stone with an iron roof. The converter-room is 149.5 feet by 80 feet, and on one side is the cupola-room measuring 116 by 60.5 feet, while on the other are the boiler and engine-rooms, each being 67.5 by 80 feet. The crusher-room, on one end, is 38 by 41 feet 9 inches. The blowing-engine is of the horizontal compound type, with a condenser run by power, independently of the main engine. The steam cylinders, on the same piston-rod, connect with the main shaft, on which are two 25-ton fly-wheels, and the cranks connecting with the two blowing-cylinders, which are on the right and on the left of the steam cylinders. The diameter of the high-pressure cylinder is 25 inches, and that of the low-pressure cylinder 51 inches, the length of stroke being 70 inches. The valves are poppet-valves, and the pressure of steam is 70 pounds. The diameter of the blowing-cylinders, which are furnished with disk-valves, is 50 inches, and the stroke 70 inches. The pressure of the blast is 25 pounds. The cupola blowing apparatus consists of three upright blowing-engines having one 12-inch steam cylinder with 16-inch stroke, and three 36-inch blowing-cylinders with 16-inch stroke, the cranks being set 120 degrees apart. There are, besides, two No. 7 1/2 Baker blowers, directly connected with a horizontal engine placed between the two. For the water service, there is one Worthington compound duplex pump, with a capacity of six million gallons, which fills the water-tanks from the river or ponds. To supply the hydraulic machinery, two pressure-pumps (with 9-inch plungers) of the same make are used, the water pressure being 320 pounds. There are ten boilers 5 feet in diameter and 30 feet long, with internal furnace, and with flat flue with round ends and upright tubes, through which the water circulates. The cranes have a lift of 13 feet and plungers 14 inches in diameter, and there are besides two Otis safety hydraulic hoists. It may be added, with the exception of the Worthington pumps and Baker blowers, all of the machinery for this new plant was built in the shops belonging to the company.

The plant consists of three 8-ton converters in one line, and placed 20 feet apart from center to center, the height of the converter stage above the general level, being 11 feet 8 1/2 inches, while the center of the trunnions above it is 13 feet. The diameter of the converters inside of the shell is 8 feet, and the vessel bottoms have 19 tuyeres, each one of which has 13 holes 3/8 inch in diameter, and drying-ovens are provided capable of holding 22 bottoms. We may add that in the old Bessemer mill one bottom will stand, on an average, 16 heats, the poorest being 10 and the best 24 heats, the bottom being put in the vessels by means of a lift carried on wheels on the general level and connected with the pressure mains by means of a hose. The two ladle cranes are placed 15 feet 9 inches from the center line of the converters and midway between vessels Nos. 1 and 2 and Nos. 2 and 3, so that one ladle commands vessels Nos. 1 and 2 and the other vessels Nos. 2 and 3. The two pits, which are four feet deep and 17 feet 2 inches in radius, are each commanded by one ingot crane, so that the steel is readily handled. Back of the vessels is a track sunk nine feet, on which are placed iron dump-cars for receiving slag and other refuse, and back of this pit are the cupola dumps and hoists. The charging-floor of the spiegel and iron cupolas is 39 feet 10 3/4 inches above the ground level, the tapping-floors of the iron cupolas being 23 feet 4 3/4 inches and that of the spiegel cupolas 32 feet 4 inches above the general level. The distance of the center of a converter to the nearest iron cupola is 45 feet 11 inches, while to the iron ladle it is 35 feet. The iron lades have a lift of 12 feet 6 inches. The distance between the center of the iron cupolas in the same line is 15 feet, and at the right angle 20 feet. The nearest spiegel cupola is 20 feet 8 inches from the converter, and the spiegel-ladle is at the same distance from it. It is the intention, when every thing is in working order, to run three iron and two spiegel cupolas at the same time. The former are 6.5 feet in diameter in the clear and 8 feet in the shell, the height from tapping-hole to bottom of charging-door being 16.5 feet and the height of the tuyeres above the tapping-hole being 3 feet 9 inches. The iron cupolas have eight 6-inch tuyeres, and are run with a pressure of blast of 10 to 12 ounces. The spiegel cupolas, which are 3 feet in diameter in the clear and 4 1/2 feet in the shell, are 9 feet 1 1/2 inches high

from tapping-hole to bottom of charging-door, and their four 3-inch tuyeres are 2 feet 9 inches above the tapping-hole. The pig and spiegel are loaded on narrow-gauge trucks which are placed on the scales when the metal is loaded on bogies to be hoisted to the cupola charging-floor. The iron and spiegel runners pass on each side of the middle vessel, between it and the two outside converters, and they are so arranged that the runners for Nos. 1 and 2 can be used while those for Nos. 2 and 3 are repairing, and *vice versa*. The main advantages which are to be secured by this arrangement of the plant, which, it will be noted, differs in a number of points from what might be called the standard American plan, are, that two vessels are always in good working order, so that a heat is always burning, so that when one vessel is turned down, another is ready to be turned up to be blown. Continuous working and all the advantages that it implies are thus secured. The whole plant is so arranged that vessel bottoms, pig-iron, spiegel, melted steel, ingots, slag, and other refuse material are easily and economically handled.

The various sections of the repair department are worthy of notice, as they are of large capacity, such as the repairs and renewals constantly required in such an establishment would make a necessity, and the bulk of the machinery and appliances for the new plants was constructed by the company. There is a pattern shop supplied with improved machinery for working wood, a fine brick building 110 feet long, with pattern store-house adjoining; also iron foundry, 170 feet long; carpenter-shop; boiler-shop, in which boilers and all other forms of plate-iron work are made; and the machine and smith shops. The machine-shop is a brick building 350 feet by 78 feet, fitted with all the necessary machinery. As an auxiliary department, the company manufactures on a large scale railroad frogs, switches, crossings, and other articles of road-bed construction, among other specialties being the Lorenz switch and the Patterson frog.

The handling of the large amount of material of all kinds required for the operations of the company, and the shipment of the product, is a matter of considerable moment. For the purpose of moving the cars received from the railroads, placing them in various parts of the works, weighing and shipping, there are in use four powerful shifting locomotives; and for moving iron, ingots, etc., there are two narrow-gauge locomotives in constant use.

The plot of land occupied by the works was originally about 80 acres, but this has been increased by purchases during the present year to about 120 acres.

At this time, the pay-roll of the company has over 2200 names, these being adults with few exceptions, and a large proportion are married men, many of whom reside in the immediate vicinity of the works.

THE HAMILTON PROCESS.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your issue of October 15th, you take occasion to cast a serious reflection upon myself and associates. You charge me with endeavoring to place my stock in the Hamilton Reduction Company upon the market, thereby creating an impression that I have not an entire confidence in my process. I have not sold any of my stock whatever, neither do I desire to. This fact I can prove to your entire satisfaction at any time. As to the practical demonstration you speak of, the works are now so far advanced that I expect to work ores some day next week, and shall take pleasure in requesting you to be present. Yours truly,

NEW YORK, Oct. 17, 1881.

WALTER HAMILTON.

INVESTIGATIONS ON THE ORE KNOB COPPER PROCESS.*

By T. Egleston, Ph.D.

(Concluded from page 255.)

5. TREATMENT OF THE SALAMANDERS.

All the loupes and salamanders which form in any of the furnaces are treated in the winter season for the copper they contain. They are collected during the rest of the year, and are deposited on the side of the slag-heaps. They contain a large amount of copper, and were formerly a source of considerable loss, since all the attempts to treat them as part of the ordinary charge failed. The treatment consists of oxidizing and then sweating them in a German hearth, made by taking out the breast of one of the black copper furnaces in the upper furnace-house. The furnace is heated with charcoal, and the salamanders piled up against the tuyere side and covered with charcoal, and a powerful blast turned on. This serves to oxidize the iron, and in order to scorch it a little quartz is added. The product is a rich matte, which is treated with the other mattes, and a black copper, which is put with the other black copper. There is about four times as much black copper as mattes. The slags are very rich, and contain at least $1\frac{1}{2}$ per cent of copper, and are treated with the matte in the furnaces. They run out in a stream on the ground. The furnace is charged three times in the twenty-four hours. When the charge is exhausted, the matte and pig-copper are removed and a new charge put in. The cost in twenty-four hours is, two men at \$1 per day, two at 75 cents, and 300 bushels of charcoal. The repairs to tools cost about 25 cents per day. About two tons of salamanders are smelted in this way in twenty-four hours. This work is only done in the winter time, as the men at any other season would be greatly inconvenienced by the heat. The blast used is at about half a pound pressure.

6. REFINING PIG-COPPER.

The refining furnace is a reverberatory adapted for wood, and holding a charge of 10,000 pounds. The fireplace is made for wood, and is really a wood gas-producer. It is 4 feet 6 inches long by 4 feet wide. The fire-bridge is 4 feet 6 inches long and 2 feet 2 inches wide, and 14 inches below the roof. The laboratory is 10 feet long, 4 feet 6 inches at the fire-bridge, and 7 feet in its widest part. The hearth inclines from the bridge on all sides to the working door under the flue, where there is a small sump just large enough to admit of the ladle being put in it to take out the last traces of copper. The height of the roof is uniformly 2 feet 3 inches over the whole surface of the hearth except to within 2 feet of the flue,

where it dips to 18 inches at the flue. The flue is 14 inches wide and 4 feet above the level of the working door. The area of the fireplace is 16 square feet, that of the hearth 36 square feet; of the bridge, 9 square feet; of the furnace-flue, 4 square feet, and that of the main flue 8 square feet. Their relative relations are therefore $1:2\frac{1}{4}:\frac{3}{8}:\frac{1}{4}:\frac{1}{2}$.

As there is not sufficient pig-copper made for continuous running, the furnace is lighted once a week: this is a bad plan, both for the working of the furnace and for the economy of fuel. When cold, it must be heated from eight to nine hours, to get it into condition to receive the charge. It is, besides, much more difficult to make good copper on a freshly-heated hearth.

When the furnace is brought to a white heat, the hearth is repaired by filling up with sand any cavities that may have formed in it, and then the temperature of the furnace is lowered by opening all the doors. When it is reduced to a red heat, the pig-copper is charged through the charging-door on the side, and so distributed over the hearth that it will be easily reached by the heat. The charging-door is then closed and luted, and the temperature raised to the point of fusion. It takes four men one hour to charge the furnace. It takes from five to six hours to melt the charge: the first skimming is then made. The analysis of this slag is given in No. 1 in the table below. The charge should be melted slowly, in order to get the greatest amount of oxidation at this stage, so that the foreign metals may at once combine with the silica. The pasty slags are not drawn until they cover the whole bath. The operation of refining, after the metal is in fusion, consists of three distinct phases fining, refining, and lading, the first one of which, the fining, now commences.

The charge, after being crassed, is subjected to a very strong oxidizing atmosphere, in order to slag out the impurities which rise to the surface in the shape of slags and crasses, more or less charged with copper, but all rich, which are carefully put one side, to be treated in the pig-copper fusion. These slags are skimmed as soon as they form in sufficient quantities, and in the intervals the matte is rabbled to make the oxides come to the surface, every twenty-five or thirty minutes, from three to twelve hours, until it boils from the evolution of sulphur. This is owing to the fact that it has been impossible to separate all the matte from the pig-copper before it goes into the furnace. It is allowed to boil as long as it will, generally from one to three hours, and then it is rabbled from three to five hours, and crassed whenever necessary.

The crasses consist of a very friable material, which contains a considerable amount of metallic copper in the shape of grains. Four samples were taken at the hours indicated in the table. The analyses of these, made as a whole, are given in Table I. The shots of metallic copper were then carefully separated, and the results are given in Table II; and analyses were then made of the siftings, which are given in Table III.

TABLE I.—ANALYSES OF THE REFINING CRASSES AS A WHOLE.

	No. 1. Six hours after charging	No. 2. 7 P.M.	No. 3. 2 A.M. boiling ceased.	No. 4. After first poling.
Metallic copper	40.50	26.90	48.50	30.00
Oxide of copper	15.19	12.79	24.45	31.77
Protoxide of iron	26.50	30.88	8.91	10.87
Sulphur	2.77	1.37	0.23	0.11
Alumina	0.66	1.23	0.33	0.63
Manganese	0.06	0.16	0.04	0.06
Lime	1.17	2.70	1.35	2.02
Magnesia	trace	0.52	0.17	0.31
Cobalt	0.42	1.27	3.88	1.09
Nickel	0.16	1.37	5.36	2.03
Zinc	0.36	0.62	0.00	0.14
Silica	12.72	20.39	6.94	19.94
Total metallic copper contained.	100.51 54.00	100.20 38.26	100.16 70.00	98.97 58.21

The metallic copper is in grains; the oxide of copper is mostly combined with silica, and partly free as oxide.

TABLE II.—MECHANICAL ANALYSIS OF THE REFINING CRASSES.

	1.	2.	3.	4.
Metallic copper	40.5	26.9	48.5	30.0
Siftings	59.5	73.1	51.5	70.0

TABLE III.—ANALYSES OF THE SIFTINGS.

	No. 1.	No. 2.	No. 3.	No. 4.
Copper	22.67	15.54	42.16	40.30
Iron	34.64	32.85	13.48	12.08
Sulphur	4.66	1.87	0.44	0.16
Alumina	1.11	1.69	0.64	0.90
Manganese	0.10	0.22	0.04	0.08
Lime	1.97	3.70	2.63	2.89
Magnesia	trace	0.71	0.33	0.44
Cobalt	0.71	1.74	7.53	1.56
Nickel	0.27	1.87	10.41	2.90
Zinc	0.60	0.85	0.00	0.20
Silica	21.38	27.89	13.47	28.48

The copper and iron contained in the above analyses correspond to:

	No. 1.	No. 2.	No. 3.	No. 4.
Oxide of copper Cu_2O	25.53	17.50	47.48	45.39
Protoxide of iron	44.54	42.24	17.31	15.53

The results of these analyses are remarkable. The analysis of the ore showed only from 0.8 to 1.2 per cent of nickel and cobalt. The ores are thus very poor in these metals. The slags, as a whole, Table I., show 0.58 per cent in slag No. 1; 2.64 per cent in No. 2; 9.24 per cent in No. 3; and 3.12 per cent in No. 4. No. 1 is a basic silicate; No. 2 contains a little more silica than No. 1; No. 3 is a tribasic silicate, which contains a little more base than a neutral silicate. They are all lower in silica than is desirable. The siftings show 0.98 per cent in No. 1; 3.61 per cent in No. 2; 17.94 per cent in No. 3; and 4.46 per cent in No. 4, which shows that the cobalt and nickel are concentrated in the refining slags continuously up to the point where the sulphur disappears, as shown in No. 3. When the last slags are taken off, they are quite poor in cobalt and nickel, and the copper contains no trace of them, showing that if they are treated as usual, by being put back into the black copper furnace, the cobalt and nickel will be entirely lost. This fact, so far as I know, has never been noticed before. The amount of the slags taken from the furnace is small; but they should be separated, as the cobalt and nickel are valuable in themselves, and are only impurities in the copper.

When all the slags have been removed, the atmosphere of the furnace

* A paper read at the Virginia Meeting of the American Institute of Mining Engineers.

is still kept oxidizing, in order to remove any trace of impurities except a very small amount of silver and lead. The metal is rabbled and test pieces are taken in order to ascertain its exact quality. As this stage—the taking of tests—is the most important part of the operation, great care was taken in doing this, and three sets of samples were taken to determine the exact condition of the furnace at these different periods. The analyses of the three sets taken during the rabbling are given below for two sets, and six samples for a third. These all show remarkable freedom from impurities of every kind. The dark-red samples were taken as the rabbling was carried on, from No. 1 to No. 6; the first one after two hours rabbling, the second after three hours, the third at three and a half hours, and the others from fifteen to thirty minutes each, till the impurities are completely oxidized.

FIRST SET: DARK-RED SURFACES.

	No. 1. 4 A.M.	No. 2. 5 A.M.	No. 3. 6 A.M.	No. 4. 7 A.M.	No. 5. 8 A.M.	No. 6. 9 A.M.
Oxygen	1:32	1:21	1:21	1:38	1:28	1:53
Sulphur	none	none	none	none	none	none
Silver	0:05	0:05	0:05	0:05	0:05	0:05
Lead	none	none	none	none	none	none
Copper by difference	98:63	98:74	98:74	98:57	98:67	98:42

The second and third sets were taken at much longer intervals; their analyses are given below:

SECOND SET WITH BLACK SURFACES.

	No. 1.	No. 2.	No. 3.
Oxygen	0:34	0:29	0:29
Sulphur	none	none	none
Silver	0:05	0:05	0:05
Lead	none	none	none
Copper by difference	99:61	99:66	99:66

THIRD SET.

	No. 4.	No. 5.	No. 6.
Oxygen	1:38	1:44	1:52
Sulphur	none	none	none
Copper by difference	98:56	98:50	98:42

The value of silver in all the rabbling samples corresponds to 14.6 ounces to the ton of 2000 pounds.

The operation of rabbling is continued for some time, in order to make sure that all impurities possible shall be separated as oxides, for which reason considerable oxide of copper is made. This oxide dissolves readily in metallic copper, making the test pieces bright red. When the operation of rabbling is finished, this oxide must be separated by a process of refining, for which purpose poling is resorted to. The operation of fining is one of oxidation. As very small percentages of oxide of copper dissolved in metallic copper make it useless for commercial purposes, it must be reduced with the greatest nicety by a carefully conducted process of reduction. When the assay shows that the impurities are oxidized, the rabble is discontinued, and the operation of refining, which is one of reduction, is commenced. For this purpose, a green or very wet pole is put into the copper and held in it, supported on a wooden crutch; all the air-holes of the furnace are stopped tight, and it is poled until the slag is thick, generally two hours, so it can be skimmed off. The copper is then covered with charcoal and a fresh pole put in; then the samples are taken; the first one half an hour from the time the second poling commenced, beginning at No. 1, and the others during the poling, every 15 or 20 minutes, till the copper is tough pitch, which generally takes about an hour. The samples are bright and shining.

The analyses of two sets of these samples are given below:

FIRST SET.

	1st poling.	2d poling.	Casting.
Oxygen	0:61	0:26	0:24
Copper by difference	99:33	99:68	99:70
Silver; one determination for all			0:06
Lead; " " " "			trace

The silver corresponds to 17.5 ounces to the ton of 2000 pounds.

SECOND SET WITH BLACK SURFACES.

	1st poling.	2d poling.	Casting.
Oxygen	0:20	0:50	0:26
Silver	0:05	0:05	0:05
Lead	none	none	none
Copper by difference	99:75	99:45	99:69

The silver corresponds to 14.6 ounces to the ton of 2000 pounds.

As soon as the test shows the proper grain and silky luster, the metal is cast into ingot molds with iron ladles covered with a wash of clay in water. These are first put into the furnace, to bring them up to the proper temperature, during which time a piece of sheet-iron is put over the door. They contain about 1½ ingots of copper, which weigh from 13 to 16 pounds. The ladling takes two hours. It is necessary to heat up the furnace at least once during every operation of the casting, when the furnace is out of repair, but, when new, it is not heated after the ladling commences. It takes four men to ladle, two men to tip, and two boys to pick out the ingots from the water-bosh. During the dipping, the blacksmith, whose shop is near by, comes to assist.

It is essential that the casting should be done at the lowest possible temperature, and that the bath be covered with charcoal. In order to have a reducing atmosphere, every precaution should be taken to have a complete combustion of the fuel, and no oxygen in the furnace. This is often not the case, and very often the copper is cast from under a thick film of oxide of copper in the bath.

Seven cords of wood, one third of which is chestnut, and the rest oak, are used in twenty-four hours.

The refining furnace was in such bad order that the results varied very much. The copper is consequently not of even, though always of high quality, and, as will be seen by the analysis of the ingot copper given below, the copper is often purer at the last stages of poling than in the ingot. That the ingots vary in the amount of oxide they contain could be seen by the eye, but this was owing to the accidentally bad condition of the refining furnace.

The copper produced is exceedingly pure, being nearly equal to Lake copper. It is, however, under-refined, and contains a very variable amount of oxygen, which does not remain constant, even while the same charge is being ladled out of the furnace. The amount of silver is small, and though higher than in the Lake copper, is much lower than other commercial coppers that I have examined.

COST OF REFINING PIG-COPPER.

Produced from Matte Furnace, in Charges of 10,000 Pounds, Yielding 80 per cent Fine Copper.

Two furnace-keepers at \$1.25	2.50
Carting, charging, and packing, five men, at 75 cents	3.75
Fuel used, eight cords of wood, at \$1.70 per cord*	13.60
Fuel used, thirty-three bushels charcoal†	.....
Sand and poles	.25
Cost of labor and fuel, each charge producing 8000 pounds of fine copper	\$20.10
Cost per pound for refining	.25

OTHER DAILY EXPENSES.

One superintendent	\$3.33
One watchman and night-boss	1.25
One blacksmith	1.00
Four engineers, at \$1.10, each	4.40
One weighman	.75
One charcoal receiver	1.00
Two dump-men, at 75 cents	1.50
One stamp-man	.75
One carpenter	1.00

Average amount smelted daily	\$15.52
Cost per ton for labor, as above	50 tons.
	31 cents.

The cost for soapstone, fire-brick, materials, tools, clay, etc., during fifteen months, \$6001.03, or an average cost of 33½ cents per ton.

SUMMARY, COST OF SMELTING PER TON.

Roasting the ore, labor and fuel	\$0.18	14-100
Smelting roasted ore, labor and fuel	3.32	
Roasting single and double mattes, labor and fuel	1.00	
Smelting roasted mattes, fuel and labor	3.24	
Refining pig-copper; as each ton of the ore yielded 105 pounds fine copper, the cost per ton of ore would be	.26½	
Superintendence and other expenses, as itemized, per ton	.31	
Repairs and materials, tools, etc.	.39½	

In order to see exactly how the copper compares with other coppers, ingots from Lake Superior and Baltimore were analyzed and tested.

The analyses are given below:

	Ore Knob.	Lake Superior.	Baltimore.
Metallic copper	99:80	99:85	99:65
Oxygen	0:39	0:15	none
Sulphur	none	none	none
Silver	0:05	0:026	0:066
Lead	0:01	0:016	0:044
Arsenic	none	none	0:088
Antimony	none	none	0:035
	100:25	100:022	99:883
Silver, in ounces, to ton of 2000 pounds	14.6	7.3	19.75

The tensile strength of the Ore Knob copper was found to be 30,660 pounds, and that of Lake copper 30,790 pounds to the square inch. The difference is altogether insignificant. The copper, though varying in quality, is equal to the best grades of copper.

The store yielded a profit of \$34,684.60 during the fifteen months ending April 1st, 1880, which, on a product of 17,920 tons of ore treated, reduced the cost of the ore to \$1.93½ per ton. The cost of producing the copper, independent of the store profits, is very low, and this is owing both to the extreme purity of the ore and the very low price of labor and materials.

RESUME.

Ore mined, from January 1st, 1879, to April 1st, 1880	21,223 tons.
Ore smelted, from January 1st, 1879, to April 1st, 1880	17,920 "
Fine copper produced	1,640,750 pounds.
Copper matte	244,325 "
Gross yield	1,885,075 "
Fine copper per ton of ore treated, 105 1-10 pounds.	
Administration	\$303.33
Dressing	725.70
Furnace labor	1,828.70
Outside work—engineers, machinists, and blacksmiths	568.21
Underground labor	1,681.53
Copper supplies	45.58
Providence	646.75
Transportation	971.00
Miscellaneous	91.92

Trial balance in 1880, on a run of fifteen months, to April 1st, 1880:

Production	\$202,653.51
Construction	2,601.00
General expenses	4,703.04
Total	\$209,957.54
Cost of copper per ton, from January, 1879, to April 1880	12½ cts.;
Profit of store, from January, 1879, to April, 1880	\$34,684.60
Amount of copper shipped	1,640,000 pounds.
Cost of copper per ton, less store profits, 10 3-100 cents.	

TOTAL COST.

DEBIT.	CREDIT.
Construction and supplies	\$122.83
Copper works	66,443.65
Labor account	99,652.47
Mine supplies	3,459.24
Providence	5,468.36
Wood	11,494.71
Expense account	47,703.04
Transportation	19,799.24
Total	\$254,163.54
Store accounts	\$79,264.48
Real estate	50.00
Live stock	371.00
	\$79,685.48
Balance	\$151,478.06

The total copper shipped was 1640,000 tons of 2000 pounds. The absolute cost of the copper is 12½ cents per pound, which is nearly as low as at Lake Superior, and which is reduced by a store profit that last year was \$34,684.60. In conclusion, I beg to express my thanks to Mr. J. E. Clayton, the general manager of the works, who gave me every facility to collect information, and himself prepared a number of tables of cost; and to Captain John Dent, the superintendent of the smelting-works, for information given to me at the works and since my return.

* Wood costs here \$1.85 for all selected oak, \$1.65 for mixed wood, and \$1.50 for soft wood, per cord, and has been averaged at \$1.70.

† The charge for charcoal used in refining was included in the average taken of the coal used per ton of ore smelted, and has been charged once against the ore.

‡ Including all charges, freight, etc.

STATISTICS OF QUICKSILVER.

The San Francisco *Market Review* prints the following statistics of quicksilver, the production for eleven years in bottles being given in the following table:

Spanish and Italian.				Spanish and Italian.			
Year	Spanish	Italian	Total	Year	Spanish	Italian	Total
1871	35,000	12,000	47,000	1877	41,900	13,000	54,900
1872	37,700	13,200	50,900	1878	44,900	12,000	56,900
1873	35,900	12,400	48,300	1879	45,500	14,000	59,500
1874	33,400	12,500	45,900	1880	48,200	12,600	60,800
1875	44,400	12,500	56,900	1881 (est'd)	48,000	12,600	60,600
1876	41,900	12,500	54,400				

The exports since 1871, from London and California, are as follows:

Year	From London	From California	Year	From London	From California
1871	37,749	15,205	1877	30,151	52,471
1872	30,807	13,089	1878	28,766	40,158
1873	28,832	6,359	1879	28,710	62,172
1874	32,297	6,670	1880	16,072	44,019
1875	32,578	28,900	1881	16,000	724,000
1876	25,959	41,140			

* 1881 (to Aug. 31).
† 1881 (to June 30).

Leading English brokers estimate the present rate of consumption as follows: Europe, excluding England, 30,000 to 35,000 per annum; England, 12,000 to 15,000; California, 8000 to 12,000; Mexico and West Coast, 20,000 to 25,000; China, 25,000 to 30,000; New York, etc., 10,000 to 12,000; sundries, 2000 to 3000. Total number of bottles, 107,000 to 132,000. The average consumption of the last ten years, 1871 to 1875, 85,000 per annum, and 1876 to 1880, 120,000 per annum, or an increase of 41 per cent. If 1881 to 1885 increases similarly, it would be 168,000 per annum.

The annexed table of highest and lowest price in London will be of interest:

Year	Highest per bottle	Lowest per bottle	Year	Highest per bottle	Lowest per bottle
1850	£15 0s. 0d.	£13 2s. 6d.	1875	£24 0s. 0d.	£9 17s. 6d.
1860	7 0 0	7 0 0	1876	12 0 0	7 17 6
1870	10 0 0	6 16 0	1877	12 0 0	7 2 6
1871	12 0 0	9 0 0	1878	7 5 0	6 7 6
1872	13 0 0	10 0 0	1879	8 15 0	5 17 6
1873	20 0 0	12 10 0	1880	7 15 0	6 7 6
1874	26 0 0	19 0 0			

THE AGE OF THE COPPER-BEARING ROCKS OF LAKE SUPERIOR.*

By M. E. Wadsworth, of Cambridge, Mass.

Two principal views regarding the relative age of the copper-bearing traps of Keweenaw Point and the eastern sandstone have been and are now held. The first regards the traps and sandstone as of the same age. The second places the traps as the earlier formation (pre-Paleozoic), and the eastern sandstone as the later one (Paleozoic). The traps are said to have formed a sea wall along the eastern side of the Point, while the sandstone was deposited against the base of the cliff. The sandstone is said to be horizontal, or at most to have only a slight inclination at the base of the cliffs, at which point it contained pebbles of the trap derived from them. This evidence was principally obtained at the Douglass Houghton Falls, and on the face of the published accounts appears conclusive. It has given rise to the supposition that the traps formed a distinct geological series belonging to Azoic or Archean time, which series has been recognized by lithological characters far and wide. As this Keweenaw series was first established on Keweenaw Point, it must stand or fall by observations made there, and not, as some would make it, by observations in Wisconsin, the northern shore of Lake Superior, or in Newfoundland.

By personal observations at the Douglass Houghton Falls, I have found that the eastern sandstone, instead of being horizontal as stated, dips north 45° west, 25°, while passing down the river the dip gradually diminishes in angle until it is only 5° at the mouth of the ravine below the falls. Instead of the cliffs at the falls representing the termination of the copper-bearing traps, as stated, I found several basaltic overflows below the falls interstratified with the conglomerate and sandstone. The relation of the copper-bearing traps below the falls to the interbedded sandstones and conglomerates is the same as it is in the rocks above the falls. The last basaltic flow here is a thin sheet some two feet in thickness, which is interbedded between sandstones having the same dip as the basalt. The finding of the copper-bearing rocks below the Douglass Houghton Falls explains the presence of pebbles of melaphyr in the conglomerate at the falls, and shows that the observations referred to were made within the region of the copper-bearing traps, the observers not having found the junction of the traps with the sandstone at all. Something more is necessary in such observations than simply to find a sandstone on the eastern side of the copper-bearing rocks. It is necessary to know that this is part of the eastern sandstone, and not a bed intercalated with the trap. Now, as I find that the eastern sandstone underlies the trap conformably, that is, as conformably as a bed can underlie a lava which has flowed over it, it must be older in order of time, but of the same geological age with the copper-bearing rocks. As my observations show the incompleteness of those on which the "Keweenaw series" was founded, it seems right to hold, until my observations shall be disproved, that the "Keweenaw series" has no foundation, but that the copper-bearing rocks are of the same age as the eastern sandstone. This series has been advocated upon lithological evidence, and said to be recognized in other localities from this evidence; but the above observations furnish another proof of the absurdity of founding and identifying geological systems simply by lithological characteristics.

In ascending the Hungarian River, I found the same relations of the trap to the sandstone. The last bed of the eastern sandstone, dipping north 45° west, 20°, is overflowed by the first bed of trap, which has baked the former, the same as these basaltic flows indurate the sandstone within the copper-bearing rocks. This thin flow is overlain by a conglomerate and sandstone, at the base of which we find pebbles of the un-

derlying trap. Furthermore, similar alternations of trap, sandstone, and conglomerate extend until the western sandstone is reached.

It seems then that the writer has advanced sufficient evidence to prove that in the parts visited the eastern sandstone conformably underlies the copper-bearing rocks and that both are of the same geological age. The question of the relative ages of these rocks was the one with which my time was occupied; but so far as the absolute geological age of the sandstone, and therefore of the trap, is concerned, it would seem that the evidence brought forward by Dr. Rominger, until disproved, shows that Messrs. Foster and Whitney were correct in regarding it as of Potsdam age. For a fuller treatment of this subject the reader is referred to another publication.*

ADVERTISERS' NOTES.

EXPERIMENTS WITH HECLA POWDER.—Recently a number of experiments were made at the works of the Hecla Powder Company, near Rahway, N. J., before a party of gentlemen, representatives of prominent steamship lines, railroads, and others interested in the use or the transportation of explosives, in order to show that the Hecla powder, while possessing great power, can resist rough handling.

A wooden case containing fifty pounds was hoisted some 75 feet to the branch of a high tree on the edge of a bluff, and on a signal the fastening was detached and the case fell upon a pile of broken bricks, smashing the box entirely, breaking the cartridges, and scattering the powder, but without causing any explosion. A cartridge of the powder dropped was then thrown with as great a force as possible against a building, breaking it and scattering the powder. A piece of this cartridge of powder was taken to a test mortar, and about a thimbleful of the powder was put into it, and when exploded with a special exploder, attached to a piece of safety-fuse, it threw a shot weighing 26½ pounds to a distance of 242 feet. About 25 pounds of cartridges of the powder dropped from the tree were thrown on a fire of shavings without any explosion. An ordinary safety-fuse was inserted in a cartridge and lighted, when it burned to the powder and went out, after which an exploder was inserted and fired, the cartridge exploded with great force, while another cartridge two feet distant remained unaffected, which was itself exploded with a special exploder. A quantity of powder was then taken and hammered violently with an iron hammer without any effect. We may add that it is claimed for the Hecla powder that it can be used in bulk.

PROGRESS IN SCIENCE AND THE ARTS.

A Novel Application for Ice-Machines.—Suzani, an engineer of Milan, Italy, has had the idea of keeping the eggs of the silk-worm in a state of lethargy for an indefinite time by keeping them at a temperature near the freezing-point, and the *Génie Civil* gives elaborate drawings of the apparatus as now in operation at the exhibition at Milan. A Pictet ice-machine is employed for the purpose. The value of the process lies in the fact that in years when the mulberry-trees are behind, the eggs may be held for a future more auspicious period, so that thus the dangers incident to slow growth of the trees in some seasons are avoided.

Water-Glass.—The *Génie Civil*, in a recent article on water-glass, gives the following as the proportions used by English manufacturers for producing that article by fusion in crucibles: Pure quartz, 45 parts; powdered alkaline carbonate, 23 parts; charcoal, 3 parts. Another recipe is: Quartz sand, 100 parts; caustic soda or potash, 48 parts; and charcoal powder, 5 parts. Or, washed quartz sand, 65 parts; anhydrous alkaline carbonate, 34 parts; and charcoal powder, 4 parts. The mixture is heated to redness, until entirely fused, and the contents are cast on tin plates for cooling, and finally crushed.

The Dry Ammonia Process for Gas Purification.—A process is now trying on a commercial scale at the works of the South Metropolitan Gas Company in London, which, according to the *Journal of Gas-Lighting*, is carried out in the following manner: It is based upon the fact that commercial superphosphate of lime, when brought in contact with gas containing carbonic acid and ammonia, is converted into a mixture of carbonate of lime and phosphate and sulphate of ammonia, a product which is valuable as a manure, and its promoters expect will realize a higher price for ammonia than that obtained for it when removed by water. In the new process, the gas, before passing through the ordinary purifiers for the removal of sulphureted hydrogen by lime and oxide of iron, goes through boxes, in which it is exposed to layers of superphosphate, 8 inches thick. About 2,500,000 cubic feet of gas per day pass through boxes containing about 120 tons of superphosphate, which, when saturated, hold about 10 per cent of ammonia.

Immigration Statistics.—During the month of September, there arrived in the customs districts of Baltimore, Boston, Detroit, Huron, Minnesota, New Orleans, New York, Passamaquoddy, Philadelphia, and San Francisco, 69,924 passengers—of whom 58,452 were immigrants, 8380 citizens of the United States returned from abroad, and 3092 aliens not intending to remain in the United States. Of this total number of immigrants, there arrived from England and Wales, 8997; Ireland, 5633; Scotland, 1971; Austria, 1043; Belgium, 241; Denmark, 460; France, 613; Germany, 19,608; Hungary, 490; Italy, 1162; Netherlands, 548; Norway, 1953; Poland, 195; Russia, 795; Sweden, 3703; Switzerland, 866; Dominion of Canada, 8710; China, 976; and from all other countries, 488.

A Test of Incandescent Electric Lamps.—Gradually we are obtaining what was so long needed—accurate data on the intensity and consumption of power of incandescent electric lamps. We have had occasion recently to give the results of some experiments, and may now add additional figures, which were published by Sir William Thomson and Mr. James T. Bottomley in a paper read recently before the British Association at York. The electro-motive force for the three lamps used, the

* Abstract from the *Proceedings of the American Association for the Advancement of Science*, Vol. XXIX. Boston Meeting, August, 1880.

* Notes on the Geology of the Iron and Copper Districts of Lake Superior. *Bulletin of the Museum of Comparative Zoology*, 1880, Vol. VII. (Geol. Series, Vol. I.) No. 1 157 pp., 6 plates.

make of which, however, is not given, was derived from Faure secondary batteries, the number of cells and horse-power of which are given in the tables :

No. of Experiment.	LAMP No. I.				LAMP No. II.			
	Cells.	Horse-power.	Candles.	Candles per horse-power.	Cells.	Horse-power.	Candles.	Candles per horse-power.
1.....	26	0.093	12	125	40	0.27	49	181
2.....	30	0.129	25	194	42	0.20	68	234
3.....	32	0.156	42	263	43	0.31	76	245
4.....	33	0.170	38	224	44	0.33	101	306
5.....	34	0.180	44	243	46	0.37	117	316
6.....	35	0.187	55	294	50	0.40	147	367
7.....	36	0.210	63	300	52	0.43	189	440
8.....	37	0.224	66	295	54	0.47	196	417
9.....	38	0.228	76	333	56	0.47	186	388
10.....	39	0.235	82	349	58	0.49	177	361
11.....	40	0.247	84	340	40	0.25	35	140
12.....	42	0.267	102	382	42	0.27	42	156
13.....	44	0.270	89	330	60	0.51	183	365
14.....	46	0.296	114	385	62	0.53	180	340
15.....	...	.....	.....	.....	66	0.57	222	383

The carbon of lamp No. I. broke during the 14th experiment, immediately after the measurement of the light was completed, while the carbon of lamp No. II was ruptured by the application of 70 cells. A third lamp was ruined by the use of 60 cells, after having resisted 40 and 50.

The point of particular interest in the preceding table is the irregularity of the results, showing the effect of the blackening of the glass by volatilization of the carbon when too high electric power was applied. The durability of the lamps at any particular power must be tested by months' experience before the proper intensity for economy can be determined.

GENERAL MINING NEWS.

ARIZONA.

From a letter written under date of September 26th, by a correspondent, we take the following on the Globe and Mineral Creek districts of Arizona: After spending four months in the territory with the sole object of inspecting the mining camps and obtaining reliable information as to mines I could not visit (although I have visited a large number), I am led to the conclusion that Globe and Mineral Creek districts are by far the most promising, when we take into account the few developed properties and the many fine properties which are sufficiently opened to furnish the best possible evidence of rich copper and silver deposits, covering an area of nearly one hundred square miles from the Gila River north. Thirty miles west of Globe is the rich Silver King mine. The Eastland, adjoining it, is now finding similar ore. The Last Chance, near by, is looking well; but this is about all that holds out special promise in that neighborhood. But in Globe District there are rich discoveries on every side, commencing on a line northeast of Globe City, and following around to the westward to a line north and south through Globe City. True, the paying mines are only two or three in number as yet; but this is easy of explanation. The Old Dominion Copper mines, the Mack Morris, and McMillen, the Pioneer and Pioneer South, have separate camps of their own, being several miles from the town.

Much of the money which has been spent there has been fearfully misappropriated, either through dishonesty or incapacity. Useless mills have been erected there before there has been any warrant for it, and "prospects" have been treated as mines, to the disgust and discomfiture of the owners. Outside the Mack Morris property, I know of no mine in Globe which has been properly developed as a mine, until the present year. The Silver Nugget was handled with little judgment until the present superintendent took hold of it, and he has had serious difficulties to encounter as a consequence of previous mistakes, as, in my judgment, the shafts were sunk in the wrong place and were not justified by the "nuggets" found in the loose dirt on the surface. It would be strange, however, if the present explorations did not yield some good result, as the Mack Morris vein evidently crosses a portion of their property. It is not so sure an investment, perhaps, as many surface prospects thereabouts, but there is some hope of developing a mine ultimately. The Irene mine is another great mistake, and it seems due to the fact that the New York purchasers had too much confidence in some one who was totally unworthy of it. The Antler is another illustration of too great faith in man, and these, with other cases which came to my knowledge, will sufficiently explain why capital moves slowly and cautiously in that direction. These things are terribly damaging to the best mining district in the world, and the remoteness of Globe from the railroad renders it difficult of access. But these difficulties are likely to be in a great measure counteracted by the energetic manner in which some of their copper and silver mines are now opening. Among the recent developments in silver are the Etna, Pioneer and South Pioneer, the Rescue and its extension, the Little Chief, Alta, and others in Mineral Creek, and the A. Lee and Kentuck, and Shearman, near Globe City. But there are very many other claims, which are prospected sufficiently to offer the greatest encouragement; but the discoverers are men of little or no means, and can not develop their properties themselves, while they have too much confidence in them to sell them for nothing. There seems to be a "ring" even in Globe, and its policy evidently is to depreciate rather than appreciate what it knows to be good mining claims—a species of bear movement borrowed from Wall street. There are two or three discoveries of free-milling gold, which, when opened up, may and will make the Globe District a shipper of the three precious metals, gold, silver, and copper. The Etna mine sent several tons of good ore to the Globe mill this month, taken out within 40 feet from the surface. The Rescue, at Richmond Basin, has had high assays and mill returns of \$300, \$400, and \$150 per ton. Pioneer will run from \$100 to \$400, and the vein is from two to three feet. A country with such prospects, and many more scattered over so large a tract, will command attention. What is likely to give this district its greatest immediate celebrity are its copper discoveries. The rise in the Gila River has prevented the Old Dominion Company from demonstrating what its ores are likely to produce, as its smelters could not cross until the waters had subsided. They are now across, and will probably be turning out bullion by the end of October. Meanwhile the ore-dumps are growing, and there ought to be a quantity ready with which to begin operations. No stopping has been done, and none will be until required for the furnaces. The Old Dominion tunnel is sunk 300 feet on the vein. There is a shaft to the surface, and sinking is going on to the second level, so that there is ample stopping ground while further development goes on. The New York & Chicago is where the first smelters are to be located. The Takoma Copper Company shows some splendid specimens of glance and malachite; but the company is not yet sure enough of its continuance to erect reduction or smelting works. As it is

pushing its investigations under able management, it can not be long in the dark. The Berva mines are near the Old Dominion, and begin to show a fair ore-stack, which is not unlike that of the Old Dominion. There are other copper properties in various stages of development, but none is far advanced except the Carrie mine. The Hoosier is a promising mine, but no great amount of work is done. I see Globe Copper quoted at \$2 per share. I visited the property a few weeks since, but must state that there is nothing to warrant such a price, or indeed any fixed value, unless they have found something since I was there. They have a handsome shaft. The "mine" may prove very valuable, but there is nothing more than a surface prospect at present. The croppings show native copper and stains of green and blue carbonate ore; but this ought not to make the property worth \$2 a share. I see considerable stock is changing hands at advancing prices, if I can judge by the quotations. I do not wish to be understood to say that Globe Copper is altogether without a foundation; for, beyond the indications named, it has ground to hope that it may strike a spur of the New York & Chicago. REFLEX.

GLOBE DISTRICT.

CARRIE.—The smelter was started up on the 29th ult., and, with the exception of a few hours' delay, has been working steadily.

MACK MORRIS.—A dispatch to the *Tribune*, under date of October 18th, announces that an ore-body was struck in the 420-foot level.

OLD DOMINION.—The long-expected machinery for hoisting-works and smelters for this property has at last reached the mines, and a large force of men is employed in the erection of the same.

MINERAL CREEK DISTRICT.

MINERAL CREEK.—The *Chronicle*, under date of October 8th, denounces the Mineral Creek Mining Company as a fraud. It says: There was a small surface deposit in the 319 feet of tunneling, and a small kidney deposit in the shaft, of promising ore, but which would not assay over six dollars a ton. In fact, there has been no ore discovered, or discernible, since the latter part of January last. Out of 180 tons of the rock, of which so much boast has been made, only 91 ounces of bullion were realized, and this included the deposits above named—the only ore ever found.

TOMBSTONE DISTRICT.

The *Tribune* announces that the Contention Mining Company, through compromise to avoid a lawsuit, has absorbed the Flora Morrison mine, its hoisting-works and every thing pertaining thereto; also 100 feet of the south end of the Sulphurets mine. The hoisting-works of the latter will not go into the combination. The mines will be connected by drifts on different levels. No change of officers will occur until the annual election of the Contention Company. A 40-stamp mill is to be erected at once for these mines. The Contention Company has brought suit against the Head Center for \$200,000, claiming that the latter is taking ore from the Contention ledge on its dip across the side-line, directly under the surface ground of Head Center. The Contention Company made the same claim against the Flora Morrison, which compromised before the suit was brought.

The *Epitaph* says that the Way-Up Mining Company, a New York corporation, filed a suit against the Tombstone Mill and Mining Company in the District Court on the 5th inst. The plaintiff sues to quiet title, and asks for \$250,000 damages. It seems, from the complaint, that the Way-Up Mining claim adjoins the Good Enough claim, belonging to the defendant, on the northeast. The Tombstone Company, owning the Good Enough location, claims that the Good Enough ledge dips to the north and east and enters the Way-Up claim; and that the ore-body in the Way-Up is the Good Enough ledge. On the other hand, the Way-Up Company asserts that the ledge in the Good Enough claim runs across the claim and enters the Way-Up on its strike. The Way-Up urges that the Good Enough was erroneously located across the lode, and that by effect and operation of law the side-lines have become and are the end-lines, and that the claim is limited to 300 feet on each side of the lode, and a decree is asked for accordingly.

GIRARD.—The correspondent of the *Tucson Journal* says that this mine is still closed down, although there are signs that work is to be resumed about the middle of the month. The shaft is 450 feet deep, and most of the work has been done from 350 level down. There is, however, a great deal of work before there are about 3000 tons of ore on the dump for a commencement. Grading for this mill goes on.

INGERSOLL.—The *Epitaph* states that developments on the property are assuming prominence.

TOMBSTONE.—The *Epitaph* has the following: A good body of ore has been developed in the Good Enough, extending from the 200-foot level to the surface. No. 3 continues to pour forth its usual amount of ore. West Side is steadily improving. In No. 2 shaft, they are drifting at 75 feet, at the same time the shaft continues downward, being now 120 feet deep. At No. 1, they are still drifting on the ledge. No. 6, Good Enough, is doing well. The bullion output was only \$111,995.05, owing to working more low-grade ore and harder rock than for several months past.

VIZINA CONSOLIDATED.—The superintendent reports that in September 612 tons of ore were sent to mill, producing \$70,000 bullion. Previous to September 3d, 680 tons were milled, yielding \$295,500. Average value of September output, \$114 per ton. The main shaft is now down 415 feet, and the bottom is improving, the ground becoming softer. No. 2 east drift is looking well. The bulk of the ore now extracted is taken from this drift and its stopes. The output will now be limited to 500 tons per month until the question of erecting a mill has been decided.

CANADA.

SILVER ISLET.—The heavy storm last week had a disastrous effect on the immense new crib-work which has lately been built. The two cribs heavily laden with rock have been carried out into the lake a long distance.

COLORADO.

LAKE COUNTY.

ARGENTINE.—This company is working a gang of men on shaft No. 5, or Keystone shaft, as it has been named. This shaft is down about forty feet, with an incline from the bottom of 190 feet. They have already struck the vein, which at this point is from six to fifteen feet in thickness, and continues along the whole incline. At the upper shaft, prospecting is going on. They are also running a large stope at a distance of 600 feet from the mouth of the tunnel. A hind shaft on the top of the hill has already struck contact at 290 feet, finding the old vein at this depth. An incline shaft is now sinking on the northeast side of Iron Hill, finding a continuous body of ore. A new shaft-house will soon be erected over the Keystone shaft, and a boiler and engine have been ordered, and will be set up as soon as received.

The American smelter has been temporarily out of blast on account of an accident to the engine. The recent fire has done most damage to the Amie.

GLASS PENDERY.—The *Herald* has the following under date of the 15th inst.: Near the Glass shaft, a new stope has been begun near the large ore-body south and west from the shaft. In this portion of the mine, much development-work is progressing. To the north, the main level connects with the former workings of the Pendery shaft at a distance of 800 feet. Great improvements here have taken place. The old Pendery workings are thoroughly retimbered and in first-class shape. Here a wonderful new strike of great richness was made Wednesday; in cross-cutting the main vein about 40 feet north and 60 feet east of the Pendery shaft, a vein 18 inches in thickness, of the richest kind of chloride ore, was struck, which will run as high as from 3000 to 6000 ounces of silver to the ton. The main ore-body shows a thickness of four to six feet.

HIGHLAND CHIEF.—Arrangements are almost completed for starting up the

Highland Chief on Breece Hill. What seems to be required for the successful working of this mine is some sort of concentration-works. The deposit of ore is large, and some of it is excellent quality. The difficulty rests in the fact that it is so intermingled as to be difficult to assort, and so, often, the lots of ore contain so great a proportion of low grade as to yield no profit in smelting. If the reduction or concentration-works now putting up by the Little Ellen mine are a success, the Highland Chief owners will soon duplicate them.

ROBERT E. LEE.—The *Democrat* prints the following description of the new machinery of this mine: The engine is a 105-horse power Corliss engine, with 30 inches stroke, of Fraser & Chalmers make, Chicago. The hoister is a double engine, of 22-horse power each, made in Denver. The capacity of the new pump, at the rate of six strokes per minute, is 600 gallons per minute, and the speed can, if necessary, be increased to ten strokes per minute, thereby increasing the capacity about one third. The stroke of the pump is about eight feet, and the walking-beam 28 feet in length. The main spur-wheel weighs over eight tons and is 12½ feet in diameter, and the fly-wheel is 10 feet in diameter. The cage will not be got in till some time next week. The two 65 horse-power boilers are intended to run the hoister, the pump, and sampling-works of the mine. A fire was kindled under the boilers for the first time yesterday evening, and the hoister will be started this morning, but the cage will not be got in till some time next week.

GUNNISON COUNTY.

FARWELL.—The *Pitkin Miner* states that the new 30-stamp mill of this company was started on the 1st inst.

MOSQUITO DISTRICT.

The *Fairplay Flume* says that the labor of getting the new works of the Mosquito Sampling and Concentrating Company in operation has been so quickly and quietly performed that the importance of the enterprise has scarcely been realized. The works, located just above Park, are the property of a partnership in which F. N. Campbell, General Manager; W. H. Stevens, Superintendent; J. H. McArdle, Treasurer, and others are equally interested. The works comprise three batteries of four stamps each, and three Pomeroy concentrating-tables, giving a daily capacity for handling twenty tons of crude ore. The first run has been successfully made on ore picked up from various dumps.

SAN JUAN COUNTY.

Our able correspondent, Mr. Theodore B. Comstock, of Eureka, under date of October 10th, sends us the following notes on the mines and works of that vicinity: Judge Ingersoll has completed preparations for winter, having let a contract for 250 feet of drift upon a vein which crosses the Ruby at a distance of 125 feet from the entrance of this adit-level. Mr. P. N. Nicholas has arranged for winter work upon his claims in Grouse Gulch, to which I referred in my last letter. A contract has been taken by W. H. Thomas for a drift of 300 feet upon one of the claims of the Promontory Consolidated Company, nearly across the valley from the Ruby. S. R. Cross, Manager of the Tom Moore Mining Company, will start for the East this week, leaving every thing in good shape for the coming winter.

The Niagara Consolidated Company has recently completed 140 feet of drift upon the Cuba lode, level A, and erected substantial buildings for winter work, including a capacious ore-house. A track is laying, and a new contract has been awarded at a reduced rate for 300 additional feet of excavation. Upon the McKinnie lode, since my last letter, ruby silver has been struck, and the drift has been run 32 feet upon the vein, with good results. A shaft, to be sunk upon the rich ore-body, is projected, but will not be undertaken this winter, owing to lack of preparation. The previous workings upon the Pride of San Juan, Taber, and Boomerang have been extended, and the ore-bodies in all are found to be large and continuous. Fine bodies of ore have also been discovered in the Central Cross, Outlook, Tyrol, and Cuba, by this season's development. The Niagara Company now owns fifteen valuable properties and a mill-site.

Carley and Johnson have extended their drift upon the Crispin, showing the ore to be again abundant, beyond the "horse" which was encountered for a very short space. C. Wuerz has finished 100 feet of drift upon the Superior lode, with satisfactory returns. A larger amount than usual of assessment-work has been done this season, and with more uniformly pleasing results than ever before. Many have been led to go much beyond the legal requirement, in consequence of the favorable indications. In Eureka Gulch, the Holiday Mining Company has let contracts for two cross-cut tunnels to strike two veins in South Fork, probably 300 feet in all; also 100 feet of drift upon another vein in North Fork. Work is progressing favorably upon the Sunnyside, the last ore being more compact than heretofore. Hopes are entertained that at last some arrangement will be made for the renewal of work upon the very valuable property of the Crown Mountain Mining Company, in connection with the Crown Mountain Ore Reducing and Milling Company, under a consolidation of interests. There is no reason why these enterprises should not meet with excellent success, if honorably managed here, as they have not been for some years.

I have lately had inquiries concerning the value of the stock of the Eureka Silver and Lead Mining Company. There is no organization of that name known here, the nearest approach to it being an old tunnel company, entitled the Eureka & Virginia, whose rights have long since been forfeited by failure to prosecute the work for more than two years past.

The Denver & Rio Grande Railroad is extending rapidly toward us from Durango, and will be within fifteen miles next month. The *San Juan Herald*, our new county paper, published at Silverton, will give a full account of our local properties in its issue of October 13th. This journal is devoting much attention to mining affairs, and promises to become a reliable exponent of our resources and development. My time has been so fully occupied this season that I have had very little opportunity to make detailed examinations of the veins away from this neighborhood. It should be understood, also, that so much has been accomplished in all parts of the county this year that I have been wholly unable to take account of it in such form as to present it to your readers. One camp in San Juan is now amply sufficient for a single correspondent. We have patented the town-site of Eureka, and the lots have been divided among the shareholders. Prices range from \$25 to \$150. A wagon-road is building to the forks of Eureka Gulch, and lumber is on the ground for a commodious hotel. The winter season opens later than last year. Rain is abundant, but as yet, very little snow has fallen in the valley.

SUMMIT COUNTY—TEN-MILE DISTRICT.

According to a dispatch to the *Leadville Democrat*, dated October 4th, D. R. McNamara and Dr. Howe discovered a bed of carbonates within four miles of Robinson camp, which runs 212 ounces at the grass-roots.

DAKOTA.

A correspondent of the *Pioneer* states that the mining interests of Custer are assuming a permanent and remunerative foundation. The Mica Queen is shipping 600 pounds of cut mica per week, and some other mines are also shipping quite extensively. He says, also, that rich copper ledges have been struck northeast of Custer, about twelve miles, and that a good many locations are worked.

FATHER DE SMET.—The superintendent, under date of October 5th, writes officially to the secretary of the company: I send herewith express company's receipt for bar 120, which I think will net near \$36,000. The whole mill of 100 stamps is running finely, there being water enough by pumping from bed-rock. The north end tunnel progressed 74 feet during the month, making a length of 202 feet on 1st inst. The ore is good at all points, and we are assured of one of the best clean-ups for October that the mine ever made.

IDAHO.

WOOD RIVER REGION.

The new smelter of the Philadelphia Mining and Smelting Company, located above Ketchum, was started on the 13th inst.

QUEEN OF THE HILLS.—According to the *Salt Lake Tribune's* correspondent, this mine, located near Bellevue, was sold to Salt Lake parties for \$12,500.

MONTANA.

GLOSTER.—The last clean-up of this mine, belonging to the Boston & Montana Company, netted \$3016.47, from 154 tons of ore. The average saved per ton of ore for the last four runs was \$19.57, the aggregate amounting to \$12,716.15, with only ten stamps of the entire eighty. The large three-compartment shaft is rapidly going down, and will penetrate a depth of 500 feet and connect with the vein.

GREGORY.—The reduction-works are rapidly approaching completion, the concentrating-works having been started on the 3d ult. The mine is opened by two shafts 600 feet apart. No. 1, over which the hoisting-works were burned two years ago, is 500 feet, and No. 2, through which the mine is now worked by steam hoist, has reached a corresponding depth, at which point the station for the fifth level is completed and a cross-cut is making for the vein. The three upper levels between the two shafts are connected, and the fourth lacks only a few feet of it. The fifth from shaft No. 2 will make the connection in 350 feet; and when this is done, there will be 3000 feet of ground opened by levels and winzes, which is not stopped out, except in three of the levels, for a distance of 244 feet from No. 1 shaft.

ACQUISITION.—This mine is closed down for the winter.

ALBION.—Within a short time, one of the new "pony" stamp-mills will be in operation at this mine.

BELL.—A strike is reported in a north cross-cut in the west drift, 120 feet from the shaft.

BELMONT.—The *Helena Independent* says that No. 1 tunnel has penetrated the hill 600 feet, and reached a point 500 feet below the surface, and is still opening new ground on the vein. At the face of this tunnel, the vein is 8 feet wide, and for the whole 600 feet will average about six feet in width. For a part of the time since the fire, it has been impracticable to supply more than 20 stamps with ore. The miners struck recently against a reduction to \$3.25 per day, but many have recently resumed work.

COLUSA.—A strike is reported by the Montana Mining Company in its Colusa mine. Mr. E. F. Eurich arrived from New York last Sunday, to take charge as superintendent. Mr. Wartenweiler is now in New York.

GARFIELD.—It is understood, says the *Helena Independent*, that the directors have resigned and turned their stock and franchises over to a new York organization, of which Milton S. Latham is President; Luther C. Voorhees, Vice-President; and E. R. Neeley, Secretary. The original Montana stockholders are to receive share for share of the new issue of stock. The capital stock is to be the same as in the old company, namely, 100,000 shares, of a par value of \$20 each—\$2,000,000. The twenty-stamp mill is to be completed as soon as practicable; and if the snows do not interfere, it will be set up at the mine this season.

MAGNA CHARTA.—A contract has been let to extend the east drift on the 300-foot level 100 feet.

MOULTON.—The new 40-stamp mill is substantially completed. At the annual meeting of the company at Salt Lake City, October 10th, all the old directors were elected except A. G. Campbell, the name of J. M. Moore being substituted. The following officers were elected for the ensuing year: W. A. Clark, President; Eli H. Murray, Vice-President; G. F. Prescott, Secretary; J. M. Moore, Assistant Secretary; J. R. Clark, Treasurer. The old officers were all re-elected with the addition of J. M. Moore, as Assistant Secretary, who takes charge of the company's office, No. 78 Broadway, New York.

SILVER BOW.—The superintendent reports officially that the mill was closed for repairs and improvements during the greater part of September; consequently the bullion shipments have been very small.

NEVADA.

BRISTOL DISTRICT.

The Bristol mill and the furnace of the Day Silver Company are again at work.

THE COMSTOCK LODGE.

The *Gold Hill News* publishes its usual weekly summary, under date of October 12th: The report of work at the north end is about the same as usual. The Sierra Nevada and Union joint winze is again sinking. Its depth is stated to be 24 feet below the 2700 level. The material encountered in the cross-cuts in Sierra Nevada is reported to be the same as heretofore announced. Good progress is made in preparing for the placing of a suction-fan over the old Bonner shaft of the Gould & Curry. This is done for the benefit of the California and Consolidated Virginia mines. The mines on the lode extracting low-grade ore are Savage, Belcher, and Crown Point. The east cross-cut in Potosi has found bunches of quartz containing some precious metal. Another cross-cut will shortly be started west. There appears to be a better outlook for the Gold Hill mines this week than for some time past. Connections will be made this evening between the 2828 and 3000 levels of the Yellow Jacket by means of the north winze. This connection will not only secure a splendid circulation of air, but open up a vast amount of unexplored ground, which can now be easily prospected. Work has been started in the Alpha after a long period of idleness. The Imperial, it may be said, is just now commencing work, as for the past nine months the operations in that mine have been confined to clearing out the debris left, and repairing the damage caused by the flooding of the mine. When the drift from the Crown Point and Belcher joint shaft was running to connect with the Overman south drift, it was pushed rapidly, owing to the extreme heat. Since connection was secured and the temperature cooled off considerably, it has been gone over, widened out, timbered, and repaired, and men are now engaged in repairing the uprise which connected the two drifts. When the miners are removed from that point, the repairing of the incline shaft will be resumed, preparatory to the resumption of prospecting from the 3000 level. The Forman shaft is attaining a considerable depth. It will take about eight months yet to connect it with the Suro Tunnel south drift, at the present progress made by the tunnel folks. The Alta drift for the ledge makes excellent progress.

LEWIS DISTRICT.

A Battle Mountain, Nev., dispatch to the Mining Associated Press says: The mines of Lewis District have improved so much in the past two months that it is now a foregone conclusion that before another quarter passes by the camp will be shipping silver bricks every day or two. The new 40-stamp mill of the Highland Chief Company will begin running within two weeks at the furthest, unless some unforeseen delay occurs. The engine and boilers are now in place, and the furnaces about completed. The heavy work is at an end. The Starr-Grove and Eagle mills are running steadily, and are crushing the usual quantity of ore.

MARTIN WHITE.—The *Ward Reflex* says, under date of Oct. 4th: The uprise, started in March, to connect the main tunnel with the upper or old works of the Martin White, has at last been completed. This uprise is without question the biggest undertaking of the kind ever attempted, it being over 700 feet from the starting-point to point of connection. The air question is now settled for a long time to come, and any proposed developments can be proceeded with from this time on with comfort. The air comes up from the mouth of the main tunnel, a distance of about 4000 feet, with a rush and a roar. A chute is to be put into the uprise, and all ores and waste will pass through it to the main tunnel. In addition to developing the ore-body where the rise comes out, it is also the intention to do some prospecting along the line of the rise where several strata and bodies of ore have been passed through.

DIVIDEND-PAYING MINES.

Table with columns: NAME AND LOCATION OF COMPANY, Feet on Vein, Capital Stock, SHARES (No., Par Val), ASSESSMENTS (Total levied to date, Date and amount per share of last), DIVIDENDS (Total paid to date, Date and amt. per share), HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE (Oct. 15, Oct. 17, Oct. 18, Oct. 19, Oct. 20, Oct. 21), and SALES.

a. Gold. s. Silver. L. Lead. c. Copper. * Non-assessable. † The Deadwood mine paid in dividends, previous to the consolidation, \$275,000, and the Golden Terra paid \$75,000. Total shares of Dividend Paying stocks sold during the week, 300,748. \$219.50

FINANCIAL.

Gold and Silver Stocks.

New York, Friday Evening, Oct. 21.

The market has been weak since our last, and has been strongly attacked by the bears. Quite a large short interest has gone into some of the stocks, which, associated with the managements of some of the mines, making a little spurt, as they often can do, may cause an advance in some of the stocks that would not otherwise be warranted. The public, as usual in a declining market, is not doing much buying. It will unquestionably come in to furnish the profits of the experienced speculators who are taking the stocks at current rates. The sales for the week as officially reported have been small, amounting to 760,883 shares, against 1,042,470 shares last week.

The Tuscarora stocks have been quiet and without feature.

The Comstock shares have had a very liberal business at fairly steady prices. California records sales of 7765 shares at 95@85c. Consolidated Virginia has ranged between \$2.60 & \$2.40, with sales of 23,580 shares. Sierra Nevada, Mexican, and Union have had a moderate business within changes not exceeding \$1 per share. Sutro Tunnel has ranged between \$1 1/2 @ \$1.55, with sales of 17,050 shares. Consolidated Imperial has developed considerable activity and some advance; the sales amount to 23,700 shares at 19@24c.

The Bodie stocks have been quiet, and the fluctuations not large.

Alice has been quiet but a little weaker, selling yesterday and to-day at 55 1/2. The Leadville shares are absorbing the greatest attention of the market. Amie, under a moderate business, has been a little weak, selling at 27c. to day. Chrysolite has been quite active, and although at times showing a little strength, is lower than a week ago. The mine is producing fairly, but not nearly as much as last month. Eureka has been quite a feature of the market, with sales of 1990 shares, declining from \$22@15 1/2. Gold Stripe, under a moderate business, has been a little weak. Hibernia has had a large business, with prices fluctuating but 3c. per share. Horn-Silver has been active and strong, advancing to \$17 to-day. Iron Silver has been a marked feature of the market, and an especial prey of the bears; the sales aggregate 34,933 shares at \$2.15@1.75. Little Chief has declined to \$1, with liberal sales. Moose has been quiet at \$1@1.05. Northern Belle, with moderate sales, declined to \$11. Robinson Consolidated has been very largely dealt in. At one time it declined to \$12 1/2, but ranged to-day between \$13 1/2 @ \$13 3/4; the sales for the week aggregate 28,360 shares. Stormont has had a moderate business between \$2.35@2.75. This company has declared another dividend of 5c. per share, and the management hope to be able soon to increase this to 10c. per share per month.

Alta-Montana, under a liberal business, declined from \$1.90@1.75. Barcelona has been active and weak. Big Pittsburg has had a fair business at 80@85c.

Bradshaw has been quite active; the sales amounting to 20,100 shares, declining from 80@45c. and recovering to 74c. Bull-Domingo has ranged between 75@60c., with sales of 10,600 shares. Central Arizona has developed greater activity and further weakness; the sales aggregate 3500 shares at \$1.80@1.55. Oriental & Miller records about the usual amount of business at a slight decline. Silver Cliff has been quiet at \$3@3.30. The reports from this mine are of a more encouraging character. The State Line mines have been active, and weakening at the close. Nos. 1 and 4 have ranged between 86@80c., and 2 and 3, \$4.10@3.70.

Messrs. L. D. Courtright & Co., who put the Green Mountain Gold Mining Co. on the market, are now offering 50,000 shares of the working capital stock of the Lucky Boy Gold and Silver Mining Co., whose mines are located in Sawtooth District, Idaho.

The following are the new officers of the Varkuff Mining, Smelting, and Milling Company, of South Mountain, Idaho: Joseph Hayes, President; Jean de Ghue, Vice-President; Ph. Ferd Kotté, Secretary; and J. Boorman Johnston, Treasurer. A letter from the superintendent, dated South Mountain, Idaho, Sept. 28th, says:

We are now working a very small force of men on each of the following named mines, New York, Mona, and Avenue, and taking out considerable ore, both first and second-class. There is a ledge of fine ore in the Mona, about three feet in width, of galena and gray carbonate mixed. The Avenue is looking better and better as we sink on the ledge. We are taking about 25 tons of second-class ore out of the New York every day, besides considerable first-class. The teams are busy hauling ore to the

furnace every day, and the mill is running night and day reducing it. We have not got concentrators enough to save all that there is in the ore, but are doing the best we can with what machinery we have. Mr. Gove has got the furnace ready to start up, and will start as soon as his men arrive; he has sent to Salt Lake for them. There is no doubt but what we shall turn out a large quantity of bullion this season.

UNLISTED QUOTATIONS. Mr. L. V. Deforest, No. 70 Broadway, under date of October 20th, 3 P.M., reports the current quotations of unlisted stocks as follows: Bid. Off'd. Columbia Beavers \$1.35 1.50 Menlo \$1.60 \$2.20 Empire 10 45 Sacramento 1.75 2.25 Highland Chief. 1.10 Satemo 1.75 2.25 Hite 4.00

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

Table with columns: NAME OF COMPANY, CLOSING QUOTATIONS (Oct. 14-19), Open- ing (Oct. 20), Op'n' ing (Oct. 21). Lists various mining companies like Alpha, Alta, Bechtel, etc.

REVIEW OF THE SAN FRANCISCO MARKET.

The San Francisco market is all uncertainty, and quotations almost stationary. With reference to the recent manipulation, whereby some of the principal stocks were marked up 50 per cent above present prices, the San Francisco Commercial Herald of the 13th inst. observes:

The mining share market has not picked up worth mentioning since the Sierra Nevada deal, which appears to have had the sanction of Senator Fair, if the published statements are true. The "facts" seem to have been more plainly given to the public than on any previous occasion, and so far no denial has been made by "Slippery Jim," as he is here called in mining circles. We can not comprehend how these jobs can be so boldly manufactured out of whole cloth from time to time, and again and again be the means of robbing the public; but it proves one thing, that the public are just as anxious as they ever have been to speculate in stocks, and that, with any sort of a substantial showing, the excitement and prices would run as high as they ever did in any former period of our mining stock history.

The following by telegraph to the Tribune is dated San Francisco, October 19th:

It is reported on good authority, though unofficially, that the Sierra Nevada and Union Consolidated joint winze is again in ore, and it is said that the assays are higher than from the first strike.

The Imperial is now ready for prospecting on the 2800 level. Thirty-five men are extracting ore from the Savage 2000 level.

The west cut in Potosi at the 2400 level continues in bunches of quartz giving low assays.

Sutro Tunnel superintendent reports that the header in the south lateral drift was 141 feet in Belcher ground on October 15th. The ledge found in the south lateral is still being prospected. The vein has become wider, and is interspersed with clay seams.

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Oct. 20. Stock Broker and Member of the Boston Mining and Stock Exchanges.

The market for copper stocks continues to rule dull and inactive; in fact, there is nothing doing worthy of the name of business in this class of securities. The holders of the stocks paying dividends are not disposed to sell, while the demand for the speculative stocks has entirely faded out. Prices, however, are steady, and with an easier money market an advance would undoubtedly result. Ingot cop-

NON-DIVIDEND PAYING MINES.

Large table with columns: NAME AND LOCATION OF COMPANY, NUMBER OF SHARES, Par, ASSESSMENTS (Total levied to date, Date and amount of last), HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE (Oct. 15, 17, 18, 19, 20, 21). Lists numerous mines like Albon, Allouez, Alta-Montana, etc.

SALES.-Alta-Montana, 4800; Amrican Flag, 200; Barcelona, 28,700; Bear Creek, 1800; Best & Belcher, 1890; Big Pittsburg, 4900; Black Jack, 500; Bonanza Chief, 100; Boston Consolidated, 100; Boulder Consolidated, 200; Bradshaw, 20,100; Buckeye, 400; Bull Domingo, 10,800; Bulwer, 550; Bye and Bye, 3700; Calaveras, 700; Calaveras W. & M. Co., 900; Carbonate Hill, 900; Central Arizona, 3500; Cherokee, 300; Clarence, 2375; Colorado Central, 100; Consolidated Imperial, 23,700; Consolidated Pacific, 500; Crowell, 5600; Dahnlonga, 3800; Dunderberg, 100; Enterprise Consolidated, 4000; Exchequer, 50; Globe Copper, 100; Goodshaw, 550; Graniteville, 1000; Lacrosse, 12,600; Legal Tender, 6300; Leviathan, 250; Lucerne, 700; Mariposa, Preferred, 200; Mariposa Common, 500; Mexican, 1120; Mineral Creek, 40,600; Miner Boy, 33,900; North Standard, 200; Oriental & Miller, 33,300; Rappahannock, 3700; Red Elephant, 900; Silver Cliff, 3100; Silver Nugget (old), 100; Silver Nugget (new), 800; Sonora Consolidated, 300; South Hite, 800; State Line No. 1, 300; State Line Nos. 1 and 4, 22,600; State Line Nos. 2 and 3, 67,000; Sutro Tunnel, 17,050; Taylor Plumas, 13,700; Tioga, 200; Tuscarora, 1600; Unadilla, 3800; Union Consolidated, 1000; Vandewater, 10,800; Washington, 2,200; Wilshire, 800. Total sales, non-dividend shares, 400,135; grand total, 700,893.

per is firm, although some outside lots have been sold at a slight concession from the quoted rates; the companies, however, are holding their stock at 18 3/4c. In the silver stocks, there has been a little more doing. San Pedro being the leading stock, regaining a portion of the decline of last week. In copper, Calumet & Hecla sold at \$224@225 early in the week, and afterward at \$215, ex dividend \$5, closing in good demand at \$218 to-day. Quincy is very firm, with sales at \$30 3/4@31. Osceola was a little weak, and declined from \$29 to \$28 on larger offerings than usual of this stock. The remainder of the list was neglected.

In the silver stocks, San Pedro advanced from \$13 1/2@13 3/4 to \$14, with a good buying demand; sales about 500 shares, closing fairly firm at about \$2. Catalpa, weaker, and declined from \$1 1/16@1 1/8 to small sales. Crescent sold at \$1. Silver Islet has taken one of its periodical starts, and advanced from \$26 1/2 to \$36. Harshaw steady at \$5. Sullivan advanced to \$3 3/4, but later declined to \$3 1/4. At the Boston Mining and Stock Exchange, there has been

a good degree of activity at lower prices generally throughout the list. Deer Isle broke badly on the large amount of stock thrown upon the market, declining from \$1.22@75c regular, @65c seller 30 days; the support hitherto given to the stock seemed to be withdrawn for the present, at least, resulting in the decline as stated; sales for the week aggregate about 70,000 shares. Milton has been quite firm, although at one time it was heavy for regular stock, and declined to 55c, quickly rallying, however, to \$1 @ \$1.01 regular, and \$1.16 @ \$1.17 buyer 60; sales over 60,000 shares. Massachusetts and New Mexico was again weak, and has further declined to 23c. Twin Lead declined from \$1@20c, and from \$1.16 @ \$1 buyer 60. Copperopolis ranged from \$2.05 @ \$2.11. Peabody Silver steady at 60 @ 62c. Cedar Spring unchanged. Empire, 30 @ 32c. A new copper mine in Maine, called the Mammoth, was put on the Board to-day, and opened strong at 60c, advancing to 62 @ 63c. About the usual amount of business was done in the rest of the list, requiring no special comment.

PHILADELPHIA MINING STOCKS.

Table with columns for dates (Oct. 13 to Oct. 19) and stock names (Aetna, Alonzo, Algonquin, etc.). It includes high and low prices for each date and a 'Sales' column on the right.

3 P.M. At the afternoon Board, there was no improvement. Silver Islet declined from \$36 this morning to \$33 3/4; Calumet & Hecla sold at \$218, which was bid; Pewabic sold at \$12 3/4; Copper Falls offered at \$4 assessment paid; Franklin, \$12 1/4 bid; Osceola was offered at \$28, a decline of \$1; Quincy, \$39 bid; Ridge, \$4 bid; Huron, \$3 3/4 bid; Douglass, sales \$1 1/4; National, \$2 3/4 bid; San Pedro, \$1 3/4 bid; Bonanza, \$5 1/2 sales and bid; Catapa, \$ 3/4 bid; Blue Hill, \$3 bid.

Gas Stocks.

The following list of companies in New York and vicinity is corrected weekly by GEORGE H. FRENCH, Broker and Dealer in Gas Stocks, No. 17 Wall street, New York. Quotations are based on the equivalent of \$100.

Table with columns: COMPANIES IN NEW YORK AND VICINITY, Capital Stock, Par., Rate of interest, Am. of last, Date of last, Bid, As'd.

Coal Stocks.

NEW YORK, Friday Evening, Oct. 21.

There has been considerable activity in these stocks during the current week at prices that opened steady and have been well maintained. Delaware, Lackawanna & Western has been the most active stock on the list, the sales amounting to 248,500 shares at \$122 1/2 @ \$125 1/2. Delaware & Hudson has had a business of 9050 shares at \$109 @ \$107 1/2. The sales of New Jersey Central amount to 53,459 shares at \$95 1/2 @ \$92 1/2. Reading still continues to attract considerable attention, the sales in this market amounting to 53,375 shares at \$69 @ \$65 1/2.

The sales of the bituminous coal shares h've been well distributed, and include sales of 500 shares of Cumberland at \$33 @ \$30; 200 shares of Maryland at \$24; 1100 shares of Cameron at \$34 1/2 @ \$33 1/2; and 55 shares of Pennsylvania Coal at \$240.

BOSTON MINING STOCKS.

Table with columns for dates (Oct. 13 to Oct. 19) and stock names (Allouez, Ariz. Queen, Atlantic, Blue Hill, etc.). It includes high and low prices for each date and a 'Sales' column on the right.

BULLION MARKET.

NEW YORK, Friday Evening, Oct. 14.

Table with columns: DATE, London Pence, N. Y. Cents, DATE, London Pence, N. Y. Cents.

MISCELLANEOUS.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ending October 20th, as compiled from various sources, amounted to \$135,800.84, as against \$635,596.90 reported for the previous week. The receipts from January 1st to date are \$13,673,407.83.

Exports of Gold and Silver from New York.

Week ending October 15th..... \$177,845
Corresponding week last year..... 317,807
Since January 1st..... 8,925,104
Corresponding period last year..... 6,661,721

Silver Reef.—The bullion shipments for the week ending October 8th aggregated \$27,803.91.

Arizona's Bullion Shipments for the Month of September.—The following table gives the bullion shipments made through Wells, Fargo & Co. from Arizona during the month of September:

Table with columns: Contention, Globe, Harshaw, Maricopa, Charleston, Phoenix, Prescott, Tombstone, Tucson, Wickenburg, Yuma, Final. Includes Gold and Silver values.

* Bullion from Charleston and Contention are from Tombstone mines.

BULLION PRODUCTION FOR 1881.

We give below a statement showing the latest bullion shipments. These are officially obtained from the companies, where that is possible; and where official statements can not be procured, we take the latest shipments published in those papers nearest to the mines reported. The table gives the amount shipped for the week up to the

date given, as well as the aggregate shipments to such date, from the first of January, 1881.

The shipments of silver bullion are valued at \$1.29 29 per ounce, Troy; gold at the standard \$20.67 per ounce, Troy. The actual value of the silver in the following table is therefore subject to a discount, depending on the market price of silver. If the price of silver be counted at \$1.12 per ounce, which has for some months been about its average value, the following figures, where they relate to silver bullion, should be diminished by about 13 1/4 per cent to arrive at actual value.

Table with columns: MINES, States, For the week, Month of October, Year from Jan. 1st, 1881. Lists various mines and their production values.

Total amount of shipments to date. \$19,741,715. * Official. † Net. G. Gold. S. Silver. L. Lead.

Table with columns: SMELTERS AND MILLS, State, Month of September, Year from January 1st, 1881. Lists smelters and mills with their production values.

* Including value of lead.

METALS.

NEW YORK, Friday Evening, Oct. 21.

The metal market has been somewhat quiet. The consumption is as great as it has been, but previous purchasers are supplying present requirements to a

COAL STOCKS.

Table with columns: NAME OF COMPANY, Capital Stock, No., Par Val., Last Dividend, Rate per Ann., Quotations of New York stocks (Oct. 15, 17, 18, 19, 20, 21), Philadelphia prices, Oct. 14th to Oct. 20th inclusive.

† 108. † 124 1/2. † 124 1/4. † 240. Total Sales. 477,335. Of the sales of this stock 52,476 shares were in Philadelphia and 53,375 in New York.

large extent. The uncertainty of the money market, accompanied by the ability of the speculators to take a profit, has developed a selling movement in some instances which has weakened prices. Although prices may be lower in the next sixty days, their ultimate course appears to be upward in some cases.

Copper.—The business of the past week has been very small, probably not amounting to more than 200,000 pounds at 18 1/2 @ 18 1/4 c., at which prices it closes. The inclination appears to be downward, although the market is without feature at present.

STATISTICS OF COPPER, JANUARY TO SEPTEMBER, AS PER CUSTOMS RETURNS.

Table with columns: Imports, Exports, Jan. 1 to Sept. 30, 1881, 1880, 1879. Lists copper statistics for pyrites, precipitate, ore, regulus, bars, cakes, etc.

200 tons at £62 @ £62 3/4 cash, g. o. bs., £62 1/2 @ £63 1/4 sundry prompts; and favorite marks £63 cash.

Oct. 5th. Sales 100 tons Chili Bars at £63 cash for g. o. bs.

Oct. 6th. Tight money causing realizations by speculators. Sales about 300 tons at £62 @ £62 1/2 for g. o. bs. and £62 3/4 @ £62 1/4 for favorite marks; all cash terms.

Oct. 7th. Sales about 400 tons at £63 cash for g. o. bs., and £62 3/4 net three months. Wallaroo quoted at £68 1/2 @ £69; Burra, £68 @ £68 1/2; English Tough, £66 @ £68; and Select, £68 1/2 @ £70.

Tin.—The sales for the week have been about 500 tons at 21 @ 21 1/4 c. on spot and 21 1/4 @ 21 1/2 c. to arrive. The market closed at the lowest prices. The arrivals during the week have been about 1000 tons, and as this tin showed a good profit, there was a movement to sell rather than take the risks of high rates for money in carrying it. The shipments from the Straits to the United States during the first fortnight of the month amounted to 450 tons, and to Great Britain 175 tons. Straits in London was up to £98 5s., but to-day is quoted at £97. At Singapore, the quotation is \$30%, and at Penang \$30.20, with exchange at 3s. 9 1/2 d. These prices are equal to 22 1/2 @ 22 1/2 c. laid down here. L. & F. in London is quoted at £105. The price here is 22c.

STATISTICS OF FOREIGN TIN—LONDON AND HOLLAND.

Table with columns: Imports, Deliveries, Stocks, Jan. 1 to Sept. 30, 1881, 1880, 1879. Lists tin statistics for Australian and Straits, Banca (ex sale), Billiton.

Our London advices include October 7th, from which we take the following: October 1st and 3d. Manufactured advanced £2 per ton. Sales of Chili Bars about 600 tons at £62 1/2 @ £62 3/4 cash for g. o. bs.; £62 1/2 @ £63 1/4 sundry forward prompts; favorite marks £62 3/4 @ £62 1/2 cash, and £63 1/2 distant arrival. Best brands £63 @ £63 1/2 cash and £63 1/2 extended prompt.

Chili charters were announced this morning as 2000 tons, of which 1050 tons Bars and Ingots, 400 tons pure in furnace material England, 550 tons Bars for France.

Table with columns: 1881, 1880, 1879, 1878. Lists charter statistics for Jan. 1st to Sept. 30th.

Charters Jan. 1st to Sept. 30th. 27,583 31,788 40,280 36,302. September only. 5,900 3,328 5,809 4,048. Price at Valparaiso is about equal to £62 1/2, without commission to merchants on either side.

Oct. 4th. Market quiet and irregular. Sales about

Totals brought to market. 16,700 14,488 16,173. Actual deliveries of foreign. 17,488 14,905 15,574. In transit, Straits and Australian. 3,993 5,555 3,243.

Our London advices include October 7th, from which we take the following: Oct. 1st and 3d. Market quiet at 95 1/4 @ 96 1/4 s. sharp cash. Oct. 4th. Fairly active and irregular. Sales of about 250 tons at 95 1/4 @ 94 1/4 s. fourteen days, and 95 @ 94 s. sharp cash; recovering to 94 1/4 s. sharp cash; 94 1/2 @ 95 s. fourteen days; and 95 1/4 @ 95 1/4 s. three months prompt.

Oct. 5th. Sales about 150 tons at 94%@94 3/4s. sharp cash; 94%@95s. fourteen days; and 95%@95 1/4s. three months.

Oct. 6th. Sales about 150 tons at 94%@94 1/2s. sharp cash; 94%@94 1/2c. fourteen days prompt; forward metal selling at 95%@95 1/4s., according to time of delivery.

Oct. 7th. Sales about 150 tons at 94% cash, 95@95 1/4s. delivery in one and two weeks, 95%@96s., three months.

STATISTICS OF TIN, JANUARY TO SEPTEMBER, AS PER CUSTOMS RETURNS.

	Jan. 1 to Sept. 30		
	1880.	1879.	1878.
Imports, foreign	14,596	14,579	12,885
Exports — Foreign	6,228	6,859	5,886
English	2,473	3,253	4,532
Total	9,999	10,112	10,418
Sept. only.			
	1880.	1879.	1878.
Imports, foreign	1,371	1,897	1,028
Exports — Foreign	703	922	532
English	323	401	633
Total	1,026	1,323	1,165
Jan. 1 to Sept. 30.			
	1880.	1879.	1878.
Exports — English	4,395	6,218	6,210
Foreign	8,785	8,844	6,620
Total	13,180	15,062	12,830

Tin Plates.—These are very quiet, and lower prices are looked for. We quote per box as follows: Charcoal tins, Melyn grade, 1/2 cross, \$6 1/2; Allaway grade, \$5 1/2@6. Charcoal Roofing, Dean grade, \$5 1/2 for 14 x 20, and \$11 1/2 for 20 x 28; Allaway grade, \$5 1/2 for 14 x 20, and \$11@11 1/4 for 20 x 28. Coke Roofing, B. V. grade, \$5 1/2 for 14x20, and \$10 1/2 for 20x28. Coke tins, B. V. grade, IC, \$5.20, and ICW, \$4 1/2@5.

Messrs. Robert Crooks & Co., of Liverpool, under date of October 6th, say: Tin and terne plates have been very slow to respond to the advance in material, and even now coke tins are the only description in which considerable business has been done at an advance. Low figures reported from United States have no doubt had a good deal to do with the incredulity of buyers; but during the last few days, the opinion appears to be growing that prices must before long follow the course of iron and tin. In charcoal tin and terne, with the exception of the few independent makers, there is so far no material change to note.

Lead.—The sales for the week have amounted to about 200 tons, declining to 5c., which is the closing price. The consumption is large, and stocks are not increasing, but consumers have arranged for all present requirements. Lower prices are looked for in November.

The shipments of lead over the St. Louis & San Francisco Railroad for the week ended October 14th were 115 tons.

The production of pig-lead by Mine La Motte (Mo.) from January 1st to October 18th was 32,278 pigs, weighing 2,638,726 pounds.

Messrs. French & Smith, of London, under date of October 6th, say: "Lead still further improved in September, and the prices are to-day £15 2s. 6d. Soft Spanish, £15 7s. 6d. We estimate the arrivals in September not much above 5000 tons. The imports and exports for the first eight months were:

	1881.	1880.	1879.
Imports	63,874	61,270	67,060
Exports	29,849	20,836	25,107

Spelter and Zinc.—The former is scarce, and worth on spot 5%@5 1/2c. The business in this article is mostly done between producers and consumers, and does not pass through the middlemen of this city as was once the case. Sheet zinc is scarce and quiet at 7 1/2c.

Antimony.—Without any business worthy of notice, we quote Cookson's at 14c. and Hallett's at 13 1/4@13 3/4c.

Quicksilver.—San Francisco advices of the 14th inst. say:

Cable advices giving price of quicksilver £7 in London, coupled with very small stock here, have caused prices to advance to 42c.

The San Francisco *Commercial Herald* of October 13th says:

The spot supply is very light, and some receivers are holding at 40c., while others sell sparingly at 39c. The London price has been advanced to £6 15s. per bottle, and that will enable holders to get 40c. here easily. Within a day or two, Eastern buyers have run up prices from 39@

39 1/2c. to 40@41c., and at the close some speculative holders are asking 42 1/2c.

The exports for the week, by sea, were as follows:

To	Flasks.	Value.
To Mazatlan, per Newbern, hence 6th inst.:		
Thannhauser & Co.	200	\$5,700
I. Gutte	30	861
To Guaymas, per same:		
Falkner, Bell & Co.	30	868
W. Loaiza	2	57
Thannhauser & Co.	15	430
To Hongkong, per Oceanic, 8th inst.:		
Degener & Co.	206	5,960
To Hiogo, per same:		
The Anglo-Californian Bank	25	725
To Mazatlan, per Percy Edward, 8th inst.:		
J. B. Randol	550	15,989
I. Gutte	10	291
Totals	1,068	\$30,881
Previously since Jan. 1st, 1881	27,233	789,638
Totals	28,301	\$820,519
Totals same period, 1880	24,732	747,837
Increase in 1881	3,569	\$72,682

Receipts since January 1st, 1881, 42,731 flasks. The exports by rail for the first eight months aggregate 7993 flasks.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Oct. 21.

The foreign market, although showing a slight decline in Scotch Pig, is well maintained, with no indications of an important set-back. Our own market, although not active, has a demand in many instances greater than the supply, and prices have, without exception, an upward tendency.

American Pig.—We note sales of 1500 tons of No. 2 Foundry at \$23; 400 to 500 tons of No. 1 Foundry at \$25@26; and 1000 tons of Forge at \$21 1/2 at furnace. No. 1 Foundry is scarce, and exceptional sales (principally Thomas Iron Co.'s iron), are made at \$27. The tendency of prices is upward. Supplies are decreasing, while there is no decrease in consumption and no indications of an increase of production. Should prices advance a few dollars per ton, there may be a few more furnaces put in blast, but the production will not be greatly augmented. We quote No. 1 Foundry, \$25@26; No. 2 Foundry, \$23; and Forge, \$21@22.

Scotch Pig.—The Glasgow market is a shade lower, while freights are still quoted at 15s., with every thing engaged for November. There is a good demand here and practically no stock. We note sales of 600 tons of Gartsherrie at \$25, and 100 tons at \$25 1/2; 200 tons Summerlee at \$26; and 150 tons of Coltness and 200 tons of Glengarnock on private terms. We quote Eglinton at \$23 1/4; Gartsherrie, \$25@25 1/2; Glengarnock, \$25; Summerlee, \$26; and Coltness, \$26 1/2. English iron is quiet at \$21 1/2. It is said to be very much reduced in stock. In Bessemer iron, there has been a business of 7000 to 8000 tons at \$24 1/2@25 on spot.

Messrs. John E. Swan & Brothers, of Glasgow, under date of October 7th, report 105 furnaces in blast as against 104 at the same time last year. The quantity of iron in Connal & Co.'s stores was 594,568 tons, an increase of 4392 tons for the week. The shipments show a decrease since Christmas of 97,715 tons, as compared with the shipments to the same date in 1880. The imports of Middlesbrough pig-iron for the same period show an increase of 37,048 tons. The following were the quotations of the leading brands of No. 1 pig-iron: Gartsherrie, 61s.; Coltness, 62s.; Langloan, 62s. 6d.; Summerlee, 61s. 6d.; Carnbroe, 55s.; Glengarnock, 55s.; Eglinton, 52s. 6d. Middlesbrough pig-iron was quoted as follows, f. o. b.: No. 1 Foundry, 47s.; No. 2, 45s.; No. 3, 43s.; No. 4, 42s. 6d.; No. 4 Forge, 42s.

Messrs. J. Berger Spence & Co., of Manchester, under date of October 8th, say: All classes of metals seem to have had opened for them more improved prospects than could have been foreseen a couple of months ago. A good business has been done in pig-iron during the week. The actual commencement of the "decrease-of-production" arrangement in the North has attracted marked attention to the Middlesbrough and Scotch brands, and this in its turn has more or less favorably influenced the brands of all other districts. The Middlesbrough market on Tuesday was very active, and some large sales were effected at an average of 43s. per ton for No. 3. As the day advanced, sellers became less numerous, preferring to hold aloof, in the hope that higher rates would be obtainable. This has practically been the position in Glasgow, where a larger business might have been done if current prices had been accepted, but advances were firmly held for. A very natural

result of the alteration is the development of both speculative buying and selling for forward delivery. As we write, the following are about current prices: Glasgow warrants, 53s. 3d.; Middlesbrough No. 1, 46s. 9d.; No. 3, 43s.; No. 4 Forge, 41s. 9d., 42s. Bessemer iron is in steady and rather increasing sale.

Rails.—Owing to the fact that rail-makers are well sold ahead, both here and abroad, no effort is making to force sales, while buyers are looking for lower prices. English steel rails for shipment are quoted at about \$61. American, for next year's delivery, are held at \$60. There is quite a large amount of inquiry in the market for iron rails, but we do not learn of any business. Foreign are worth about \$48 here, and domestic \$47@48 at mills.

This week's number of the *Railroad Gazette* reports the construction of 119 1/2 miles of new railroad, making 5459 miles this year, against 4275 miles reported at the corresponding time in 1880, 2619 miles in 1879, 1527 miles in 1878, 1629 miles in 1877, 1770 miles in 1876, 920 miles in 1875, 1242 miles in 1874, 2955 miles in 1873, and 5312 miles in 1872.

Old Rails.—These have been fairly active, and are higher. The sales of Ts. aggregate about 4000 to 5000 tons at \$27 1/2@28, and 2500 to 3000 tons of D. Hs. on spot at \$20@20 1/2, and for shipment 1500 tons at \$31@31 1/4.

Wrought Scrap.—Sales of about 1000 tons are reported for the week. We quote \$28 1/2@29 from store and to arrive, and \$31 from yard.

San Francisco. Oct. 13.

There is a marked falling off in imports of pig-iron; at the same time, the consumption is light, as most of the foundries are running on half time. Scotch still sustains itself at full figures, but the quantity changing hands is very spare. The Clipper Gap Company reports over 2000 tons on hand, and, to utilize this, rolling-mills, nail and stove works are to be added to the foundries. Tin plate is in large stock, and low prices continue to rule. Sydney pig-tin may be quoted at 23 1/2c., with small sales at this, ex steamer, but now held at 30c.; but, as the demand has largely fallen off, we think this is an extreme rate. Pig-iron may be rated as follows:

	To arrive.	Spot lots
Eglinton	\$24.50	\$27.00
Glengarnock	25.50	29.00
Clay Lane	25.00	28.00
American Soft	30.00	30.00
American Hard	25.00	27.00
Shotts, No. 1	27.50	30.00
Clipper Gap	26.00	29.00

—Commercial Herald.

Philadelphia. Oct. 21.

The market in iron and steel is quieter, but prices are firmly maintained at their highest limit. The slight abatement in demand may check in a measure the strong upward tendency which has prevailed for several months. The anomaly of a constant upward tendency and steady prices is explained in the qualifying factor of probable British iron exports. The latest returns indicate that the export movement has not assumed a serious shape, and so far as opinions can be wisely formed, nothing is to be feared. Consumers look for an increased production. No. 1 Foundry sold as high as \$26.50 this week, and as low as \$24.50; No. 2 sold at \$23; Gray Forge iron sold at \$23 delivered, and very little can be picked up under \$21 at furnace, and, as for orders for future delivery, sellers are indifferent and buyers prefer to wait.

Merchant Bar is firm at 2 1/2c. and would be very active if iron was obtainable. Very few of the mills are taking orders. When pig-iron prices are assured, books will be opened. Very fair sales were made at 2 1/2c. delivered. The demand anticipates capacity. The usual rush of business is reported in structural plate and tank iron, and quotations are very firm. All the orders in the market can not be executed as buyers wish Tank is quoted at 3 1/2c.; Light Plate, 3 1/2c.; Sheared Plates, 3 1/2c.; Ship Plates, 3 1/2c.; Angles, 3c.; Beams, 3 7c.; Channels, 3 1/2c. The capacity is well engaged and the outlook is favorable for a busy winter. The nail factories are unable to fill orders under 30 days. Small railroad material is in active demand, such as fastenings, spikes, etc. Muck iron is firm at \$45; Blooms, \$70. The demand for heavy railroad material less active, and the easing off is attributed to the hardening of prices to \$60 for late summer deliveries. Whether the demand is supplied is not stated. Judging from the multitude of inquiries and the oversold condition of mills, prices can not weaken; but if consumers conclude to wait until foreign mills are able to supply their wants, American quotations will drop. Old Rails are dull at \$28; Doubles, \$30.50; Scrap, quiet at last week's prices.

John H. Austin & Co.'s Special Market Report.

STEEL RAILS.—£26 @ £6 5s. per ton. Market very steady, the late lowest sellers now the firmest maintainers of prices. Some large orders are coming forward from our colonies, and inquiries for 30, 35, and 40 lb. rails are here from the United States for next year's shipment.

IRON RAILS.—£5 10s. per ton, for 50-lbs. per yard and upward. Makers now filled up until December shipments, and not anxious to book further ahead. £5 15s. paid for 30 and 35-lb. rails, in lots of 250 tons and over.

BAR IRON.—Very firm; £5 10s. per ton paid for common qualities, and the demand continuing, dealers being caught on short stocks all around.

OLD RAILS.—Very firm; although much business reported, available stocks are light; freights are advancing; the inquiries numerous for all kinds of sections, c. i. f., Philadelphia; 80s. for Flanges asked.

HEAVY WROUGHT SCRAP-IRON.—Buyers at 75s. per ton, c. i. f. New York, and no sellers, although 63s. per ton, f. o. b. English ports, would buy; the high freights current more than swallow up the difference.

STEEL BLOOMS, 7" x 7" AND UPWARD.—A very large business done on the basis of £5 11s. @ £5 14s. per ton, f. o. b. for prompt and forward shipment.

BESSEMER PIG-IRON, Nos. 1, 2, AND 3.—Very strong at 60s. per ton.

SCOTCH PIG-IRON.—Very strong, 53s. 6d. cash.

MIDDLESBOROUGH PIG-IRON, No. 3.—42s. 6d. @ 45s. cash.

FREIGHTS.—Outward freights to the United States from Wales, per ton: New York, 13s.; New Orleans, 16s.; Galveston Bay, 20s.; Galveston Wharf, 27s. 6d.; Vera Cruz and Corpus Christi, 30s. From Middlesborough to New Orleans, 18s. is offered; and from Middlesborough to Quebec, 20s. Steam tonnage very scarce.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Oct. 21.
Anthracite.

There is a demand for more coal than the companies can furnish, and prices are well maintained. There is no necessity or desire to regulate the business, and the managers are likely to let the trade take its own course on the present basis of prices. The demand will probably continue until the close of navigation, and even then there will probably be a demand greater than the supply of transportation. With winter, snow, and ice, and shorter days, there will be a natural curtailment of production, which many think will keep prices steady. The demand from the West continues to be very large, with the supply of cars quite inadequate. From no quarter do we learn of large stocks. The supplies with dealers in this city are small, and with the advent of weather sufficiently cold to cause the general lighting of fires for heating purposes, there will be a large local demand. Of course, the winter business will depend upon the severity of the temperature. With a moderately cold winter, there will be a large demand for domestic sizes, while the consumption by the iron-works is probably larger than it ever has been, and gives evidence of continuing so for a long time to come. In fact, the indications rather favor an increased than a decreased consumption.

The scarcity of water in the coal regions is felt to a greater extent now than at any previous time, and is having a marked effect upon production. Unless heavy rains come, many collieries will have to cease operations.

The labor question rests at peace. There is nothing to indicate any uprising. There is a scarcity of labor; and if the demand continues to increase, as it seems probable, an advance of wages will have to be made in some districts to encourage a fresh supply.

Vessels, although not in great supply, are much more abundant than they were. Freights are a little easier, but do not show indications of a further decline. In fact, there are so many orders to be filled previous to the closing of many ports, that an advance is more probable.

Owing to several causes, but principally a scarcity of cars, bituminous coal is somewhat scarce and prices are about 50c. per ton higher than the lowest point. This greatly helps the market for anthracite steam coal.

The production this year promises to meet the estimates of the most sanguine. About a year ago, we predicted that the production this year would equal 28,000,000. From the present outlook, it will exceed this amount.

With all the drawbacks, the production last week was 640,781 tons; and although not so large as for the corresponding week of 1880, the total production from January 1st shows an improvement of 3,935,010 tons. This amount is not likely to be increased during the next two weeks, but during the remaining two months there will probably be an important increase.

The production of anthracite coal last week was 640,781 tons, as compared with 641,254 tons the pre-

vious week and 684,500 tons the corresponding week of 1880. The total product from January 1st to October 15th was 21,704,951 tons, as against 17,769,941 tons for the like period of last year, showing an increase this year of 3,935,010 tons.

Statement of anthracite coal tonnage for month of September, 1881, compared with same period last year. The following has been furnished by John H. Jones, accountant:

	September, 1881.	September, 1880.	Difference.	For year 1881.	For year 1880.	Difference.
Philadelphia & Reading RR.	665,806 00	769,551 16	103,685 10	4,638,351 10	4,294,433 17	343,917 13
Lehigh Valley RR.	504,739 04	497,865 07	6,873 17	4,025,782 18	3,117,411 07	908,371 11
Central Railroad of New Jersey.	360,608 07	457,632 05	91,023 18	2,898,125 01	2,477,683 11	460,441 10
Delaware, Lack. & Western RR.	380,013 07	411,672 12	31,659 05	3,138,327 02	2,590,400 18	597,926 04
Delaware & Hudson Canal Co.	292,373 14	306,498 13	14,124 19	2,300,055 07	1,915,336 18	384,718 09
Pennsylvania RR.	196,698 04	208,061 01	11,362 17	1,637,284 18	1,308,083 19	329,200 19
Pennsylvania Coal Co.	144,627 00	157,362 08	12,735 08	1,037,621 00	788,371 10	249,249 10
New York, Lake Erie & W. RR.	43,293 01	38,833 16	4,459 03	355,816 03	285,187 19	70,628 04
Total	2,568,219 03	2,842,478 00	254,258 17	20,361,363 19	16,686,009 10	3,674,454 00

The stock of coal on hand at tide-water shipping points, September 30th, 1881, was 613,958 tons; on August 31st, 652,943 tons; decrease, 38,985 tons.

Although the business for September this year was not as large as it was in 1880, it was still very large and satisfactory. The most favorable feature this year was a reduction of stocks during the month of 38,985 tons, bringing the total down to 613,958 tons. In September of 1880, the stocks increased 65,839 tons, and at the end of the month aggregated 685,788 tons.

The most striking feature in the above statistics is the position held by the Lehigh Valley RR. Co. Of the large companies, it is the only one that shows a gain in September, while for the year the increase is 908,371 tons. It is now carrying over four fifths as much as the Reading, while a few years ago it was expected to produce less than two thirds as much, and upon this point the companies disagreed.

The Philadelphia & Reading Railroad Company is increasing its Western business by shipments over the Baltimore & Ohio, the coal being shipped from Port Richmond to Locust Grove and there put on cars. One contract is for 50,000 tons.

The Philadelphia North American of October 15th says:

Anthracite shipments to the Eastern market are active; for a fleet of vessels came in this week and partially relieved the inflated condition of the tide-water freight schedule, so that coal is leaving the wharves faster than it is coming in, and unless the drought is soon ended for good by a series of copious showers in the mining regions, there will be a general cleaning up. The recent rains have been enough to postpone for a few days the danger

of entire stoppage in some collieries, but there has been no permanent and substantial relief, and the Schuylkill Canal is still too low for navigation by heavily-loaded craft. Large dealers are compelled to decline good-sized orders, and advocates of higher prices claim that the opponents of such policy will surrender unless relief is had from the drought by the first of November, as the enforced restriction will otherwise be so severe that present rates can not be depended on to meet expenses and pay a fair profit for any length of time; and the increase demanded will be active enough to counteract any falling off of orders from those who think prices are high enough, and threaten retrenchment if they are put up any higher. Opponents of higher prices meet these arguments by saying that an increase to an exorbitant figure for city and line will establish a bad precedent, even if it does not become a prohibitory measure, owing to the peculiar circumstances of the enforced restriction. The demand from the West is first-rate, and is only trammelled by the inadequacy of the car facilities afforded by the railroads, which the bituminous people are entirely dependent on, and which they frequently obtain ahead of their anthracite cousins. Large corporations like the Pennsylvania Railroad have already opened their eyes to the fact that a good many more coal cars would be a paying investment, and are increasing their supply of that kind of rolling stock as fast as they can consistently with the innumerable other demands upon the equipment appropriation. Some talk of the reckless over-production into which the bituminous trade would rush if they had all the cars they wanted; but that is not the affair of the railroad companies; as they would get enough additional traffic from the anthracite trade to keep all the cars busy, which would be necessary to supply the wants of the bituminous shippers when their shipments are largest. The anthracite market in the West is increasing gradually every year, faster than in the East, and the discoveries of veins that will compete with Lehigh, Schuylkill, and Wyoming products are so few and small as to be hardly worth considering in calculations for many years ahead. The same dependence can probably be placed upon the Southern trade, although there are large consuming regions exceptionally blessed with the proximity of regions where bituminous is mined pure enough and hard enough to burn in an open grate. The anthracite trade will not suffer from the development of this trade by the increased railroad facilities it is constantly receiving. On the contrary, the knowledge that the inexhaustible fields of West Virginia produce bituminous coal of all grades of hardness, the finest of which will, when more generally introduced, prove a refuge for those who think the prices of anthracite are exorbitant, will serve as a useful check upon the disposition to put up those prices indefinitely, and will ultimately be as valuable as a means of regulation as suspension of operations at stated intervals has been.

Bituminous.

There is a very fair incidental demand for this coal, while the contractors are pressing the mining companies very hard. This class of coal is very scarce, and still has an upward tendency in price. The quotations to-day range from \$4.65 @ \$4.80 alongside. There is a little better supply of cars to the Clearfield region, but no guarantee that it will continue. The supply of cars on the Baltimore & Ohio Railroad is liberal. The George's Creek & Cumberland Railroad is not receiving a sufficient quantity of cars to meet its requirements for shipment via the Pennsylvania Railroad. The Chesapeake & Ohio Canal has a greater depth of water than it had, and larger shipments are making by this route. Vessels are very scarce at Georgetown.

The production of Cumberland and Clearfield districts is larger than a year ago, but smaller than the preceding week this year. The Cumberland District still shows a loss, as compared with 1880, of 31,169 tons. The Clearfield District is ahead 533,671 tons, and has produced more this year than the Cumberland District.

San Francisco. Oct. 13.

The arrivals from the North and elsewhere continue large and free, and much difficulty is experienced in finding storage room or places of discharge. Imports for the week include: per Cedric the Saxon, 2129 tons Sydney; Marmion, 1085 tons from Newcastle, N. S. W.; Sovereign, from Newport, Eng., 1824 tons; Warsaw, from Liverpool, 1979 tons; Levi C. Wade, 417 tons Wellington; Mississippi, 400 tons Seattle; Two Brothers, 2310 tons do.; Fannie Tucker, 1900 tons Liverpool; Sophie, 1471 tons Cardiff Coal and 280 tons Coke; Victoria, from Nanaimo, 1 68 tons. During the past few months, arrivals of coal have been larger than ever before, and prices rule unprecedentedly low. Steam coals for shipment from England (now loading) have been sold for \$5.25 @ \$5.40, duty paid, and arrived cargoes of Scotch splint have been disposed of at \$5.75 per ton. The cargoes per Caitloch, Traveler, and Dunnotar Castle, also Splint Coal and all loaded at Dundee, have been on fire and were more or less damaged. The value of Australian coal remains unchanged at \$6 @ \$6.25 per ton. For spot cargoes low prices still rule. Three cargoes of coal, partially damaged by fire and water, being forced on the market, have assisted in demoralizing prices. Foreign coals are still freely loaded for this port, although present prices leave only a nominal freight. Anthracite coals, lump and egg, sustain extreme figures. Cumberland is improving. We submit the following schedule of rates:

	Prices to arrive.	Spot rates.
Australian	\$6.00 @ \$6.25	\$6.25 @ . . .
Liverpool Steam	5.50 @ 5.75	5.75 @ . . .
West Hartley	6.12 ¹ / ₂ @ 6.25	6.12 ¹ / ₂ @ 6.25
Scotch Splint	6.00 @ 6.12 ¹ / ₂	6.00 @ 6.25
Lehigh Lump	13.00 @ 13.25	20.00 @ . . .
Cumberland bulk	9.75 @ 10.00	11.00 @ . . .
Egg Hard	11.50 @ 11.75	18.00 @ . . .
Cardiff	6.12 ¹ / ₂ @ 6.25	6.25 @ . . .

The following table shows the imports of coal for the

month of September, and the total for the first nine months of 1881:

Table with 3 columns: Category, Month of September, Nine months of 1881. Rows include Domestic (Eastern), Australian, Coos Bay, etc.

Increase in 1881... The above receipts for the month of September include 1080 tons coke. The Barnard Castle brings 1900 tons Wellington. The miners at Nanaimo are now on a strike.

STATISTICS OF COAL PRODUCTION

Comparative statement of the production of anthracite coal for the week ending Oct. 15th, and years from January 1st:

Table with 5 columns: TONS OF 2240 LBS., Week, Year, Week, Year. Rows include Wyoming Region, Lehigh Region, Schuylkill Region, Sullivan Region, etc.

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

Total same time in 1878... 1877... 1878... 1879...

The decrease in shipments of Cumberland Coal, over the Cumberland Branch and Cumberland & Pennsylvania railroads, amounts to 185,323 tons, as compared with the corresponding period in 1880.

The shipments of Cumberland Coal, over the George's Creek & Cumberland RR., by the Maryland and the American Coal companies, for the week ending Oct. 8th, amounted to 10,364 tons, making a total of 123,788 tons since the beginning of transportation.

The Production of Bituminous Coal for the week ending Oct. 8th was as follows:

Table with 4 columns: Tons of 2000 lbs., unless otherwise designated, Week, Year, Tons, Year. Rows include Cumberland Region, Md., Barclay Region, Pa., etc.

The Production of Coke for the week ending Oct. 8th, and year from Jan. 1st:

Table with 4 columns: Tons of 2000 lbs., Week, Year, Tons, Year. Rows include Penn. RR. (Allegheny Region), West Penn. RR., etc.

F. E. BRANDIS, Engineering and Mining Instruments, 55 FULTON STREET, NEW YORK, Makes a specialty of first-class work only at reasonable prices.

Coastwise Freights. Per ton of 2240 lbs. Representing the latest actual charters to Oct. 21st, 1881.

Table with 3 columns: Ports, From Philadelphia, From Baltimore, From Elizabethport, Port Johnson, South Amboy, Hoboken, and Weehawken. Rows include Alexandria, Annapolis, Albany, etc.

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

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Table with 10 columns: Lines, Inches, One Issue, 1 Month (4 issues), 3 Months (12 issues), 6 Months (24 issues), 9 Months (36 issues), 12 Months (48 issues). Rows include 1/4 Column, 1/2 Column, 3/4 Column, 1 Column, 1/2 Page, 1 Page, Full Page.

Double these rates for outside front, add 80 per cent for outside back page, and 50 per cent for page next reading matter.

DIVIDENDS.

OFFICE OF THE DEADWOOD-TERRA MINING COMPANY, No. 18 Wall Street, New York, Oct. 10, 1881. DIVIDEND NO. 11.

A dividend of \$30,000, being 15 cents per share, has been declared for September, payable at the office of the Transfer-Agents, WELLS, FARGO & CO., 65 Broadway, on the 20th inst. Transfer-books close on the 15th inst. H. B. PARSONS, Secretary.

OFFICE OF THE HOMESTAKE MINING COMPANY, No. 18 Wall Street, New York, Oct. 12, 1881. DIVIDEND NO. 38.

The regular monthly dividend of 30 cents per share has been declared for September, payable at the office of the Transfer-Agents, WELLS, FARGO & CO., 65 Broadway, on the 25th inst. Transfer-books close on the 20th inst. H. B. PARSONS, Assistant-Secretary.

NEW YORK, Oct. 3, 1881. THE STANDARD CONSOLIDATED MINING COMPANY to-day declared its regular monthly dividend of SEVENTY-FIVE CENTS PER SHARE, payable Oct. 12th, 1881, at the Farmers' Loan and Trust Co., 26 Exchange Place, New York.

Transfer-books close Oct. 5th, and open on 13th inst. M. R. COOK, Vice-President.

OFFICE OF EXCHANGE SILVER MINING AND MILLING CO., 54 Broad Street, Room 8, NEW YORK, Oct. 17, 1881. DIVIDEND NO. 4.

The Board of Directors have this day declared a dividend of three cents per share on the capital stock of the company, payable October 31st, 1881. Books close on the 27th, and reopen on November 2d. H. W. HOWELL, Treasurer.

HORN - SILVER MINING COMPANY, office, 44 Wall Street, New York, Oct. 15, 1881. The Board of Directors have this day declared a DIVIDEND OF \$300,000.

being three per cent on the capital stock, payable to the stockholders of record on the 15th of November next, at the office of the company. Transfer-books will be closed on November 7th, and reopened November 16th. W. S. HOYT, Secretary.

SAN FRANCISCO, Oct. 15, 1881. THE FATHER DE SMET CONSOLIDATED GOLD MINING COMPANY has declared DIVIDEND No. 14,

of twenty-five cents per share, payable at the office of Laidlaw & Co., 14 Wall Street, November 1st. Transfer-books will close 20th inst. H. DEAS, Secretary.

OFFICE COPPER QUEEN MINING COMPANY, 34 Thomas Street, NEW YORK, October 15, 1881. The Board of Directors of this company have this day declared a monthly dividend (No. 1) of TWENTY-FIVE THOUSAND DOLLARS, payable to stockholders on and after November 1st, 1881. Transfer-books close October 29th, and reopen November 3d. A. A. HAYES, Jr., President. L. ZECKENDORF, Secretary and Treasurer.

DIVIDENDS.

OFFICE OF THE STORMONT SILVER MINING COMPANY, No 2 Nassau Street, New York, Oct. 19, 1881.

DIVIDEND NO. 5.

The Board of Trustees have this day declared a monthly dividend of FIVE CENTS per share, payable on the first day of November, at this office.

The transfer-books will close on the 26th inst., and reopen November 2d. WILLIAM S. CLARK, President. JOHN R. BOTHWELL, Secretary.

OFFICE OF LA PLATA MINING AND SMIETING CO., OF LEADVILLE, COLO., 58 Broadway, Rooms 12 and 13.

NEW YORK, Oct. 20, 1881.

DIVIDEND NO. 26.—The Board of Trustees have this day declared a dividend of SEVEN AND ONE HALF CENTS per share (par value \$10) on the capital stock, payable on Tuesday, Nov. 1st prox., at the office of the company. Transfer-books will close on Tuesday, Oct. 25th and reopen Wednesday, Nov. 2d, 1881. Statement of the financial condition of the company: Working capital, \$10,000; Sept. 1st, 1881—Balance surplus account, \$59,509.98; Oct. 1st, 1881—Net earnings month of September, \$16,480.60. Total, \$175,990.58. Dividend of 7½ cents per share, 200,000 shares, \$15,000; balance Oct. 1st, 1881, \$160,990.58.

D. OLYPHANT TALBOT, Assistant-Secretary.

OFFICE OF CHRYSOLITE SILVER MINING COMPANY, No. 18 Wall Street, New York, Oct. 13, 1881.

A dividend (No. 10.) of

ONE HUNDRED THOUSAND DOLLARS,

or fifty cents per share, has been declared, payable on the 10th November proximo.

The transfer-books will be closed on the 26th October, at 3 o'clock P. M., and reopened on the 11th November.

HENRY C. COOPER, Secretary.

OFFICE OF THE GREEN MOUNTAIN GOLD MINING COMPANY, of California, No. 18 Wall Street, New York, September 13th, 1881.

DIVIDEND NO. 27.

The Trustees have this day declared a dividend of SEVEN AND ONE-HALF CENTS per share on the capital stock of this company for the month of August (being the 27th consecutive monthly dividend; and making a total to date of \$193,625), payable on the 26th inst.

Transfer-books close on the 19th, and reopen on the 26th of September.

J. JAY PARDEE, Secretary.

OFFICE OF THE CONSOLIDATED GOLD MINING COMPANY OF GEORGIA, 140 Nassau Street, New York, Oct. 19, 1881.

DIVIDEND NO. 6.

The Board of Trustees of this Company have this day declared, from the earnings for the month of September, a dividend of \$4000, being four cents per share on the capital stock, payable on and after the 22d inst., at the office of the Company as above.

Transfer-books close on the 20th, and reopen on the 24th inst.

S. NELSON WHITE, Secretary.

ROBINSON CONSOLIDATED MINING COMP'Y

DIVIDEND NO. 7.

NEW YORK, Oct. 1, 1881.

The Board of Trustees have this day declared the regular monthly dividend of Fifty Thousand Dollars, also an extra dividend of Fifty Thousand Dollars, making one hundred thousand dollars, payable on and after October 15th, 1881, at the office of the company, 18 Wall street.

The transfer-books will be closed from 3 o'clock P. M. of the 5th until 10 o'clock A. M. of the 17th inst.

JAMES K. SELLECK, Secretary.

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SPECIAL NOTICES.**SALE OF IRON MINING PROPERTY.**

The undersigned will sell at public auction, without reserve, at the Exchange Salesroom, No. 111 Broadway, New York City, on TUESDAY, October 25th, 1881, at 12 o'clock, by C. J. Lyon, auctioneer, the following property: Three leases of iron mining property situated in Rockaway Township, Morris County, N. J., known as the Green Pond iron mines.

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A lot of machinery, tools, etc., for working the mines. The iron ore from these mines contains very little phosphorus and has been used very largely for making Bessemer pig.

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CHARLES E. MAXWELL, Trustee in Bankruptcy of Green Pond Iron Mining Co.

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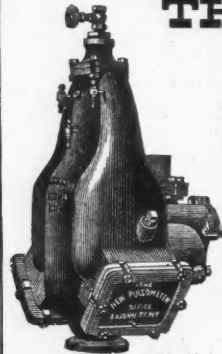
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OFFICE OF JOSEPH FIRMINICH, Steam Syrup Refinery, 1 to 25 Mortimer Street, and 386 to 412 Jefferson Street, BUFFALO, N. Y., May 16, 1881. PULSOMETER STEAM PUMP CO.: Yours of 14th received and noted. The No. 4 New Pulsometer (ball valves) is used for elevating thick solution of meal and water. The suction is six feet vertical, and it forces it through fifty feet of pipe at an elevation of thirty feet. It seems to work very satisfactorily so far. We shall want more of them in our works. Yours truly, J. FIRMINICH.

PULSOMETER STEAM PUMP CO.: GREENPORT, L. I., N. Y., May 6, 1881. In regard to the No. 3 New Pulsometer we purchased of you, we have to say that it gives us complete satisfaction, far beyond our expectations. It is used for pumping water into tanks for supplying steamboats. It stands 90 feet from well, raising the water 9 feet vertical and forcing it up 15 feet. We can cheerfully recommend it to any one in want of a pump for supplying water. Yours, etc., H. FORDHAM & SON.

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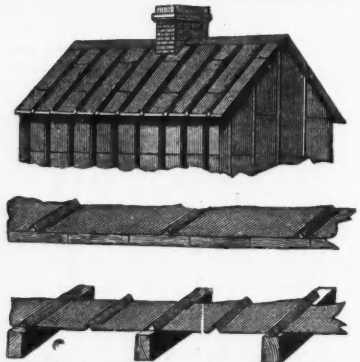
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