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CONTENTS.

PAGE.	PAGE.
Irrigation of Our Desert Lands..... 255	Thompson's Amalgamator and Separator..... 262
Petroleum Fuel in Roasting Furnaces. 255	New Insulating Material..... 262
Is There Still Another Harney Peak Deal?..... 255	Mineral Imports at El Paso, Texas..... 262
A New Style of Ore-Carrying Vessel..... 255	Giant Tree in California..... 262
The Nicaragua Canal..... 256	Workmen's Co-operative Stores in France..... 262
The Silver Market..... 256	American and Russian Oil in Bombay..... 262
The Mexican Trade Directory..... 257	The Arctic Iron Ore Mines of Norway..... 262
The Elements of Electric Lighting..... 257	Production of Coal in France in 1887..... 262
Preparatory Engines for Indication..... 257	New Method for Making Aluminum..... 262
Petroleum Fuel for Roasting Furnaces..... 257	Irrigation in India..... 262
Utilize the Waste Gases from Coke Ovens..... 257	Technical Education in England..... 262
Why Cornmen Do Less in Cornwall Than Here..... 257	Wiborg's Air Pyrometer..... 262
Mineral and Metal Production of Great Britain..... 257	Aluminum and Aluminum Alloys..... 263
Merrill's Process for Rendering Iron Incurable..... 257	An Artificial Volcanic..... 263
The Fontinettes Hydraulic Canal Lift..... 258	How Ants Live and Work..... 263
Related Letters—III..... 259	Dividends of Mining Companies..... 263
The Carlson-Bessemer Process..... 260	Books Received..... 263
Losses in Roasting Gold Ores and Volatility of Gold..... 260	Mining and Metallurgical Patents..... 263
Gold from British and French Guiana..... 262	Metallurgy of Steel..... 264
	Personals..... 266
	Industrial Notes..... 266
	Contracting Notes..... 266

MINING NEWS:	FOREIGN MINING NEWS.	BUILDING MATERIALS..... 271	London..... 273
Alabama..... 266	Canada..... 269	IRON: New York 271	Paris..... 273
Alaska..... 266	Colombia..... 269	Louisville... 271	San Francisco 275
Arizona..... 266	Mexico..... 269	Philadelphia 271	Boston..... 276
California..... 266		Pittsburg .. 271	
Colorado..... 266			FREIGHTS..... 270
Connecticut... 267	MARKETS:		FINANCIAL..... 272
Dakota..... 267	COAL: New York 269		MEETINGS..... 276
Michigan..... 267	Huffalo..... 269	MINING STOCKS:	DIVIDENDS..... 276
Montana..... 267	Boston..... 269	New York..... 276	ASSESSMENTS... 276
Nevada..... 268	Pittsburg... 269	Baltimore... 273	PIPE LINE CERT. 276
New Mexico... 268		Birmingham 273	
New York..... 268	METALS..... 270	Pittsburgh... 273	
North Carolina 268	CHEMICALS..... 270		
Pennsylvania... 268		Advertisers' Index..... xvii	
Texas..... 268			
Utah..... 268			
Wyoming..... 268			

IRRIGATION OF OUR DESERT LANDS.

Our recent remarks upon the subject of irrigation engineering have brought us some interesting communications, and in one of them we are reminded that the late HORACE GREELEY was one of the earliest apostles of irrigation in this country, and never failed upon every opportunity to show the advantages to be gained by irrigation even in the eastern portion of the United States. Indeed it would be difficult to fully measure the immense advantages that would result from an intelligent system of irrigation carried out in the dryer regions of the west and south, as advocated by Major POWELL, the director of the Geological Survey.

The immense areas in India that have been reclaimed from the desert and the prevention of the periodical famines that devastated many parts of that thickly settled land where the crops were injured or destroyed by long droughts, have shown that no other investment of money in that country has made so good a return.

On a smaller scale we can see in the Salt Lake Valley of Utah, the sagebush or alkali covered desert converted into the most productive garden in the land by the system of irrigation, which formed so important a feature in the administration of that far-seeing and able Mormon high priest, BRIGHAM YOUNG.

We have no doubt that a great portion of the Southwest could be made to "blossom as the rose" by the intelligent utilization of its present supply of water, and by the sinking of artesian wells for a further supply.

The literature of this branch of the profession is rather meager, but Mr. BOWIE's work on hydraulicking, and Mr. EDWARD BATES DORSEY's paper, read about a year ago before the American Society of Civil Engineers, are extremely valuable.

Mexico is also interested in this great subject, and many of its valleys offer extremely inviting investments for capital, where a moderate expenditure will produce large and permanent profits.

PETROLEUM FUEL IN ROASTING FURNACES.

A correspondent asks on another page whether petroleum fuel has been used in roasting furnaces. We are not aware of any works where it is in use for this purpose, but it has been proposed many times and a question of cost has been the only reason for its non-adoption.

It has long been used in iron melting and heating furnaces, in burning brick, and is now in use in a revolving cylinder furnace burning cement, and unquestionably will prove equally well suited for roasting furnaces.

It is usual in heating or reducing furnaces to blow the petroleum into the combustion chamber by a jet of steam, but in roasting it would be better to use an air-blast furnished by a fan and in a properly constructed combustion chamber, so as not to lessen the oxidizing quality of the atmosphere.

As compared with coal or wood, where cost does not interfere, the use of petroleum in roasting furnaces offers many advantages. The heat is absolutely under control and the labor account is lessened; also, in some cases, the ashes of the fuel which is carried into the ore is a disadvantage in its subsequent treatment, so that there are quite sufficient advantages in the use of the liquid fuel to justify its adoption where, as stated, its cost will permit.

As a measure of relative values of coal and petroleum, we may cite the fact that in Cleveland, Ohio, it requires from 2000 to 2800 pounds of nut coal to puddle a ton of iron, according as the double or single reverberatory furnace is used. With coal at \$1.25 per ton, this would represent a cost of, say, \$1.30@1.40 per ton of iron; while at Pittsburg it is claimed that with fuel gas made from petroleum the cost of fuel per ton of iron is less than 50 cents per ton.

IS THERE STILL ANOTHER HARNEY PEAK DEAL?

We note a strange conversion on the part of one of our contemporaries, the London *Mining Journal*, with regard to the value of the tin prospects in Dakota, or the prospects of success of the new Harney Peak Tin Mining Company, which, we gather, is again to be launched on the financial sea of London.

We say "strange conversion," because when the former attempts were made to raise the enormous capital asked for this enterprise, there was none of the English press more emphatic than the *Mining Journal* in condemning the scheme and warning the public against it. It can hardly be the extraordinary report of Professor VINCENT, on which we commented in our issue of September 15th, that has brought about this change and still less the reports of two of his co-commissioners (the third commissioner is not mentioned), both, no doubt, very respectable gentlemen, who do not even presume to offer an expert opinion on the value of the tin deposits in question. In their reports, necessarily everything that should carry any weight is only second-hand, as they had to depend upon what they were told, and could form no opinion of value from what they saw.

It seems as if still another effort were about to be made to place this property in London, and as a sample of the wild statements made to prepare the gullible public to lend their invaluable aid, it is gravely asserted that "It is not unlikely that in the regular working of the tin deposits of the Harney Peak district sufficient gold will be obtained to cover all outlay for mining and marketing, so that the tin will virtually be obtained for nothing."

It is almost unnecessary to say that no such value has yet been proven in these ores, and it has never been even claimed when \$10,000,000 was spoken of as the value of the property.

It is but fair to the former editor and the assistant editor of the London *Mining Journal*, who recently resigned their positions, that they disclaim any responsibility for the change of front which the *Journal* has made since they left it.

The Harney Peak Company should consolidate with the Keely Motor, which has promised its stockholders almost as much and given them just as little for their money.


A NEW STYLE OF ORE CARRYING VESSEL.

The Cleveland *Iron Trade Review* describes and illustrates a novel ore-carrying barge for the lake trade.

As is generally known, the tonnage engaged in carrying ore and coal on the lakes amounts to about 570,000 tons, of which about 300,000 tons

are steamers and 270,000 tons sailing vessels, which are towed by the steamers and only hoist sail when the wind is favorable. The masts, sails, and the necessary shape of a sailing vessel present objections in a vessel destined to be towed altogether, which are not compensated for by the occasional use of the sails.

Mr. ALEX. McDUGALL, of Duluth, has designed and built a vessel specially intended for this trade, and its use in carrying coal and ore between Cleveland and the Michigan ore shipping ports this season, since July last, seems to have demonstrated that it possesses many important advantages over the old style vessel.

This new ore carrier is shaped under water something like an ordinary lake vessel. That is, its bottom is nearly flat, but its bow is spoon shaped. In place of the ordinary deck, the upper part of the vessel is rounded, and the midship section is almost a semi-circle, thus . Near each end of the vessel is a tower which rises about 13 feet above the water when the vessel is loaded, and serves as a deck for the steering gear and to carry the lifeboat.

A hand railing runs from end to end of boat on top of the rounded deck, and in fine weather men can use it. In bad weather a passage way under the deck has to be used. When the vessel is loaded the top of the rounded deck is about 5½ feet above the water.

It is found that this vessel rolls very little, is much easier towed than the ordinary sailing vessel; rides easily at anchor in any weather, requires very few hands to man it, and from its construction is very easily loaded and unloaded, and costs far less to build and is less liable to damage than the ordinary sailing vessel. It is, in fact, absolutely fire-proof.

The vessel which has been running since July last has the following dimensions: Length, 178 feet; beam, 25 feet; depth, 18 feet; carries 1000 tons cargo on a draft of 12½ feet, and is built throughout of steel, of which only 200 tons was required in her construction, though her frames and plating are heavier than those of any other vessel of her size on the lakes.

The hatches are made of a single plate of steel about 8 feet square, and are perfectly watertight. They are easily slid fore and aft, so that one half of the top of the boat is formed of hatches and the cargo can be dumped in and requires very little trimming. This arrangement also offers great facilities in unloading.

On the whole the boat seems to have proved a great success, and it will certainly lessen the cost of transporting coal and ore, for it requires much less investment and lower running expenses for a given freight capacity than the old style vessels.

THE NICARAGUA CANAL.

In our remarks upon the Panama and Nicaragua canals in our issue of August 25th, we scarcely touched upon the commercial aspect of the latter enterprise. As, however, it is a question of vast national importance, we reproduce here some of the figures and statistics that have been gathered from entirely reliable and official sources, and which have a direct bearing upon the solution of the problem of improved communication between the eastern and western waters of America. In the first place, with regard to the cost of the canal. In the early part of this year it was stated that detailed estimates of the cost of construction had been examined and accepted by eminent engineers in this country and in Europe, placing the cost at \$65,000,000. Since then we are assured by Mr. MENOCAL, the engineer-in-chief of the undertaking, that the modifications found practicable in the re-survey recently completed will effect a saving of at least \$10,000,000 upon these first estimates, and from the nature of these modifications, as explained to us by Mr. Menocal, we can readily understand and believe that this is so.

The Canal Company, by its concession from the Government of Nicaragua, has a grant of 1,000,000 acres of land, which should prove a valuable asset after the completion of the work. Statistics of the United States Treasury and other Government Departments, and the statistics of foreign Governments, agree that if the canal were now open there would be a traffic of 4,500,000 tons and this probably will be largely increased, to perhaps 5,500,000 or 6,000,000 by the time the canal can be opened. So that with tolls considerably less than those on the Suez Canal there would be ample revenue for the maintenance of the canal and for interest on the investment. To take credit for the whole of this traffic is of course to assume that the Panama Canal will never be completed, and indeed, unless the French Government takes up the bankrupt concern and completes it with national funds—which is not likely, as the public debt of France is already a burden almost past bearing—this will probably be the fate of this unfortunate enterprise. If, however, the Panama Canal by any chance should be completed, and come into competition with the Nicaragua route, the latter being so much more advantageous in situation, and from the smallness of its capital

being able to charge so much lighter tolls, it is certain to command the bulk of the traffic.

One manifest advantage that the Nicaragua Canal will possess over its rival of Panama is the proved healthiness of its location, while, as we all well know, Panama has a frightful record in this respect. The large surveying force recently employed on the Nicaragua survey, and the permanent staff now at work, though exposed in every way and undertaking work which would involve every risk to health that the climate possesses, has been singularly free from even the common fever attack, which usually result from such work and exposure in tropical countries.

Another very manifest advantage of the Nicaragua route is that the harbor of Brito, on the Pacific, can be approached by sailing ships at all times in the year, while Panama, on the same coast, for many months in the year is only accessible to steamers, owing to protracted calms, which would entail impracticable towing for sailing ships for some 500 miles.

A striking illustration of the influence of this calm belt surrounding Panama upon the shipping trading to that port, is shown by the figures of tonnage in a semi-official report by Mr. JULES CH. ROUX, Delegate of the Marseilles Chamber of Commerce, in 1886, which gives the entrances and clearances at Panama, exclusive of coasters, for the year 1885, at 367,513 tons, and at Aspinwall for nine months from January to September, 1885, at 753,129 tons. Out of these 367,513 tons on the Pacific side there were only 18 sailing vessels of 17,622 tons in the whole year, while in the nine months on the Atlantic port of Aspinwall the sailing vessels numbered 604, of 106,234 tons. This seems conclusive testimony condemning the availability of Panama for sailing vessels.

THE SILVER MARKET.

A decided improvement in value has recently taken place in silver. The rise from the lowest point reached, is about 5 cents an ounce, and this has occurred during the past month. This represents about \$2,200,000 on the production for the year, which will probably reach if it does not exceed 44,000,000 ounces. It is to be hoped that the silver mining companies will now share in some degree with the copper companies better remuneration for their investments. Take the Granite Mountain Company, for instance; this improvement of 5 cents if continued would mean an increase of about \$170,000 in the net profits on the years production. The Leadville, Colo., mines will receive the lion's share.

It is perhaps worthy of note that this rise has followed an advance in value of most descriptions of produce, whereas in the past its increase in value has generally preceded the improvement in price of produce. The importance of this advance in the price of silver depends on whether it is due simply to speculation, or whether it has some more tangible and durable foundation. The short European crops must create, or, to be more accurate, have already created a greater demand than usual for wheat from all quarters, including British India, and at higher prices, and the increased sum to be paid for the Indian crop must be provided for, to a great extent, in silver.

Then again China, towards which country the eyes of the whole silver producing world have long been turned as a very important market for the metal, is beginning to open its gates to the pressure of modern progress, and from being simply "ajar," they may soon fly wide open and invite the world to build its railways, open its mines and create metallurgical works of every description. We are not at all convinced that the exploration of China's great natural mineral resources, and the development of manufacturing by its countless hosts of industrious, intelligent and frugal inhabitants will be of benefit to the industries of other parts of the world; but while these improvements are being made China will certainly afford a large market for silver, and as our total exports of the metal last year exceeded our imports by only about \$9,000,000, the price of the metal may well be maintained at or above its present level.

Our exports of silver exceeding our imports by so small an amount, comparatively speaking, a new market might easily absorb our surplus and thus advance the markets of the world. The indications, though not conclusive, yet lead us to hope that for a time at least the downward course of the silver market has been arrested.

It can not, of course, be expected that the coinage standard of \$1.2929 per ounce will ever again be reached; but it is something to be able to feel that the bottom has been reached for the present, and that somewhat better prices may come in the future. The importance to the Indian government of any improvement in the price of silver was shown by the Under Secretary of State for India in the House of Commons in 1886, when he pointed out that a fall of one penny in the rupee (equal to about four cents on the ounce) entailed a loss of about £1,000,000 on the Indian Treasury each year.

In addition to this, the mere natural reaction from the heavy depreciation that silver has suffered from for so long, would be something to go upon, though it is hopeless to expect a return to anything like the coinage standard. We referred in our issue of September 8th to the influence of the exchange transactions between the English and Indian Govern-

ments, and statistics lately published show that the seven principal banks of Europe then held about \$445,000,000 in silver, constituting nearly one half their metallic reserve.

NEW PUBLICATIONS.

THE MEXICAN TRADE DIRECTORY. By Ramon V. Williams. New York. Price, \$2.

This Directory is the first of its kind, and though, of course, somewhat imperfect, from the nature of the work undertaken, as might be expected in a first edition, yet it contains a list of names and addresses most useful to any one having business relations with Mexico. The author, who is Chancellor of the Mexican Consulate in this city, has prefaced the Directory proper, by some very pertinent and useful remarks on the right method of doing business with Mexico, and he gives as well a great deal of miscellaneous information, appropriate to the matter in hand.

THE ELEMENTS OF ELECTRIC LIGHTING. By Philip Atkinson, A.M., Ph.D. D. Van Nostrand, New York.

This work is a comprehensive treatise in plain language, on everything connected with electric lighting, and for this reason (the absence of technicalities) is particularly suited for the use of business men, and those who have the care and management of dynamos and lamps. It seems to be very complete, and deals not only with lighting, but with the generation, measurement, storage and distribution of electricity. The information on the subject of dynamos and their two classes is very full, and, like the rest of the work, embraces all that is necessary to know about them for practical purposes.

PREPARING FOR INDICATION. By Robert Grimshaw, M.E. New York. Price, \$1.

This is a handbook of instructions to enable an intelligent engineer to get ready his engine in the simplest way for indication, and by following them the attachments should be such as to give correct cards. The directions seem to cover all possible cases and are the result of the author's practical experience.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Intials only will be published when so requested. All letters should be addressed to the MANAGING EDITOR. We do not hold ourselves responsible for the opinions expressed by correspondents.

Petroleum Fuel for Roasting Furnaces.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In many localities the growing scarcity of wood is the chief difficulty encountered in chloridizing roasting. It is true, also, that this scarcity of wood is most frequently found along the lines of railroad where the requirements for domestic uses have been greatest. The price of petroleum in Colorado is now so low that it occurs to me of great interest to know why it cannot be used for fuel in roasting. I know that a number of experiments have been made in the way of supplying it through a jet under pressure for other purposes, and I would be under obligation to you if you could inform me whether complete or partial success has ever been met in attempts to chloridize roast with petroleum.

Very respectfully,
WALTER C. HADLEY.
LAKE VALLEY, New Mexico, Sept. 17, 1888.

Utilize the Waste Gases from Coke-Ovens.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your editorial on "New Uses for Electric Motors" in the JOURNAL of September 1st, your reference to the enormous waste of power going on in all our coking districts by letting the surplus gases escape unused, is in the right direction. The full enormity of the thing can only be seen perhaps by showing the equivalent of coal which is wasted in this way. A local authority in the Connellsville region estimates that the output of coke for that region was 102,000 tons of coke for the week ending June 2d, 1888, for which an estimated 163,000 tons of coal was used; that such a quantity of coal is at least 10 per cent below the actual quantity used has been shown to demonstration in the JOURNAL during the last two years, but for present purposes it may stand.

Now we know that even pretty dry coals are coked which contain only 10 to 12 per cent of volatile matter (of course, this is not done in the venerable beehive), therefore, the surplus of gas of coal containing more than that quantity is wasted. As Connellsville coal has about 30 per cent of gas, 18 per cent of this is wasted; the equivalent in tons of coal wasted for the week ending June 2, 1888, is therefore, taking their own estimate of coal used, 19,560 tons, or 978 car-loads of 20 tons each! That is the waste of power for one week in the Connellsville region alone!

I believe it will be too much to expect that our coke makers will take the initiative in a reform. Why will not our ironmasters, who often profess to be so hard pressed, take the matter in hand, buy the coking coal instead of the coke, use rational modes of manufacture, save the surplus gases and apply them for some of the purposes indicated by you?

WEST VIRGINIA, Sept. 18, 1888. PROGRESS.

Why Cornishmen do so much Less in Cornwall than Here.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Permit me to give an additional reason for "the undoubted fact that we in our mines accomplish fully three times as much to the man per day as they do in Cornwall," one that was given to me in a conversation on this subject with a Cornish-American.

He stated, in substance, that it is a sort of religion with "old country" miners to "steal time." They even carry it so far as to "pray the Lord" to give them an opportunity to do so, and as an illustration of this feeling on their part my friend related an instance that occurred years ago when he went to see the foreman of a certain mine in Colorado. Briefly, it was necessary for him to go into the mine to find the

"captain," and coming unexpectedly upon a gang of miners he found them smoking instead of working. Upon expostulating with them for taking \$4 per day from a company that was struggling hard for existence, and then "stealing time," one of the Cornishmen replied, "Cap'n, if the Lord give we a chance to steal time we be goin' to do it."

In Cornwall the miners seem to understand that three shillings per day is all they will be permitted to earn; for if by an exhibition of energy they should manage to earn five shillings they well know that on next "setting day" their contract would be "set" to them at a price that would permit them to earn but two shillings a day, or less. The captains of the mines know so well what constitutes a day's work that, in some instances, contracts are "set" for but two weeks for fear the men might strike some soft ground, on nearing a cross-course for example, and thereby earn more than the usual amount, or else have too easy a contract. Therefore, being deprived of an incentive to work harder, they go to the other extreme and endeavor to do as little as possible to obtain their daily stipend, and hence their disposition to "steal time" when employed by the day.

When a Cornishman comes to this country he is comparatively worthless on account of these "old country" ideas, but as soon as he acquires the energy that is so pre-eminently characteristic of the American people, and finds that he must put in his "best licks," his "skill in his elbows" places him at once in the front ranks of our miners. W. DE L. B.
32 LIBERTY STREET, Sept. 26, 1888.

THE MINERAL AND METAL PRODUCTION OF GREAT BRITAIN.

The British Blue Book has just been issued, giving the mining and mineral statistics of Great Britain for the year 1887. This report is much more voluminous than usual and contains a vast amount of valuable information. At present we have space for only the following summary of the mineral production of the United Kingdom for the years 1887 and 1886: The production of coal still continues to increase, and has reached the enormous amount of 162,119,812 gross tons. This forms much more than half of the entire value of the mineral products. The total "spot" value of the minerals raised in 1887 was £55,326,164, or, say, \$376,000,000, or a little more than half the spot value of the mineral and metal production of the United States in 1887. To make the comparison closely, however, the values of the metals should be taken and the values of their ores deducted from the aggregate figures. This would make the value of the British minerals and metals perhaps \$300,000,000, as compared with \$538,000,000, the value of the mineral products of the United States.

England will for many years continue to lead the coal output. She also sets an example of promptness in publication in this present volume, which we would commend to "the powers that be" at Washington.

MINERAL PRODUCTION OF GREAT BRITAIN.

DESCRIPTION OF MINERALS RAISED.	1886.		1887.	
	Quantity.	Value at mines.	Quantity.	Value at mines.
Alum clay (bauxite).....	8,262	2,478	4,169	1,040
Alum shale.....	2,992	374	2,588	323
Arsenic.....	5,027	32,807	4,618	32,458
Arsenical pyrites.....	4,918	7,749	4,364	3,205
Barytes.....	25,142	25,818	24,813	26,619
Bog iron ore.....	6,780	2,72	9,273	4,836
Cays (excepting ordinary clay).....	2,390,440	58,1210	2,413,693	590,412
Coal.....	167,118,930	38,145,930	162,119,812	39,092,830
Cobalt and nickel ore.....	100	526	154	900
Copper ore.....	18,205	38,567	9,079	20,942
Copper precipitate.....	412	2,831	280	3,075
Fluorspar.....	279	412	283	385
Gold ore.....			1776	209
Gypsum.....	118,748	44,462	120,765	48,293
Iron ore.....	14,110,013	3,513,515	13,098,041	2,235,355
Iron pyrites.....	27,829	16,575	22,079	12,082
Jet.....	4,870	934	1,418	289
Lead ore.....	53,420	471,295	51,563	429,137
Lignite.....			1,784	733
Manganese ore.....	12,763	10,893	13,777	11,110
Ochre, amber, etc.....	12,392	22,185	8,293	15,783
Oil shale.....	1,728,503	435,962	1,411,378	355,085
Petroleum.....	43	129	66	99
Phosphate of lime.....	20,000	31,500	9,694	15,830
Salt.....	2,142,220	742,178	2,193,851	732,320
States and slabs.....	456,208	1,107,169	464,334	1,118,818
Stone, etc.....		8,917,705		8,609,600
Sulphate of strontia.....	13,602	5,750	15,169	7,584
Tin ore.....	14,232	780,372	14,189	878,831
Tungstate of soda.....	11	273	1	24
Wolfram.....	140	2,236	54	1,289
Zinc ore.....	23,156	63,759	25,445	76,182
Total values.....		\$55,010,231		\$55,326,164
Copper.....	1,472	65,507	889	42,850
Gold.....			58	210
Iron.....	4,967,574	11,259,834	4,708,994	11,000,000
Lead.....	39,482	523,650	37,890	486,826
Magnesium.....		1,320		1,000
Silver.....	325,427	63,511	320,345	59,594
Tin.....	9,312	944,470	9,282	1,048,633
Zinc.....	8,988	141,135	13,042	20,596
Total values.....		\$12,997,847		\$12,849,739

Meritens' Process for Rendering Iron or Steel Incorrodible.

The following method for burnishing iron and steel by means of the electric current was communicated by A. de Meritens at a meeting of the International Electric Society in Paris. The layer of oxide on the surface of the metal is obtained by placing the same as anode in a bath of common or distilled water. The sides of the vessel holding the liquid, or a piece of iron, copper or carbon, are used as cathode. The temperature of the water is kept at 160 degrees to 175 degrees F. The electromotive force must be just strong enough to decompose the water, as a current which is too strong gives a dusty layer which is not permanent. Under the action of the oxygen liberating at the anode, a layer of a black oxide (Fe₃O₄) forms on the metal. This layer can be easily polished, steel giving the best results, while on cast and rod iron a more dusty layer is obtained, though the use of distilled water makes the polish permanent.

THE FONTINETTES HYDRAULIC CANAL LIFT.

The question of canals as a means of transport of heavy goods is so prominently before the public, that we reproduce from our admirable London contemporary *Industries*, an illustration of the above interesting hydraulic work, and condense the following description from its columns:

The site of this lift is close to the town of St. Omèr, on the highway canal between Dunkerque, Calais, and Paris, and which has, therefore, a very considerable traffic. At this point, the canal makes its first important change of level, rising from the flat "Wasserinques," which are virtually at the sea level, to the plateau of Aa. The difference of level is 43 feet, and the old canal surmounted this by a consecutive chain of five locks. The time lost by this was very serious, and the government determined to increase the accommodation. The particular formation of the ground was extremely applicable to a lift; and after carefully examining Mr. Edwin Clark's hydraulic canal lift at Anderton, on the Weaver, the engineers recommended the adoption of a similar lift, but on a larger scale, for the Neuffossé Canal. The French Government accordingly entered into an agreement with Mr. Edwin Clark, who was then in partnership with Messrs. Starfield & Clark, of 6 Westminster Chambers, London, by which these gentlemen were to make the designs for, and superintend the erection of, a hydraulic canal lift, large enough to accommodate the maximum size of barge capable of navigating the French large section canals. These barges are 126 feet long, 15 feet broad, and draw about 6 feet of water. The pontoons or troughs which must accommodate them, and which may be considered to be the lock proper, were, therefore, constructed 129 feet 7 inches long by 18 feet 4½ inches broad, and deep enough to carry 6 feet 6½ inches of water. For purposes of description, we cannot do better than consider the lift as a lock made of iron instead of stone, and supported on a single central hydraulic press instead of being sunk in the ground, and closed at each end with lifting instead of swinging gates.

The iron pontoon is supported by longitudinal girders, and these in their turn by transverse girders, which rest on the head of the ram. There are two of these troughs or pontoons, each supported on its own press and ram, and as one goes up, the other descends. They, therefore, counter-balance each other, and the only work to be done is that required to overcome friction and compensate for the extra weight of the protruding ram. Both the upper and lower canals are divided into two branches, corresponding to the two troughs; and, like the troughs, they are closed by means of lifting gates. We have then a low level canal closed by a movable gate, a section of canal (the trough) closed by movable gates at each end, and capable of being raised as a whole, and a high level canal, also closed by a movable gate.

In our illustration one trough is at the top level, and is virtually a continuation of the high level canal; the other trough is at the bottom of its course, and forms a continuation of the low level canal, the gates of the two latter are lifted, and a barge can be seen entering the trough. When the barge is in position, the two gates are lowered, and the trough becomes an isolated tank. The same operation is performed at the upper trough, which thus also becomes an isolated tank. If to one of these tanks a preponderance of weight be given, it is clear that on effecting a communication between the two presses, it will commence to fall, forcing up the higher one. The superiority of weight is insured by stopping the rising pontoon a little before it arrives at the level of the top canal, so that when the gates are opened it receives about 16 inches more than the normal depth of water. This surcharge is run off when the pontoon returns to the lower level by stopping it 16 inches too high, so that on opening the gates the extra water runs away. This surcharge of 16 inches, equivalent to 80 tons of water, is all the power that is theoretically required; and the single communication valve between the presses all the machinery required; but, in practice, the engineer does not always succeed in stopping his lifts at exactly the spot he requires, and there is leakage to be compensated for, so that there has been provided a small accumulator, which is worked from a turbine taking its feed water from the upper level. The pressure given by the accumulator is also used to work the gates that close the canal and the pontoons, and to pump out the leakage that accumulates in the dry pit into which the pontoons descend.

The manner of construction of the presses and rams deserves some consideration. Regarding them as a column, they required to be of a large diameter to support a weight of nearly 800 tons at a height of 43 feet, and the size was therefore fixed at 2 meters (6 feet 6½ inches) diameter. They were constructed of cast-iron 2½ inches thick, and built up of sections about 8 feet long bolted together. The top is finished with a square capital, strengthened by brackets, on which rest the transverse girders that carry the pontoon. The actual weight supported, including the pontoon and its contained water and the weight of the ram itself, is 765 tons; this gives a pressure of 25 atmospheres (372.5 pounds per square inch) in the presses. A press of that diameter of cast iron would require a thickness of 6 inches, and be a somewhat heavy casting. After numerous trials with presses of different designs, it was decided to make the press of rolled weldless steel hoops, 2½ inches thick and 6 inches wide; these are stepped one into the other, and vertical angle irons and bolts bind the whole together, not unlike the tightening strings of a big drum. Water tightness of the whole has been insured by lining the cylinder throughout with copper 3 mm (⅛ inch) thick. The press is placed on a solid masonry bottom, so that the weight is taken directly by the ground. The total length of the press is 49 feet 2 inches, while the stroke, that is the height of the lift, is 43 feet 1 inch; so that a good length of ram always remains in the press.

The presses are contained in cast-iron cylinders of large size, so that free access can be had to all parts of the press. These cylinders, owing to the water bearing nature of the ground, had to be sunk by compressed air.

A difference from the Anderton lift (which was the first designed by Mr. Edwin Clark) is found in the manner of guiding the pontoon during its ascent and descent. At Anderton the trough was guided at the four corners, but here central guides are used, as with the cross-head of an engine. The guide blocks are of great length (about one-fourth of the whole height lifted) so that the trough rises and descends with the greatest smoothness. These central guides are supposed to take only any

direct longitudinal push or tipping of the pontoon, whilst the tendency of the pontoon to turn centrally on its ram owing to wind pressure, is met by side rubbing pieces placed at the upper end of the lift; the lower end of the same being entirely unguided, and projecting freely into the air. The central guides are carried by the solid brick and masonry towers shown in the engraving. Brick was also used with a stone coping for the construction of the dry pits. The cabin in which the engineer works his valve levers is placed on the middle one of the three central guide towers. The valve levers are thus directly over the valves themselves, and the arrangements are of the utmost simplicity. These consist of a wheel working a large central valve governing the communication between the two presses; a lever on the right hand which, by either putting over or pulling to, admits water from the accumulator into, or allows water to flow from, the right hand press; and a similar lever on the left hand performing the same functions for the left-hand press. These three constitute the whole of the valve gear of the apparatus.

By means of speaking tubes the engineer can communicate with the lower and upper canals and the turbine room. The building that contains the turbine is placed between the two lifts, and extends from the middle tower to the buttress that supports the aqueducts. It contains a 50 horse-power horizontal turbine geared with four pumps, which may be used together or separately. These feed an accumulator of a capacity equal to a stroke of 16 inches in the great presses. A separate small turbine is used for pumping out the waste water and leakage from the dry pits, and for driving a small air compressor.

We have spoken of the trough becoming part of either the upper or lower canal. It is clear, therefore, that some sort of water-tight joint has to be made between them, as otherwise all the water would escape as soon as the gates were lifted. The joint is made in the following manner: An india-rubber hose runs round the end of the aqueduct, and when the pontoon is brought opposite, the hose is inflated with an air pressure of about 22 pounds per square inch, and is squeezed against the end of the pontoon, and thus, by filling up the narrow space between the ends of the aqueduct and the trough, makes a water-tight joint between the two. Both the pontoon and the canal are terminated by separate gates, which are, however, both worked by one action. When the pontoon arrives at the top level, the man in charge there, after making his air joint, hooks the two gates together; he then starts a small hydraulic press situated in the overhead frame work, and the two gates are lifted together and the boats are free to enter or leave the pontoon. The action of hooking the two gates together also opens a sluice in the gates and allows the space between to fill with water, thus making the pressure the same on both sides. The height that the gates are lifted clear of the water is 14 feet, this being the minimum regulation height fixed for all permanent structures over the French canals.

The actual number of hands employed at the Fontinettes lift is four—an engineer at the valve house, one assistant placed at the top level between the two canals, who looks after the making of the joint and lifting of the gates of both the upper canals; a third hand who performs similar duties at the lower level, and an assistant in the engine room to look after the turbine and pumps. This man might be dispensed with and the turbine made to work automatically; but the traffic through this lift is so great that the engineer has no time to even occasionally see to his pumps and general gear. The actual quantity of water used in each operation is from 80 to 90 tons, neglecting that used by the turbine for lifting the gates; for this amount one boat of 250 tons can be raised 43 feet, and one lowered the same distance. This compares very favorably with the amount that would be required for a lock 180 feet long by 18 feet, with 43 feet fall. The actual time required for the up and down movement of the trough is from five to seven minutes. Taking into account the time required to haul the boats into and out of the pontoon, make joints, shut and open the gates, etc., the whole time occupied amounts to only twenty minutes. But even this could be shortened by using hydraulic capstans. For instance, in a similar lift in Belgium, boats of 400 tons pass through a lift of 50 feet in fifteen minutes all told. Even at the Fontinettes, supposing the canal working at its fullest capacity, three boats of 250 tons each can ascend and three descend in an hour, which makes 1500 tons an hour; and working for ten hours daily, 15,000 tons. Taking the working days at three hundred, we thus see that 4,500,000 of tons per year could pass through this lift. In the Belgian lift, where the boats are 400 tons and the time fifteen minutes, no less than 9,600,000 tons could be passed in a year.

The importance of this fact can scarcely be overrated. If by using lifts the carrying capacity of a canal is doubled, it follows that the canal pays double interest on its capital, leaving out of the question the advantages of a more rapid carriage of goods.

It is somewhat difficult to effect a general comparison of the cost of these lifts with that of locks. In Belgium, however, where four lifts (one of which is completed) are being constructed on a new canal, it is possible to compare their cost with that of the locks on this particular canal. Taking everything into account, the Louvière lift of 15 meters (50½ feet) cost 1,300,000fr. (£52,000). The cost of a 5-meter (17 feet) lock on the same canal is 500,000fr. (£20,000). Supposing the 5½-foot lift to replace three of these locks, there would be a saving of 200,000 francs by the lift. These prices are undoubtedly high, but it must be remembered that they refer to government work of great solidity and excellent finish. In Belgium the saving is greater than this; there are in all four lifts, overcoming a difference of level of 200 feet, the estimated cost of which is £208,000. It would require thirteen of the largest size of locks to replace these lifts, the estimated cost of which would be £250,000. This estimate, it must be remembered is for double lifts; but for locks which would insure the same rapidity of transit through the locks as exists through the lifts, double locks would be required at a vastly increased cost.

A few details of this Louvière lift, which is also just finished, will be interesting. It is larger than the French one we have above described, the troughs being 141 feet 1 inch long by 19 feet 0½ inch broad, with 7 feet 10½ inches depth of water. The rams are 6 feet 6½ inches diameter, but the stroke is 50 feet 6½ inches. The presses are also different. Each press consists of a cast-iron lining 4 inches thick, hooped with contiguous

steel weldless rings 2 inches thick. These rings are carefully shrunk on, so that with the normal working pressure no strain whatever falls on the cast iron. The total weight supported on the press is 1037 tons, which gives a working pressure of 32 atmospheres, or 476.8 pounds per square inch. The system of guiding is identical, but the guides are carried by wrought iron lattice instead of masonry towers. The joint between the pontoon and the canals is made by means of an iron wedge with india-rubber faces instead of the inflated hose. The gates are lifted by hydraulic power from an accumulator worked by turbines. Hydraulic capstans are provided, so that two boats of 400 tons each can be passed in fifteen minutes, one each way. The actual time of the up and down movement is two and a half to three minutes.

It is worthy of note that these enormous structures, which are by far the largest hydraulic machines in existence, derive their power entirely from the canal, and not from the consumption of coal. There is not even one steam engine used in connection with either of them.

BELATED LETTERS.—III.

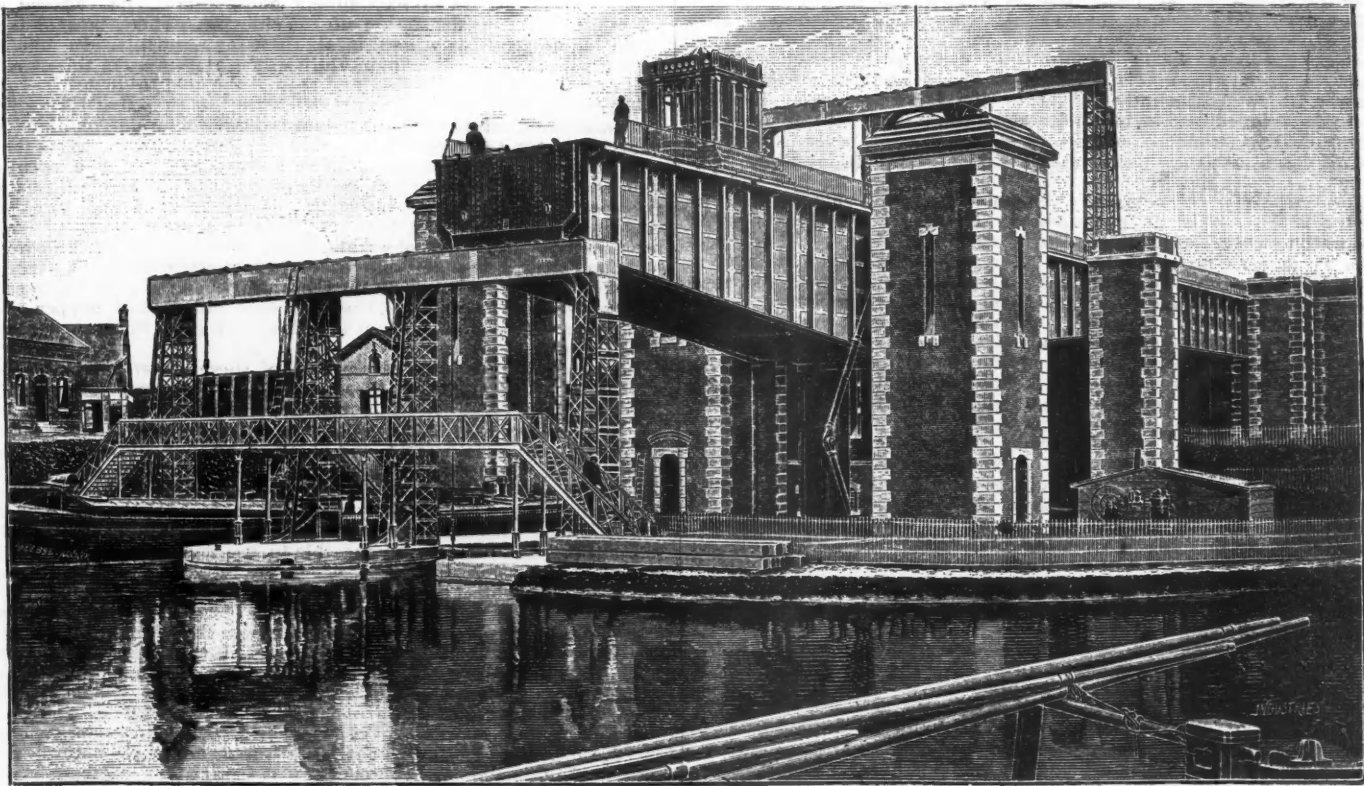
In the North Carolina Mountains.

This letter should be dated somewhere in the dim past. For the Birmingham meeting and its sequences are already receding beyond the horizon. The papers thereof have all been got into print—thank goodness!—the letters of thanks for cordial hospitalities (and a big pile they

difference between the Savant, sitting A. D. 1888, in a lonesome, chilly midnight, on a bench beside the rail, and a Savage, similarly seated, A. D. 1788, on a stump beside the trail? None, I say: for the time being, Civilization is a failure.

But the next day, we were again *en rapport* with the congenial Nineteenth Century, exemplified in the Kimball House, and the next night we spent in the quiet luxury of Marietta, home of elegant leisure "befoh de waw," and not yet wholly turned over to the noisy bustle of the New South, though doubtless tending that way. Old Kennesaw, not far away, looks down with sleepy surprise upon the goings-on at his feet. Having been once waked up by the boom of cannon, he finds these real estate booms less startling, though not less mysterious. Presently they will run a railroad up his nose, and sell town lots on the crown of him. Then he "may not look so pretty, but he will know more."

On the following day we traveled by the Marietta & North Georgia railroad to Murphy, N. C. This is—or was, in the remote period (last May) of which I write—a narrow-gauge road. But there is little use in recording such transitory facts. It is broad-gauging or broad-gauged already, and has met the extension of the Western North Carolina road, coming from Asheville through Red Marble Gap (or if they haven't met, there is no reason why they shouldn't), and thus one of the most picturesque of railroad journeys is made complete. There could be no lovelier approach to the magnificent amphitheater in which Asheville lies, than the mountain-circled plateau of the Hiwassee, the precipitous pass at Red Marble Gap, the cañons of the Little Tennessee and the Tuckesegee, and the tremendous summit between them and the French Broad. But nobody



THE FONTINETTES HYDRAULIC CANAL LIFT.

made!) have been written and sent and handsomely acknowledged; the Buffalo meeting draws near apace, and this one final epistle is only a remnant rescued by memory from that fugitive thief, the Past. Let the reader conceive it to be yellow with age, and fragrant with odors of flowers long faded—a manuscript found in an antique secret drawer, or in a bottle bobbing on the sea, or in a copper cylinder, or in the pocket of a second-hand coat, or in the "Postponed" pigeon-hole of Rothwell's sanctum, or in any other nook of comfortable temporary oblivion.

I left off, last June, talking about the prosperity, beauties and delights of Anniston. There was much more to say: but I cannot say it now. Death has stepped in, to break the continuity of my thought, and overlay with a new, strange shade the colors of the picture, recently so bright. When I think of Anniston now, it is to recall the pervading and controlling spirit which seemed to us to incarnate the history and glory of the place, and which has now departed from earth. The brief tribute to Mr. Noble, which appeared in this JOURNAL a few weeks ago, not only expresses my sincere regard for him and sorrow at the loss of him, but is also indirectly an explanation of the interruption of these "belated letters." For a little while, it seemed as if I could not go on with them.

But go on we must, in literature as in life. And go on we did, leaving with much regret even Anniston, its pleasant inn, and its charming people. Of our night-trip to Atlanta, the less said the better. It was one of those occasions on which all the triumphs of progress are set at naught by elementary forces. Man has tamed the fiery steeds of Nature: but once in a while they run away, and Man is only a helpless pendant at the end of the reins. What is the use of an express-train with a "Mann boudoir" car, if it can not get to you by reason of a freight-wreck, somewhere up the road, between you and it? What is the use of the telegraph, when the operator has gone to bed? And what is the

who traverses this route by rail will enjoy it so much (even if the Mann boudoir car does arrive on time) as the merry party of Mining Engineers and ladies who went that way, from Murphy to the Gap, in the good old days of last May, skirting the Valley River with a procession of hacks, saddle-horses and baggage-wagon, entertained *en route* with simple and primitive, but abundant and toothsome fare (the primitive simplicity of mountain trout, for example, may not be despised by the disciple of the highest culture—ask Prof. —, of Boston. He ate 'em!), and feasted all the way with Nature's bounty in perfumed air and luminous color. The woods fairly flamed with the pink azaleas, sometimes in vast masses like sunset clouds entangled among the trees; and dogwoods all in white kept company with their rosier sisters; and the hacks broke down in the most picturesque places (the most picturesque place for a hack to break down is in the wheel, because then you can introduce all sorts of rustic effects in your temporary repairs); and night caught us in the mountain passes; and the wild beauty that had fringed our road came down into it; and driving over romantic rocks and things gives so much variety to one's experience of beauty; it makes one really feel it, you know; and oh, such larks! when — of Pa. got flung clean out over the wheel of his hack, and couldn't express himself adequately, because there were ladies present!

Tourists are beginning at last to realize the wonderful combination of sublimity and beauty in this part of the United States. The forests which clothe these mountains and the abundant, never failing streams which water the plateaus and valleys, supply the elements which the æsthetic sense so often misses in the more barren, if more stupendous, scenery of the far West. But comparisons are neither possible or necessary. It is enough to say that no American has truly seen his country

who has not visited the heart of the North Carolina mountains—the region from Murphy to Asheville, and beyond, to Roan Mountain (so-called from the acres of rhododendrons in solid bloom that in early summer tinge its summit red, as far as it can be seen).

As the members of the Institute have been made aware by Mr. Colton's paper on the Hiawasse region, presented at the Boston meeting in February last, it is rich in mineral wealth, only just beginning to be developed. I shall not here attempt, on my short and hasty inspection, to give an account of what he has so well described. His paper constitutes, in fact, with its maps and sections, clearly elucidated by the text, an admirable guide book for the traveler on this line. I will say only, as regards my own observations, that I had opportunity to verify, at numerous points, the accuracy of his, particularly as to the marble-zones and iron-ore deposits of the region. Of the mica, corundum, and manganese ore that abound in it, I happened to see less; but the proofs of their presence are beyond question.

The persistent intercalated beds of limonite, to which Mr. Colton refers as uncommon in their character, are not without parallels in other localities, and, perhaps, later geological formations. I think he does not fix their age, but intimates that they are at least Lower Silurian. From my cursory examination of outcrops and surface-openings, I should conclude that they are replacements of slate, as the famous Oriskany ores of Low Moor and Longdale are replacements of sandstone. That they persist in depth, has been indicated, so far, only by the old workings of explorers who thought that, like the iron-ore outcrops of Ducktown, Tenn. (not very far away), they might be the caps of copper-bearing deposits. I passed one old shaft, now inaccessible, which was said to have gone down 90 feet or more, and to be still in iron-ore.

But after all, the value of these apparently immense deposits depends on a market for them. The marble, and the mica and the corundum, even the manganese ore, can go out by way of Marietta on one side, or Asheville or Morristown on the other. But such circuitous routes involve freight-charges which no iron ores (certainly no non-Bessemer ores, such as these) can bear. Good limonite ores, carrying 40 per cent of iron and over, are worth at Chattanooga \$2 per ton; and Chattanooga is the nearest, not to say the only market for the Hiawasse ores. It is true that this secluded plateau offers favorable conditions for the manufacture of charcoal iron. Wood cut in the mountains could be rafted or drifted down such streams as the Hiawasse or the Valley River, to be coaled in kilns at the furnace-site; and the supply of ore, flux and fuel would certainly be large and cheap. But the charcoal-iron industry is no longer as profitable as it was once. There may be restorative gains in the by-products of the kilns. That question is under trial in practice now. But otherwise, it is questionable whether charcoal iron-making will offer hereafter an inviting field for capital. At all events, the iron (and other products, if such there be) must be got to market; and so we come back to railroad connection with Chattanooga as the hope of the Hiawasse region. Such a connection may be established by a branch of the Marietta & North Georgia, connecting with the East Tennessee, Virginia & Georgia, or it may be gained more directly by the building of the Hiawasse Railroad, along the easy grade of the Hiawasse River into the Tennessee Valley. The survey already made brings Chattanooga within 94.2 miles of Murphy, by a line having a maximum grade (on a few tangents only) of 70 feet and a maximum curvature of 6 degrees. There is one tangent 28,000 feet long. The grades are in favor of the traffic, as Murphy is some 900 feet higher than Chattanooga. Judging from the rates fixed by Southern railroads generally, I should think it safe to say that iron-ore could be carried from mines on the Hiawasse or Valley River to Chattanooga for less than one dollar per ton; and there are certainly many places where it can be put on the cars at a profit for the same amount. It is therefore to be presumed that the building of the Hiawasse Railroad would be followed immediately by shipments of such ore. What is true of iron-ore would be, of course, much more emphatically true of other mineral products, better able to bear the cost of shipment. And the active prosecution of any of these industries would undoubtedly lead the way to further developments and discoveries, now unforeseen.

I prophesy, therefore, that the rural seclusion through which we journeyed will shortly cease to be; and while I shall rejoice patriotically and professionally at the exploitation of a new source of national wealth and "expert" employment, I shall also rejoice privately that some of us saw the Hiawasse before the locomotive tore up its flowery banks, or stained with smoke its peaceful sky.

The Carlsson-Bessemer Process.—The Carlsson modification of the Bessemer process is employed, says the *Iron and Coal Traders' Review*, in Sweden in the treatment of a charcoal pig-iron containing about 1.5 per cent of silicon, 0.1 to 0.15 of manganese, 3.9 of graphite and 0.1 of combined carbon. The slag produced in the production of this pig-iron approximates more closely to a tri-silicate than a bi-silicate, alumina being considered as a base. After the pig-iron has been charged into the converter, it is blown for about five or six minutes, until the blue flame appears that marks the commencement of the combustion of the carbon. The blow is then stopped, and a definite proportion of the charge, varying with the quality of the metal it is desired to produce, is poured into a ladle of peculiar construction, so arranged as to show the weight of the metal charged into it, the slag being carefully removed. This portion of the charge usually contains 4.15 per cent of carbon, 0.05 of silicon and 0.07 manganese. The remaining portion of the metal in the converter is then blown until most of the carbon has been eliminated and the bath converted into malleable iron. The portion of the metal previously removed, together with any necessary additions required for special purposes, is then added to the bath. When the reaction that ensues is ended the metal is ready for pouring. Before this addition is made, the bath usually consists of metal containing a trace of silicon, 0.03 per cent of manganese, 0.05 per cent of carbon, and, as a maximum, 0.02 of sulphur. As this metal is usually red short some rich manganese iron is added before the addition of the second portion of the metal from the ladle. The percentage of silicon in the final product is usually about one tenth of that of the carbon, so that steel containing 0.2 of carbon would also contain 0.02 of silicon.

THE LOSSES IN ROASTING GOLD ORES AND THE VOLATILITY OF GOLD.*

(Continued from Page 217.)

THE VOLATILITY OF GOLD IN AN ATMOSPHERE OF CHLORINE.

The evident connection between the chlorine supply and the loss of gold naturally suggests that chlorine was the principal cause of the loss. The conflicting statements of various authors on the subject also led to an investigation of the matter.

My first experiments were made in June, 1880. The chlorine used in these experiments was generated from pyrolusite and crude HCl. The gas was passed through a second flask filled with pyrolusite to absorb the HCl, and was then passed in a moist state through a glass tube in which the gold was placed. In my first experiment I used a 30-milligramme fragment of fine gold in a very porous state, obtained by parting with nitric acid. When chlorine was passed into the tube the gold became discolored, changing to a dark, reddish-brown color; when warmed gradually with an alcohol flame, this discoloration passed away, the gold became bright again, and at the same time a reddish-yellow sublimate, fading off into pale yellow, began to form about an inch from the flame. When the flame was applied to this incrustation, it became first dark brown, then changed into spangles of metallic gold, which, on cooling, were again attacked by the chlorine as before.

The tube was cut in two between the gold and the incrustation, and when the latter was dissolved in a few drops of water, a copious precipitate of metallic gold was obtained with ferrous sulphate.

In another similar experiment, the gold weighed before treatment 28.5 milligrammes, and after one hour and fifteen minutes weighed only 17.75 milligrammes, or it lost 5.75 milligrammes or 24.47 per cent of its weight in this time (or per half hour, 8.99 per cent). In both these cases the gold was in an exceedingly porous state, and exposed considerable surface to the action of the chlorine. There was abundant proof that gold was volatilized in all these experiments. In one case the glass was heated till it began to fuse; the glass was, in this case, colored purple immediately below and around the gold fragment.

Another interesting fact was discovered at this time that I have never seen mentioned before, that the volatilized gold chloride contained in a chlorine stream, when passed into a Bunsen-burner flame, tinged the latter a peculiar and intense green. This I have since found a peculiarly delicate and characteristic test for the presence of chloride of gold in a chlorine stream. That the coloration was due to gold and to no other cause is proved by the fact that the chlorine stream never, under any circumstances, gave this coloration, except when it had passed over the gold; and that it was not due to copper, apart from the fact that fine gold was used, is evidenced by the fact that, when the gold was replaced by a fragment of pure copper, the volatilized chloride of copper tinged the flame not green, but blue, as is well known to be the case with chloride of copper.

Other work prevented a resumption of these experiments till April of 1888. I then repeated these tests, and obtained others which follow. I placed a clean porcelain dish filled with water over the Bunsen flame through which the chlorine stream, charged with chloride of gold, was passing, and obtained an incrustation of a purple color. This, dissolved in aqua regia, reacted for gold. I also tested the gold flame with a single-prism spectroscope, and obtained a number of lines in the yellow and green, entirely different from those obtained with copper or other metals under similar circumstances. At first I had great hopes of being able to use the spectroscope in furnace work, but at present it does not seem practicable, although I hope to resume this subject at a future time.

I found the most delicate test for the presence of chloride of gold in the chlorine stream, is to make the test in a darkened room and to turn the stream against the Bunsen flame, so that it strikes against the flame about an inch above its base, and then to view the flame at right angles to the impinging stream against a black background. The colored edge of the flame can then be compared with its uncolored edge and an exceedingly minute trace of gold can thus be detected, an amount so small, indeed, that, with the spectroscope that I used, no lines whatever could be seen. In this manner I succeeded in detecting the coloration when only 0.17 milligrammes of gold were volatilized by the chlorine stream in half an hour. Unfortunately at a furnace heat, the amount of light set free entirely masks the coloration, and it can not, therefore, be used in roasting.

I next wished to ascertain whether or not the gold was volatile in an atmosphere of chlorine at all temperatures, in order to account for the conflicting statements that I have already quoted. For this purpose I finally devised the following method of procedure: For all temperatures below the boiling point of quicksilver, the gold was placed in a U-tube of glass, the whole being heated in a steam bath for 100° C., and in an air bath for higher temperatures. The gold used in all cases was in the shape of buttons of fine gold. This gold was prepared with the greatest care by first parting in the usual manner with nitric acid, then dissolving the gold in aqua regia, diluting to remove traces of silver chloride and evaporating to dryness; the whole was then taken up with water and a little acid, and finally precipitated with oxalic acid, washed out with nitric acid, and finally melted down into two buttons, whose original weights were 1.52990 and 1.84050 grammes, respectively. All the temperatures above mentioned were determined with an ordinary mercurial thermometer immersed in the bath. I found the actual temperature of the chlorine stream was a few degrees below that of the bath.

For all temperatures above the boiling-point of quicksilver I found it most convenient to place a clear scorifier of white fire-clay into the back of a small gas-furnace, whose temperature could be rapidly and accurately adjusted, or maintained for a long time constant. The gold button was then placed in the center of the scorifier and the chlorine introduced by means of a long-stemmed tobacco pipe of the English pattern. The bowl of the pipe was placed over the button of gold and the chlorine turned on, and the whole button was thus surrounded by an atmosphere of chlorine at just about the furnace tem-

* Abstract of a paper read before the American Institute of Mining Engineers, May, 1888.

perature. In all cases, before the button was added, the pipe and the scorifier were allowed to become thoroughly heated, and the chlorine was passed for some time to volatilize any traces of iron that might be contained in the clay. The clay after treatment always came out as white as snow and completely free from all iron discolorations.* After this was done the chlorine stream was turned off and the gold added to the scorifier. As soon as it had assumed the furnace heat the chlorine was turned on and the time taken. The temperature was maintained constant, as was also, as far as possible, the strength of the chlorine stream. After half an hour the chlorine was turned off and the scorifier and its contents removed, cooled and the button weighed. The balance used was sensitive to 0.01 mg. The above plan of procedure was found to work perfectly for all the high temperatures, as it could be adapted to secure all the varying conditions necessary in such tests. The button came out clean and free from all adhering impurities, no trouble from adhesion to the bottom of the scorifier being found even when the button had been melted. If a slight shake was given to the latter a moment after the latter had solidified.

The chlorine in all these experiments was generated from pyrolusite, pure strong HCl being used in this case. The gas produced was passed through a wash-bottle containing a concentrated solution of salt. The chlorine so produced may have contained some traces of ferric chloride, though no evidences of that fact showed themselves. This moist chlorine was used in some of the tests while in others the chlorine was, in addition to the above treatment, passed through a wash-bottle so arranged that the gas passed through about an inch and a half of strong sulphuric acid. This is what is designated "Dry Chlorine" in the experiments, though of course the gas was not entirely free from moisture.

With all the temperatures measured with the quicksilver thermometer a difficulty was found in determining the exact loss of weight which the button suffered, for the gold came out after treatment with a slight brownish film of chloride upon it. This prevented an accurate weight of the button being taken, on account of the extreme hygroscopic nature of the film, while if the film were washed off the indicated loss would have been greater than that really volatilized in the given time. As the composition of this chloride was uncertain, and probably not constant, no exact allowance could be made for it. The fairest method of approximation appeared to be to weigh the button as rapidly as possible, then wash and ignite it, and when cold weigh again, then to take the mean of these results. The following, which was the extreme case of this difficulty, will illustrate:

* Experiment No. 11. Time, 1/2 hour. Temperature, 250° C. Chlorine stream moderate.

Original weight of gold before experiment	1.42466 grms.
Weight after with chloride film, etc.	1.41117 "
Loss of wt. ...	0.01349 grms.
" washing and ignition	1.41016 "
" "	0.01450 "
Difference between (a) and (b)	0.00101 "
Mean loss taken	0.01399 "

The latter figure, 0.01399, is the one given in the tabular resumé that follows. The error introduced by this cause is evidently a very slight one. With all the high temperature experiments there was no difficulty from this source, for the gold came out free from any film whatever, and all that was necessary was to weigh the button, and hence in these results there is no uncertainty from this cause.

In all the low temperature experiments where glass tubes could be used it was easy to get most indubitable proofs of the volatilization of the gold other than those obtained by loss of weight; the flame test already referred to was obtained in all cases except at 100° C., where the loss was only 0.01 mg. in half an hour; here no indication could be obtained with the flame. In all cases there was a sublimate of chloride of gold in the cooler portions of the tube, showing plainly that the chlorine deposits a part of the chloride of gold when a stream of chlorine saturated with it at a certain temperature is cooled. With damp chlorine the sublimate was in the form of a rich ruby-colored liquor fading to a pale yellow, but with dry chlorine the tube was filled with a net work of beautiful ruby-colored crystals which rapidly deliquesced in the air.†

In some of the high temperature experiments additional proof of the volatilization of the gold was obtained by using an aspirator tube of hard glass, one end of which was introduced into the muffle near the pipe bowl; the other end was then connected with a filter pump, and the fumes thus drawn through the tube a deposit was found at the hot end of the tube several inches long of a reddish brown color. This, dissolved in aqua regia, reacted for gold. Also in the case of the experiments conducted at a melting heat, a deposit of a similar color formed on the front of the furnace above the mouth of the muffle. This deposit also contained gold, as also iron from the clay of the muffle itself. It recalls to mind the deposit mentioned by Mr. Aaron in the passage already quoted, where he was thus led to discover the true cause of the losses he was suffering in roasting. Besides, there was always present when any amount of gold was volatilized, a deposit of a purplish color immediately outside of the bowl of the tobacco pipe, and also on the scorifier immediately outside of the bowl. In one case, that of "Expt. 12a," the scorifier was placed just outside the mouth of the muffle, where a thermometer placed beside the pipe-bowl indicated a temperature of from 180° to 250° C. or an average of 205° C. When this scorifier was withdrawn after a half hour's treatment it presented a remarkable appearance. On the hot side, toward the interior of the muffle, was a beautiful fan-shaped deposit of minute crystals of metallic gold. These, afterwards examined under the microscope, proved to be microscopic octahedrons and

apparently dodecahedrons. On either side of the gold button, and extending in a direction parallel to the front of the muffle was a narrower fan-shaped stain or incrustation of a purple color, this again shaded off into broader fan-shaped stains of a dark-blue color, while between these two and on the coldest side was a pale-yellowish stain. Evidently, as the chloride of gold escaped into an atmosphere containing less chlorine, it had been decomposed by the different amounts of heat differently.

With this explanation, the results recorded in Table VII. will be intelligible.

TABLE VII.—TABULAR RESUME OF EXPERIMENTS ON THE VOLATILITY OF GOLD IN CHLORINE GAS.

TEMPERATURE.	No.	Original weight of gold, grms.	Actual Wt. Lost 1/2 hr.		Calc. per cent. loss 1 gm. button.	Remarks.	Exp. No.
			Grms.	Per cent.			
98° to 100° C...	1	1.40564	0.00001	0.0007	0.0008	Strong current dry Cl. steam bath.	14
100° to 130° C...	2	1.43030	0.00017	0.01	0.013	Flame test for gold, air bath.	8
150° C.....	3	1.43013	0.00058	0.04	0.044	Flame test for gold, air bath.	9
200° C.....	4	1.42957	0.00403	0.28	0.32		10
205° (180° to 230°).....	5	1.84050	0.00800	0.43	0.53	Done in muffle, temp. uncertain.	12a
210° to 220° C...	6	1.40563	0.01324	0.94	1.08	Good stream Cl. air bath.	15
250° C.....	7	1.42466	0.01399	0.98	1.11		11
300° C.....	8	1.41016	0.00778	0.197	0.22		12
Over 300° C.....	9	1.43138	0.00106	0.074	0.08	Done in muffle, temp. uncertain.	7
Below red heat...	10	1.43161	0.00025	0.017	0.02	No subl. vis. in aspirator tube.	6
Incip. red heat...	11	1.68930	0.00073	0.043	0.052	Dry chlorine. In muffle.	23
" " " "	12	1.63216	0.00086	0.053	0.062	Treated in same muffle with 12.	30
" " " "	13	0.89346	0.00091	0.102	0.098		
Low red heat...	14	1.40726	0.00162	0.12	0.13	Moderate current chlorine.	3
Cherry red heat.	15	1.47242	0.00357	0.24	0.28		
" " " "	16	1.46885	0.00343	0.23	0.27	Moderate current chlorine.	4
" " " "	17	1.63693	0.00377	0.23	0.27	Treated side by side, in same atmosphere, dry Cl same temp.	28
" " " "	18	0.89652	0.00215	0.24	0.23		
" " " "	19	0.88857	0.00184	0.11	0.13	Very weak cur. Cl.	24
" " " "	20	1.68673	0.00323	0.19	0.23	Stronger	25
" " " "	21	1.63230	0.00404	0.25	0.29	Side by side with following.	32
" " " "	22	0.83346	0.00376	0.43	0.39		Draft in muffle stronger here.
Incip. yellow heat.....	23	1.69607	0.00677	0.40	0.48		22
Just below straw yellow heat....	24	1.68350	0.00811	0.48	0.57	Very weak current Cl.	26
Just below straw yellow heat....	25	1.67459	0.03422	2.04	2.43	4 or 5 times as much Cl. as preceding experiment.	27
Just about melting.....	26	1.71083	0.02076	1.21	1.45	Moderate current Cl.	21
Above melting heat.....	27	1.46541	0.03380	2.31	2.62	Gold cond. in aspirator tube.	5
Above melting heat.....	28	1.83264	0.04284	2.34	2.86	Gold cond. in aspirator dry Cl.	16
Above melting heat.....	29	1.78980	0.03636	2.03	2.47	Inpinging stream dry Cl.	17
Above melting heat.....	30	1.20635	0.03305	2.74	2.92	Atmosphere dry Cl.	18
Above melting heat.....	31	1.75344	0.03661	2.07	2.51	" "	19
Above melting heat.....	32	1.52990	0.05730	3.74	4.32	" damp Cl.	1
Above melting heat.....	33	1.47260	0.00018	0.01	0.014	No chlorine present. Temp. as in 32.	2
Near a white heat.....	34	1.17300	0.06069	5.17	5.46	Strong current dry Cl. †	20

The first column contains the temperature, the second the reference number which will be used in the discussion of the results which follows. The actual order in which the experiments were performed is given in the last column, headed "Expt. No.," which I have retained for convenience in referring to my detailed notes, but I have here preferred to group the results according to the temperatures, to bring out more clearly the relation existing between the temperature and the volatilization loss. The third column gives the original weight of the button in grammes before each experiment, and the fourth and fifth give the actual loss of weight in grammes and the percentage loss suffered by the button in half an hour. The sixth column has been calculated for the purpose of bringing the buttons to a standard of comparison. For this purpose I have selected an ideal gold button weighing one gramme. I have assumed, as I shall shortly show to be practically the case, that the loss is, other things equal, proportional to the surface exposed to evaporation. Now, the surfaces of solids of the same composition and shape is proportional to the two thirds power of their weights, and as the surface of one of these buttons is nearly constant during the short time of one of these tests, the reduction to standard, or to the weight that would be lost in the same time, and under the same conditions, by a button weighing one gramme, is easily made with sufficient exactness by dividing the weight actually lost by the button by the two thirds power of its initial weight in each case. The percentage loss, reduced to standard as given in column six, easily follows by simply pointing off. The standard percentage loss is, of course, always greater than that of the actual percentage loss of the experimental button, when the latter is larger than one gramme, and vice versa. The column headed "Remarks" gives the amount of chlorine used. When no remark is made, a moderate current of four to six liters per hour is meant; "weak" means less than that; "strong" means more. The generator was frequently gauged by measuring the stream for a minute, and afterwards judging of the current by the number and size of the bubbles in the wash-flask.

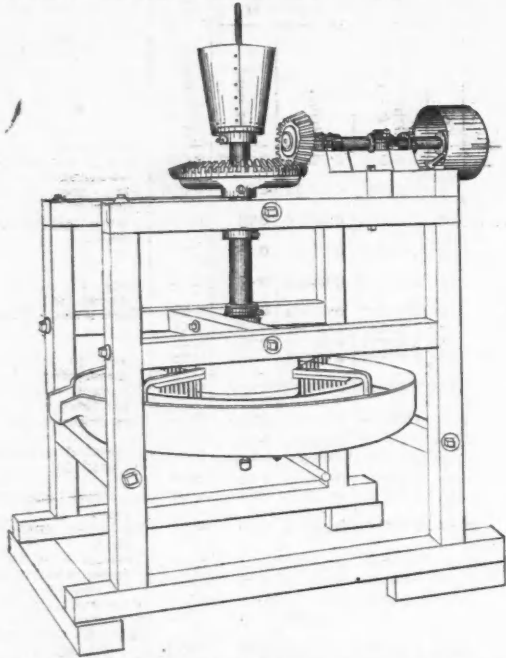
(TO BE CONTINUED.)

* This fact was so remarkable that a possible application might be made of it in decolorizing fine porcelain at a furnace-heat. The ware seemed, however, to be rendered somewhat more brittle by the chlorine treatment, but this might have been due to the lack of annealing, which I had no time for.

† Some of these crystals were examined in the microscope. Great difficulty was had in mounting them, without decomposition from heat on the one hand or the reducing action of the mounting substance on the other. The method which was finally selected was to place them on a glass slide on which a previously prepared dried ring of asphaltum had been placed; a cover was then placed over the ring and the whole gently heated till the cover adhered, thus making an air-tight compartment. The crystals were partly melted by the heat in mounting, but reforming in minute microcrystals of a straw yellow color, while the main mass of crystals retained its ruby-red color. In some of the pale yellow crystals minute twin crystals and crystalline aggregates of metallic gold were visible with powers magnifying 500 diameters. The crystals of gold chloride were monoclinic.

THOMPSON'S AMALGAMATOR AND SEPARATOR.

The accompanying illustration shows a new pan amalgamating machine which the Fort Scott Foundry & Machine Works have placed on the market, after having had it in satisfactory operation at Hermosa, in New Mexico, for a year. The most important claim put forward by the inventor is, "that every particle of gold or silver, set free in the fine pulverized ore, is brought forcibly into contact with heated mercury, through which it has to travel a long distance, entirely submerged in it." To accomplish this is, of course, practically to succeed in catching all the precious metal that is in condition for amalgamation.



This part of the operation is described as follows: "The large three-inch feed stream, on reaching the mercury in the stationary concave chamber, is divided up into a multitude of very small streams, and together with the mercury is forced sidewise through small holes, from one chamber to another, and thus acted upon five times before it passes to the surface of the mercury bath. The pulp is thoroughly agitated in the pan by means of the revolving stirrers and washed by numerous jets of water separating and retaining in the machine the fine mercurys. Each machine, it is stated, will handle the product of a five-stamp mill, and one attendant can operate several machines. Each pan is driven by a two-inch belt, and occupies about five feet square, the weight is about 1500 pounds; price \$500.

Gold from British and French Guiana.—Up to the 15th of August, 1888, British Guiana exported for the year 9309 ounces of gold, against 6212 ounces for the same time last year, showing an increase of 3097 ounces. From French Guiana the gold exports up to June 30th, 1888, amounted to 991 575-1000 kilos, against 865 673-1000 kilos up to the same date last year, showing an increase of 122 902-1000 kilos for this year.

New Insulating Material.—A new insulating material, described in the *Chronique Industrielle*, has just been produced. It is composed of one part Greek pitch and two parts burnt plaster, by weight, the latter being pure gypsum raised to a high temperature and plunged in water. This mixture when hot is a paste, and can be applied by a brush or cast in molds. It is amber-colored, and can be turned and polished. Its advantage is its endurance of great heat and moisture without injuring its insulating properties.

Metal and Mineral Imports Through the Custom House, at El Paso, Texas, for the Month of July, 1888.—We condense the following from the *El Paso Bulletin*: Silver ore, 5346½ tons, value \$335,459; gold ore, 6 tons, value \$2462; copper ore, 630 pounds, value \$31; silver bullion, value \$224,299; gold bullion, value \$27,894; silver coin, \$430,882; gold coin, \$28,768; total, \$1,049,795. The entire imports of ore amounted to \$337,952, including gold, silver, and copper. The amount of lead in the above ore was of the value of \$53,441, not one-sixth of the value of the entire importations.

Giant Tree in California.—An engineer of the Comstock mines reports that, while spending some time recently in the wilds of the Sierras, in Tulare County, California, he came upon an enormous tree of the sequoia species, which he believes to be the largest on the continent. The party had no rule with them, but one of them measured the giant with his rifle, which is four feet in length. He found it to be 44 lengths of his gun in circumference at a point above the ground as high as he could reach. The top of the tree has been broken off, but it is still of great height.

Workmen's Co-operative Stores in France.—The co-operation movement for the supply of provisions to workmen, says Mr. André in a letter to the *Colliery Guardian*, which has made rapid progress of late in France, is not likely to be retarded by the publication of the results of the co-operative society established at Anzin for the benefit chiefly of the coal miners employed by that great company. The report covers four and a half years, the period during which the society has been in existence. In this time, though the provisions have been sold at a very moderate profit, the gains, after setting aside a sufficient sum for insurance, reserve and *amortissement*, amount to £56,800. This allows a dividend of £4 5s. per share per annum for distribution among the workmen.

American and Russian Oil in Bombay.—According to the United States consular report of Mr. B. F. Farnham, the sales of kerosene oil from June 1st, 1887, to June 1st, 1888, were 870,000 cases, of 10 imperial gallons each. Out of this 320,000 cases were American and 550,000 cases Russian; both 125 degrees government test; both put up in cases of two tins of five imperial gallons each. The American oil realized 3.70 rupees per case, Russian oil, 3.50 rupees per case. Quality about the same. Russian oil is very generally used, and the brokers report that Russian oil is expected to come freely on the market here in future. Sun Flake American oil, 150 degrees government test, is sold in smaller quantities at higher price, but the majority of consumers use 125 degrees government test oil, American or Russian.

The Arctic Iron Ore Mines of Norway.—An important engineering enterprise now in progress is a railroad in the arctic circle. The Swedish and Norwegian railroad now building from Lulea, on the Gulf of Bothnia, to Lofoden, on the North Sea, is partly situated in the arctic circle, and is some 1200 miles farther north than any railroad in Canada. An interesting meteorological fact stated in relation to this work is that the snowfall is found to be actually less than in some more southern latitudes, while the darkness of the long winter nights has been partly compensated by the light of the aurora. The object in view in constructing this line is to tap the enormous deposits of iron ore in the Gellivara Mountains, the approximate exhaustion of the ore in the Bilbao district rendering very desirable a new field of non-phosphoric ore suitable for steel-rail making.

The Production of Coal in France in the Year 1887 amounted to 21,403,049 tons, an increase of nearly one and a half million tons on that of the previous year. The consumption has apparently not increased in the same proportion, for we find the imports in 1888 falling off, though the output has not increased in the current year in a greater ratio. The total quantity imported in the first six months for consumption in France amounted to 3,951,411 tons, against 4,074,800 tons in 1887, and 3,971,484 tons in 1886. The falling-off has been almost wholly in the trade with Belgium and Germany. Of this year's quantity, Belgium furnished 46.43 per cent; England, 44.12 per cent, and Germany, 9.39 per cent. The consumption of coke has increased, stimulated mainly by the revival in the iron trade. The imports of coke in the half-year amounted to 549,075 tons, against 507,013 tons last year, and 487,846 tons in 1886. Of this coke the Belgians sent 73.8 per cent and the Germans 24 per cent. The demand for coke still increases. Coke is now quoted from 15s. 3d. to 16s. at the pits.

A New Method for the Preparation of Aluminum.—*Le Genie Civil* says: M. G. Faurie communicates to us the description of a process, of which he is the inventor, which gives very interesting results. Two parts of very pure and finely powdered alumina are made into a paste with petroleum or other hydrocarbon, which is thoroughly mixed with the addition of sulphuric acid. When the paste has assumed a uniform yellow color, is homogeneous and begins to evolve sulphuric acid, it is poured into a paper cornet, and placed in a crucible heated to redness, or above 800 degrees, in order to decompose the hydrocarbon. The fire is allowed to go down and the crucible cooled. The compact product is carefully pulverized, mixed with its weight of a powdered metal and placed in a well closed plumbago crucible, the whole being heated to whiteness in a furnace with forced draught. The crucible is again allowed to cool, opened, and in the midst of a black metallic powder are found the grains of an alloy of aluminum, which must be refined. This process of reduction is applicable in the same manner to silica, lime and magnesia.

Irrigation in India.—An irrigation project in the Godavari comprises the construction of a tank or reservoir, storage capacity 4420 millions of cubic feet, length 7½ miles, greatest width 4½ miles, and area 9½ square miles, near the ruined village of Anamalanka, in the Yernagudem taluk. It is 6 miles north of Nallacheri, a large village on the trunk road between Ellore and Rajahmundry. It will be supplied from the Yarracalva, a perennial river, which gets its principal supply from the southwest monsoon, and is said to be valuable when the northeast monsoon fails. The reservoir has been proposed to act as a flood moderator to the drainage of the Yarracalva, which enters the western section of the Godavari delta under the Nandamur aqueduct at the head of the Ellore canal, and has several times endangered the safety of some of the delta canals. The reservoir is intended to irrigate 45,000 acres, and also at times to supplement the supply of the delta canals. The estimates for the project prepared in 1873 amounted to Rs. 8,14,000, excluding land compensation, which was subsequently ascertained to amount to Rs. 77,800, making a total of Rs. 8,91,800 for works, or about \$357,000.

Technical Education in England.—Some interesting facts regarding the progress of technical education in England are given in the annual report of Sir Philip Magnus, the Organizing Director of the City and Guilds of London Institute for the Advancement of Technical Education. It appears from this report that there have been increases as compared with last year in the number of students receiving technical instruction and in the number of candidates examined, and that there has been a slight decrease in the percentage of failures. There are now 10,404 students receiving instruction in 475 classes in 183 different towns in the United Kingdom, as against 8613 students, 365 classes and 121 towns last year. The number of candidates examined was 6166 in 1888, as against 5508 in 1887. The average percentage of failures fell from 43.8 to 43.1. In most subjects a distinct advance in the general grade of work is noted. The increase in the number of candidates presented has been most notable in the textile trades, in plumbers' work, in carriage building and in several branches of the building trades. One curious feature brought out by the report is, that in some lines where the advantages of a practical acquaintance with the work would seem to be very good, the applicants succeed better in the theoretical than in the practical branches of the examination. For example, of those passing the written examination in plumbing work only a little more than a quarter succeeded in satisfying the practical tests. Technical education is making some progress in England, but there is still a wide field open for the extension of the system.

Wiborg's Air Pyrometer.—Prof. J. Wiborg, of the School of Mines, Stockholm, recently presented a paper to the British Iron and Steel In

stitute on his new air pyrometer, which paper *Engineering* summarizes as follows: "Air pyrometers, based on the co-efficient of the expansion of air, decided by Gay-Lussac, Dulong, Rudberg and Regnault, have already been known, but they have not been available for ordinary purposes in consequence of the care and practice necessary in their use, and their employment has therefore been confined to scientific investigation or for grading other instruments. As the co-efficient of the expansion of air, even at a very high degree of heat, is constant, it would seem that air should afford the best means of determining such high temperatures, and the author has therefore endeavored to produce a simpler and more practical instrument on these lines. There is a thermometer bulb containing air in one end of a porcelain tube. Leading into this is a capillary tube. This thermometer bulb is placed in the furnace gases, the temperature of which are to be determined, the other end of the tube extending through the flue or furnace into the air. The capillary tube is connected to a glass capillary tube which ends in a glass bulb. This glass bulb forms part of the manometer of the apparatus. Leading down into the glass bulb is a long glass tube attached to a scale. Leading from a receptacle common to the glass bulb and scale tube is another tube which terminates in an india-rubber chamber filled with mercury. By pressing on the india-rubber chamber, by means of suitable mechanism, mercury is forced into the glass bulb and partly into the scale tube. As the air in the thermometer bulb expands under the influence of heat, it causes the mercury to rise in the scale tube, and a reading is thus obtained." Professor Akerman stated that he had tried the apparatus up to 2500 degrees Fah., and considered it reliable to that point, but beyond that the instrument would not go, as the porcelain bulb would not stand the heat. In trying English pyrometers he always found them register too high.

Aluminum and Aluminum Alloys.—In our issue of September 8th we referred to the output of aluminum alloys by the Swiss Metallurgical Company, of Lauffen-Neuhausen, and we now take the following description of the process in use by it from the *Schweizerische Bauzeitung*. This should be of special interest to our readers to compare it with the Cowles process described in our columns last week: The Swiss Metallurgical Company, of Lauffen-Neuhausen, has set up an electrical plant capable of producing daily 300 kilograms (say 6 cwt.) of aluminum, or its equivalent, in a 10 per cent aluminum bronze. The process adopted is that of Héroult, in which the electric current is employed to fuse the metal with which the aluminum is to be alloyed, and to separate the aluminum by electrolysis of alumina in a molten state. The current is produced by two dynamos, each of 6000 ampères and 20 volts, their magnetic field being excited by a separate dynamo, the combination being driven by a Jonval turbine of 300 horse-power. The metal, copper for the production of aluminum bronze is introduced in a divided state into a crucible formed of conducting carbon, suitably strengthened by external casing of metal; this crucible forming the negative pole of the electrolyzing bath, the positive pole being composed of a bundle of carbon plates. After the copper is fused, alumina is introduced into the crucible, where it is fused and electrolyzed, the oxygen passing off at the positive pole, and the aluminum at the negative, and there uniting with the fused copper; the process is thus continuous, the fused alloy being drawn off by means of a plugged hole at the bottom of the crucible, and fresh copper and alumina being introduced by suitable openings in the cover of the crucible as required. The current passing through the crucible is from 12,000 to 13,000 ampères, with a difference of potential between the electrodes of about 12 to 15 volts.

An Artificial Colliery.—We take the following interesting item from Mr. Geo. G. André's letter to the *Colliery Guardian*: The artificial colliery that was to form one of the most interesting features of the great exhibition of next year at Paris will not be constructed, at least, according to the original design. It was proposed to represent a complete mine, of which the surface works should be on a large scale for the purpose of exhibiting all the newest machinery in action. The shaft was to be tubed and walled, and fitted to show the most perfect system yet adopted in practice. And the underground workings were to be laid out partly to full size and partly in miniature, to represent one of the collieries in the north of France. But the scheme was abandoned. As a substitute, it is now sought to arrange a three days' excursion to the coal mining district of the Nord for those visitors who may be interested in mining matters. Something, however, remains of the original scheme. There is to be a subterranean exhibit, of which the most conspicuous feature will be a descent into a coal mine. During this descent the visitor is to be made the subject of an illusion. The sides of the artificial shaft will be formed of canvas painted to show the stratification in a typical deep pit. The cage begins to descend with a considerable velocity, but is brought gradually to rest within a few yards of the pit bank. As the motion of the cage is retarded, the canvas sides of the shaft are drawn up with increasing velocity, the acceleration being proportional to the retardation of the cage. The effect upon the spectator standing upon the deck of the cage is one of continued descent at the same speed at which he started, and the illusion is kept up after the cage comes to rest by a movement of trepidation communicated to the latter. The illusion is said to be perfect. When a great depth has apparently been reached, the canvas is brought to rest gradually, the trepidation of the cage being made to cease at the same instant. The visitor, who believes himself to be deep in the bowels of the earth, then steps out of the cage and enters the workings, where he may see the various operations of coal-getting.

How Ants Live and Work.—A glass ants' nest was recently exhibited by Mr. Burns at a conversation of the Royal Society in London, and is described in *Engineering* as follows: Mr. Henry Burns's collection of ants' nests in full activity attracted great attention all the evening. Here might be studied the wonderful economy and intelligence of ant life. The roof of each nest was a sheet of glass, supported, of course, on all four sides, but the workers, in ignorance of this fact, had in the construction of the chambers and galleries, left, interspersed at fairly regular distances apart, pillars to support the roof just as miners are accustomed to do in coal pits. Here might be seen the royal palaces or cells for the queen, in which moved the monarch of the nest surrounded by her attendants and slaves, and carefully guarded by sentinels; while in another part was the dairy farm, in which the ants keep their "cows,"

also with attendants. Ant cows are certain species of alphides or plant lice, known so well to the sorrow of the rose grower, and these insects exude from their bodies a honey-like fluid, of which the ants are very fond, and which forms a considerable portion of their daily food. A still more remarkable feature of these animals is that the secretion is greatly increased by a stroking process known to the ants, and in the nests exhibited each aphid in the farm might be seen accompanied by a couple of attendants diligently stroking its back with their antennæ, and extracting the honey dew, which they carried to the queen and to their stores. This process, as well as the general surroundings, is so analogous to milking that the name of "ant cows" for these aphides is singularly appropriate. A further proof of the intelligence of the ant in this part of their domestic economy is the fact that the "cows" are regularly taken out of the nest, and put upon plants and brought back to the farms after they have fed for some time. In another nest Mr. Burns had early in the day introduced a rival queen ant, and in the evening the visitors to the Royal Society were able to watch the process of this unfortunate pretender being built up in a cell by the workers, who doubtless were acting under orders from high quarters. In another of the nests, that of the species, *Lassius flavus*, there was a complete community consisting of queen, workers, larvæ, pupæ, aphides, or "ant-cows," and slaves. The latter form another most interesting feature of ant-life, for the slaves are in some cases prisoners of war, captured after a fight with another community, generally of a different species, or they are hatched from the pupæ of certain species captured from other nests and brought up in the nests of their captors as domestics or slaves.

DIVIDENDS PAID BY MINING COMPANIES DURING SEPTEMBER AND FROM JANUARY 1st, 1888.

NAME OF COMPANY.	Paid in Sept.	Since Jan. 1.	NAME OF COMPANY.	Paid in Sept.	Since Jan. 1.
Atlantic, Mich.		120,000	Little Chief, Colo.		20,000
Alturas, Idaho.		112,500	Mammoth, Utah.		30,000
Bos. & Mon. Cop., Mont.		200,000	Mary Murphy, Colo.		35,000
Calumet & Hecla, Mich.	500,000	1,500,000	Montana Lt., Mont.		330,000
Carlisle, N. M.		50,000	Morning Star, Colo.		25,000
Central, Mich.		70,000	Mt. Diablo, Nev.		40,000
Colo. (cont.), Colo.		55,000	N. Belle Isle, Nev.		200,000
Confidence, Nev.		174,700	Ontario, Utah.	75,000	675,000
Cons. Cal. & Va., Nev.	108,000	872,000	Original, Mont.		3,000
Copper Queen Con., Ar.		70,000	Osceola, Mich.	50,000	150,000
Daly, Utah.	37,500	375,000	Parrott, Mont.		72,000
Dunkin, Colo.		80,000	Pittsburg, Cal.		29,850
Eureka, Nev.		87,500	Plymouth Cons., Cal.		80,000
Franklin, Mich.		120,000	Poorman, Colo.	5,000	10,000
Garfield, Nev.		25,000	Quick-silver, Cal., Pref.		236,500
Goconda, Idaho.		120,000	Quincy, Mich.		360,000
Granite, Idaho.		10,000	Sherwood, Mo.		3,000
Granite Mountain, Mont.		1,200,000	Sierra Buttes, Cal.		15,312
Hale & Norcross, Nev.		224,000	Sierra Nevada, Idaho.		10,000
Hecla Cons., Mont.	15,000	135,000	Silver Mz. of L. V., N. M.		25,000
Homestake, Dak.	25,000	225,000	Standard, Cal.		50,000
Hope, Mont.		50,000	Swansea, Colo.		4,000
Hubert, Colo.		64,000	Tamarack, Mich.	200,000	440,000
Idaho, Cal.	23,250	263,500	Viola Lt., Idaho.		37,500
Iron Silver, Colo.		200,000			
Jay Gould, Mont.		172,000			
			Total.....	1,038,750	9,565,382

BOOKS RECEIVED.

[In sending books for notice, will publishers, for their own sake and for that of book-buyers, give the retail price? These notices do not supersede review in another part of the Journal.]

- The Elements of Electric Lighting.* By Philip Atkinson, A.M., Ph.D. Published by D. Van Nostrand, New York. Pages 260.
- Resources of Dakota, 1887.* By Commissioner of Immigration. Published by the Department of Immigration and Statistics. Pierre, Dakota. Pages 498.
- Preparing for Indication.* By Robert Grimshaw, M.E. Published by Practical Publishing Company, New York. Pages 56. Price, \$1.
- Report on the Mining and Mineral Statistics of Canada for 1887.* By Eugène Coste, M.E. Published by Dawson Brothers, Montreal. Pages 110. Price, 25 cents.
- Annual Report of the Secretary of Internal Affairs of the Commonwealth of Pennsylvania. Part III.—Industrial Statistics.* E. K. Meyers, Harrisburg, Pa.
- Mines and Mineral Statistics, State of Michigan.* By Charles D. Lawton, A.M., C.E., Commissioner of Mineral Statistics. Pages 265.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

The following is a list of the patents relating to mining, metallurgy, and kindred subjects, issued by the United States Patent-Office.

- PATENTS GRANTED SEPT. 25TH, 1888.
- 389,876. Electric Motor. Philip Diehl, Elizabeth, N. J.
 - 389,886. Double-Acting Suction and Force Pump. Mahlon Harrold, Denver, Col.
 - 389,893. Tubular Boiler. Bernard McCerren, Rockport, Ill.
 - 389,894. Dynamo-Armature. William G. Myers, Philadelphia, Pa., and Frederick E. Coward, Camden, N. J.
 - 389,899. Pipe-Wrench. Daniel R. Porter, Chelsea, Mass.
 - 389,910. Process of Obtaining Manganese Alloys. Orlando M. Thowless, Newark, N. J.
 - 389,927. Rotary Engine. Julian A. Hurdle and Andrew W. Steiger, New York, N. Y., Assignors to Helen F. Hurdle, same place.
 - 389,928. Dynamometrical Governor. Julian A. Hurdle and Andrew W. Steiger, New York, N. Y., Assignors to Helen F. Hurdle, same place.
 - 389,939. Boiler. Joseph Leigham, Reading, Pa., Assignor of one half to D. & E. Kremp, same place.
 - 389,978. Cross-head for Steam Engines. Frank Robb, St. John's, Mich.
 - 389,988. Refining Petroleum. Charles F. Thumm, New York, N. J.
 - 390,031. Injector. William T. Messinger, Cambridge, Mass.
 - 390,036. Apparatus for Burning Liquid Fuel. Carl Qvarnström, Tjornej Gorod, Baku, Russia, Assignor to Melker Fredrik Ryden, London, England.
 - 390,044. Rotary Engine. Frank L. Voorhies, San José, Cal.
 - 390,060. Boiler-Tube Cleaner. Napoleon Blanchard, Adams, Mass., Assignor to himself and Arthur B. Daniels, same place.
 - 390,068. Steam Boiler. Edwin T. Copeland, Brooklyn, N. Y.
 - 390,077. Hydraulic Motor. Nelson E. Harris, Orange, Mass.
 - 390,091. Motor Engine, Worked by Combustible Gas or Vapor and Air. Nicolaus A. Otto, Cologne, Assignor to the Gas Motoren Fabrik Deutz, Deutz-on-the-Rhine, Germany.
 - 390,092. Igniting Apparatus for Gas or Oil Motor Engines. Nicolaus A. Otto, Cologne, Assignor to the Gas Motoren Fabrik Deutz, Deutz-on-the-Rhine, Germany.
 - 390,180. Dynamo-Electric Machine. William Mather and Edward Hopkinson, Manchester, and John Hopkinson, Westminster, England.
 - 390,191. Grate. Carl Sahler, Cologne, Prussia, Germany, Assignor to F. A. Herberts, same place.

THE METALLURGY OF STEEL.*

By Henry M. Howe.

(Continued from page 242.)

E and D, the upper members of this group, thus acquired, are not removed or rendered finer by simply lowering the temperature again towards W (7-8). E, acquired at a bright yellow, grows coarser and changes to D as the temperature rises to bright whiteness (5, 6, 22-3, 38-9, 45-6, 60-1). In slow cooling below W, E and D change gradually with changing carbon in passing through and below the critical range W-V to the cement-carbon hackly B and A respectively, the former medium, the latter coarse (B, 16, 30, 52, 56; A, 17, 31, 53, 57). During this transition D passes through the dull-crystalline fracture I (9, 10, 67), and it is probable that further study would detect similar transitions states following E and F.

D is also acquired during slow cooling from the melting point to W (78).

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If D be preserved by sudden cooling, and if the metal be again gently heated, as its carbon gradually changes to cement its fracture first becomes dull porcelanic. H, as V is approached (25-6, 33-4), changing further to flaky crystalline G as the temperature nears W (27-8, 35-6), at W of course changing suddenly to the bright porcelanic F (37). Similar changes probably occur in case of fracture E.

b. Group 2, Transition Fracture, I. Our data are too scanty to permit us to speak with certainty concerning this transition fracture, but the following hypothesis appears to fit our present facts. The transition from the granular-crystalline hardening-carbon group (F E D), to the hackly cement-carbon group (C B A), is not sudden like the reverse change, but occurs gradually as the steel cools through the range W V, thus corresponding to the gradual simultaneous change of carbon from hardening to cement. While this change is occurring the faces of the crystals become dull: this suggests that the cohesion between the particles of each individual crystal is no longer in great excess over the adhesion between the

TABLE 85.—GENERAL SCHEME OF BRINELL'S FRACTURES. Condition of Carbon: †† all hardening; †* part hardening, part cement; ** all cement.

GROUP 1. ††	GROUP 2; transition from †† to ** between W and V.		GROUP 3. **		GROUP 4. Transition † to * between 20° Cent. and redness.	
	Dull crystalline.		Bright hackly (pointed crystalline).		Dull porcelanic.	
<p>Bright { Porcelanic, and granular-crystalline</p> <p>Acquired. All the * groups (2, 3, 4) change suddenly to F at W, as * changes to † when † changes to F and D acquired on solidification.</p> <p>Lost. Change to corresponding members of groups {2} {3} {4} at temperatures between W and V and low redness. † change to coarser {E} {D} when temperature rises to {bright yellow} {bright white}</p> <p>F. BRIGHT PORCELANIC, no decided crystallization visible to the naked eye.</p> <p>Acquired. 1. On sudden solidification. 2 to 7. Succeeds groups 2, 3, 4 at W, suddenly.</p> <p>Lost. 8. Changes to C when temperature descends from W past V. 9. Changes to H when temperature rises from 20° C. towards V. 10. Changes to E when temperature rises from W to lighter yellow.</p> <p>E. FINE GRANULAR-CRYSTALLINE. FACETS SILVER-SHINING (Metallic, fiery).</p> <p>Acquired. 10. Replaces F when temperature rises to bright yellow.</p> <p>Lost. 11. Changes to B when temperature descends from light yellow past W and V. 12. Changes to D when temperature rises from bright yellow to bright whiteness.</p> <p>D. COARSE GRANULAR-CRYSTALLINE. FACETS SILVER-SHINING (Metallic, very lustrous). FRACTURE WHITE (Metallic, yellowish).</p> <p>Acquired. 12. Replaces E when temperature rises to bright whiteness. 13. Acquired on slow solidification. 13-5. Sometimes replaces I-from-D when temperature returns to W.</p> <p>Lost. 14. Changes to I when temperature descends from bright whiteness past W and V. 15. Changes to H when temperature rises from 20° C. towards V.</p>	<p>Acquired. Succeeds Group 1 gradually when temperature descends from above W towards V.</p> <p>Lost. Changes to Group 3 gradually, when temperature descends from above V to below V.</p>	<p>Acquired. Gradually succeeds Groups 1, 2, as temperature descends slowly from W or above to some point below W.</p> <p>Lost. Change suddenly to F when temperature rises to W. Do not change below W.</p>	<p>Acquired. Gradually succeeds Group 1 as temperature rises from 20° C. to points between a brown tint temperature and V.</p> <p>Lost. Change to § 2 as temperature rises still farther, to between V and W.</p>	<p>Acquired. Succeeds § 1 as temperature rises to between V and W.</p> <p>Lost. Change to F as temperature rises to W; i.e. crystallization is effaced.</p>	<p>Color of the fracture inclined towards BLUE.</p> <p>Color of the fracture inclined towards BLUE.</p> <p>Color of the fracture inclined towards BLUE.</p> <p>Color of the fracture inclined towards BLUE.</p>	<p>Color of the fracture inclined towards BLUE.</p> <p>Color of the fracture inclined towards BLUE.</p> <p>Color of the fracture inclined towards BLUE.</p> <p>Color of the fracture inclined towards BLUE.</p>
<p>Characteristics of group as a whole.</p> <p>Finer members {E} {D} change to coarser {E} {D} when temperature rises to {bright yellow} {bright white}</p>	<p>Change of † to * being completed.</p>	<p>Change of † to * being completed.</p>	<p>Change of † to * being completed.</p>	<p>Change of † to * being completed.</p>	<p>Change of † to * being completed.</p>	<p>Change of † to * being completed.</p>
<p>Characteristics of separate members of each group.</p> <p>F. Acquired. 1. On sudden solidification. 2 to 7. Succeeds groups 2, 3, 4 at W, suddenly.</p> <p>Lost. 8. Changes to C when temperature descends from W past V. 9. Changes to H when temperature rises from 20° C. towards V. 10. Changes to E when temperature rises from W to lighter yellow.</p> <p>E. Acquired. 10. Replaces F when temperature rises to bright yellow.</p> <p>Lost. 11. Changes to B when temperature descends from light yellow past W and V. 12. Changes to D when temperature rises from bright yellow to bright whiteness.</p> <p>D. Acquired. 12. Replaces E when temperature rises to bright whiteness. 13. Acquired on slow solidification. 13-5. Sometimes replaces I-from-D when temperature returns to W.</p> <p>Lost. 14. Changes to I when temperature descends from bright whiteness past W and V. 15. Changes to H when temperature rises from 20° C. towards V.</p>	<p>The transition fracture from F towards C has not been described.</p> <p>The transition fracture from E towards B has not been described.</p> <p>The transition fracture from I towards A has not been described.</p>	<p>C. FINE HACKLY. FACETS SHINING. FRACTURE-COLOR INCLINED TOWARDS BLUE.</p> <p>Acquired. 5. Succeeds F as temperature descends from W to some lower point. Change probably gradual.</p> <p>Lost. 3. Changes suddenly to F when temperature rises to W. Does not change below W.</p> <p>B. HACKLY. FACETS SHINING. [BLUE.] Color of the fracture inclined towards BLUE.</p> <p>Acquired. 11. Succeeds E as temperature descends from light yellow to some point below W. Change probably gradual.</p> <p>Lost. 4. Probably changes suddenly to F when temperature rises to W.</p> <p>A. COARSE HACKLY. FACETS SHINING. Color of the fracture inclined towards BLUE.</p> <p>Acquired. 17. Gradually succeeds I as temperature descends from a bright white to some point below W.</p> <p>Lost. 15. Changes suddenly to F when temperature rises to W. 16. When freshly formed, changes to I when temperature rises from V towards W. Does not change below V.</p>	<p>H-from-F.^a PORCELANIC: dull; fibrous. Wholly without crystallization. DARK GRAY.</p> <p>Acquired. 9. Gradually succeeds F as the temperature rises from 20° C. to points between a brown tint temperature and V.</p> <p>Lost. 18. Changes to C when temperature rises still farther, to between V and W.</p> <p>H-from-D.^a PORCELANIC: dull; fibrous. Wholly without crystallization. DARK GRAY.</p> <p>Acquired. 15. Gradually succeeds D when the temperature rises from 20° C. to points between a brown tint temperature and V.</p> <p>Lost. 19. Changes to G when temperature rises still farther, to between V and W.</p>	<p>C.^b FINE HACKLY. FACETS SHINING. FRACTURE-COLOR INCLINED TOWARDS BLUE.</p> <p>Acquired. 6. Changes to F as temperature reaches W.</p> <p>Lost. 13. Succeeds H-from-F as temperature rises to between V and W.</p> <p>18. Changes to F as temperature reaches W.</p> <p>19. Succeeds H-from-D when temperature rises to between V and W.</p>	<p>G. LEAFY CRYSTALLINE. FACETS SHINING. Color of the fracture inclined towards BLUE.</p> <p>Acquired. 7. Changes to F as temperature reaches W.</p> <p>Lost. 19. Succeeds H-from-D when temperature rises to between V and W.</p>	

faces of adjoining crystals, and hence the surface of fracture penetrates here and there beneath the crystalline faces, and the particles of one crystal adhere to and dull the faces of its neighbor. Though the crystals are thus dulled, we have no evidence that their form is changed. This dulling of the facets is apparently the essential feature of the transition fracture I.

Let us now trace this transition, and note the effects of arresting it at different stages, whether by sudden cooling, or by a rise instead of a further fall of temperature.*

I. *At V+*. If D be acquired by heating to bright whiteness, and if the steel be now slowly cooled to V+, and if the structure acquired thereby be fixed by quenching (9, 77), we find that part of the crystals have entered the transition stage, are dull-faced, I, suggesting that fracture penetrates beneath their faces. Others remain unchanged, mirror-bright, as D, suggesting that the fracture still follows their faces accurately. Part of the carbon has simultaneously changed from hardening to cement. But in descending from W to V+ the change of crystallization appears to be so slight, so merely incipient that the old crystallization has simply tottered, not fallen; so that if the temperature immediately return to W (72) the old regime, fracture D, is completely restored even in those crystals which at V+ had changed to I.

D thus regained is not further changed by raising the temperature above W (73), but it changes as usual to A (doubtless through I) when the temperature again falls slowly past W and V (74-5), carbon changing to cement.

II. *At V*. If D be acquired by heating to bright whiteness, and if the steel be slowly cooled a little farther than in the case last considered, to wit to V, and if the structure now acquired be fixed by quenching (10), we find that those crystals which at V+ had become dull, I, have now apparently changed to hackly, A, while the rest have become dull, I, preparatory to that change, and we have the composite fracture AI. In verification of his belief that the carbon of some crystals had changed to cement, while that of the others still remained hardening, Brinnell found that on polishing a bar of steel thus treated, shining specks scattered across the surface stood up above the surrounding steel: with a diamond he found them harder than the rest: while etching for twenty-four hours with very dilute nitric acid made one set of crystals stand forth sharply beyond the others, which were far more corroded by the acid. This, however, is not conclusive: the harder crystals may have been cementite, surrounded by the softer pearlyte.

If, after this slow cooling to V, we raise the temperature, the hackly A (cement carbon) crystals change back to F on reaching W, their carbon changing to hardening: but the transition I crystals remain as I, and on now quenching we get a composite fracture IF (68). If, instead of quenching from W, we cool slowly to below V, I and F naturally change to A and C respectively, and the composite fracture AC arises (70). If the reheating from V be carried above W, the transition I crystals still remain unchanged, while F of course changes to E, and we naturally obtain the composite fractures IE and AB on sudden and slow cooling respectively (69, 71).

When the slow cooling was interrupted at V+ and the temperature then raised to W, the I crystals changed back to D: but in our present case (68-9) they remain un-

changed at and above W. We may conjecture that this is because the more extended slow cooling in the present case affects the structure more profoundly, so that, on the return to W, the pre-existing crystallization no longer asserts itself as before, the pre-existing great excess of the cohesion of the particles of each individual crystal over the cohesion between adjoining crystals is not so completely restored, fracture does not follow the crystal faces so accurately as before, dull faced crystals, I, persist.

III. *Below V*. If the slow cooling be carried but slightly below V, the transition probably becomes complete. This is indicated indirectly. On immediately reheating steel whose temperature has fallen from bright whiteness to slightly below V, fractures F and E arise as soon as we reach W and bright yellow respectively (65-6). Now if, on cooling to just below V, the change from granular to hackly were incomplete, then when the temperature rises again to W and a bright yellow we would find composite fractures, as in the cases under II: while in fact we obtain F and E unmixed. Again, Coffin states^b that if steel be heated to W, quenched to V and thence slowly cooled, its fracture is perfectly porcelanic. The means at his disposal did not permit close measurements of temperature, and it is probable from analogy that his quenching cooled the steel slightly below instead of just to V. This indicates that F does not change to C at temperatures materially below V, and suggests that the change from F to C, which occurs regularly when steel with fracture F is slowly cooled from W to X, is completed before the temperature has fallen materially below V.

V then appears to be a critical temperature for these changes of fracture.

IV. Finally, if the slow fall of temperature be carried far below V and arrested at a blue oxide-tint, and if the temperature be raised again to W or bright yellow or bright white with subsequent quenching, we still obtain the characteristic fractures of these three temperatures, F, E and D, just as in the last paragraph (59, 60, 61), which naturally change to hackly C, B and A if slow cooling, which changes the carbon to cement, replace this quenching (55, 56, 57).

c. *Group 3*. The eventual change of the granular-crystalline hardening-carbon fractures F, E and D, to the hackly cement-carbon ones C, B and A on slow cooling from the formation-temperatures of the former to below V, is illustrated by experiments 15, 29, and 51; by 16, 30 and 52; and by 11, 17, 31, 53 and 75 respectively. In each case we assume that a granular fracture, F, E or D, existed before the slow cooling, because we find it in a parallel experiment in which sudden is substituted for slow cooling.

The hackly fractures thus acquired do not change unless the carbon changes back to hardening, *i. e.* unless the temperature rises again to W, at which point they are effaced and changed to F. Repeated heating and cooling, swift or slow, between the cold and V, do not affect them^c.

(TO BE CONTINUED.)

NOTE.—The publishers of the ENGINEERING AND MINING JOURNAL will thank the readers of this article if they will promptly call attention to any inaccuracies they may observe in it.

* The transition from D to A has been studied: those from E to B and from F to C have not: but it is not improbable that transition fractures analogous to I may be developed in these latter cases by interrupting the transition.

^b Mechanics, Dec., 1867, p. 313, Proposition 9: Trans. Am. Soc. Mech. Engineers, IX., 1888. Coffin terms this fracture "Perfectly amorphous."
^c Idem, proposition 5.

PERSONAL.

Mr. E. K. Stevenot, M.E., of Angel's Camp, Calaveras County, California, will leave next week for Europe.

Mr. Carlyle, late of Montreal, Canada, is preparing a topographical map of Aspen and Smuggler mountains, Colorado.

Mr. John G. Brill, the car-builder and founder of the Philadelphia Car Works, died in that city on the 22d inst., aged seventy-one.

Mr. Charles Hallam, manager of the Durant Mining Company, of Aspen, Colo., has resigned. He is succeeded by Mr. Hal Sayer, of Denver.

Mr. M. V. Smith, metallurgical engineer of Pittsburg, Pa., has been appointed Consulting Engineer to the Minnesota Car Company, of Duluth, Minn., with headquarters in Pittsburg.

William Miller, Chairman of the Miller Forge Company, Limited, of Pittsburg, one of the oldest and best known iron manufacturers of that region, died on the 21st inst. at his home in Allegheny City, Pa.

Thomas F. McDonald, a pioneer oil operator on Oil Creek, one of the first to develop territory in the famous Pithole region, and who was prominent in introducing pipe line transportation of petroleum, died on Tuesday in Montreal. He was 63 years old and a native of Brooklyn.

INDUSTRIAL NOTES.

The Spanish Government's engineering work at Bilbao, for the improvement of the port, will cost about \$5,000,000.

The Birmingham Rolling Mill Company has as many orders on hand as can be filled between now and the first of next year.

Slack Furnace No. 2 will blow in a few days. The capacity of this furnace is 100 tons per day. Furnace No. 1 is now making ninety tons of iron daily.

The Boston (Mass.) Electric Light Company has recently ordered from the Brush Electric Company, of Cleveland, 25 double arc lamps of 2000 c. p. each.

The North Chicago Rolling Mill Company's plant at South Chicago is again in full operation, after being shut down a month, and 1800 men are at work again.

The American Institute Fair opens on Monday, October 2d. The Institute Hall on Second and Third avenues, between Sixty-third and Sixty-fourth streets, shows signs of active preparation.

It is reported that the Metropolitan Underground Railway, London, will substitute electric engines of 200 horse-power each, three together in each locomotive, working independently, for steam locomotives.

There is to be seen at the Centennial Exposition of the Ohio Valley and Central States, now being held at Cincinnati, a beautiful cottage constructed entirely of iron. This display is by the Cincinnati Corrugating Company.

A Swedish engineer, M. Lundberg, has constructed a railway car, which, in a few minutes, may be adapted to five different gauges of track, the narrowest being .890 m. The invention has been patented in several foreign countries.

It is stated that W. H. Pitt, Professor of Chemistry in the Buffalo High School, has discovered a new process for refining Ohio petroleum. He has already refined 200 barrels. The process is covered by patents. In August a company was formed having \$250,000 stock, and with George H. Van Vleck as President.

It is reported that the Pioneer Mining and Manufacturing Company, of which Sam Thomas, of Pennsylvania, is president, will build a new furnace and rolling-mill at Thomas, four miles from Birmingham, Ala. The total cost will be \$500,000. The furnace will have a capacity of 100 tons of pig-iron per day, and the rolling-mill 150 tons of merchantable iron daily, and will give employment to over 1000 men.

Mr. S. R. Krom has received another large order for machinery and supplies, including two sets of his 30-inch improved standard steel rolls for the Mount Morgan Gold Mining Company, of Queensland, Australia. This makes altogether eight sets of rolls which Mr. Krom has furnished this company, and it demonstrates again the excellent quality of Mr. Krom's work and the favor with which American machinery is received in the Australian colonies.

The City of Malden, Mass., has made a contract with the Cunningham Iron Works Company, of Boston, for the sum of \$20,940, to build a wrought-iron reservoir to contain 1,158,000 gallons of water. It will be 75 feet in diameter and 35 feet high, and built of plate iron $\frac{1}{4}$ of an inch in thickness and of a tensile strain of 50,000 pounds per square inch of section. This reservoir will contain 4,344 tons of water when full, and is the largest iron reservoir on this continent.

The Keystone Bridge Company has a contract to erect at St. Paul a bridge which, it is said, will be one of the highest in the world. The bridge will extend from the end of the bridge spanning the Mississippi River at St. Paul across a flat to the top of a high bluff. There will be about twenty spans, four of which will be 250 feet each in length, one about 170 feet, and the remainder from 40 to 90 feet. The ends of the

spans will be supported on trestle bents, some of them being 150 feet high. The bridge is to be of iron and steel, and the work will be especially heavy.

The Beckett Foundry and Machine Company has bought the entire plant and business of the Beckett & McDowell Manufacturing Company, and will continue that business with increased facilities, the works having been very much improved during the past year by the addition of a new foundry and erecting shop, etc. Mr. Samuel A. Beckett, of Arlington, N. J., is President and General Manager of the new company, and Mr. Frank A. Chapman, of Morristown, N. J., Secretary and Treasurer. The company will shortly commence the manufacture of Corliss engines.

The Wisconsin Mitis Company, of Milwaukee, is now prepared to manufacture wrought-iron and steel castings under the "Mitis" process, which has been in such successful operation in Sweden, England and France for the past three years. By this process wrought iron is successfully melted and cast in such shapes as may be required, entirely avoiding the expensive process of forging, and meeting the demand for a material stronger than malleable iron, flexible and weldable to the highest degree. The castings do not require annealing, and the shrinkage is one fourth inch to the foot.

It is reported from the City of Mexico that the Government has signed a contract with the Mexican Central Railroad by which the latter agree themselves, or by other agency, to deepen the bar at Tampico, the terminus of their Gulf line, thus making it a harbor that can be entered by shipping instead of an open roadstead where the steamers have to lie two miles off shore, and shippers are put to a heavy expense for lighterage. This will prove a very serious matter for Vera Cruz, and consequently for the Mexican Vera Cruz Railroad, as Tampico will possess such a decided advantage over the other port that the larger part of the traffic should be attracted to it.

CONTRACTING NOTES.

Machinery and supplies wanted will be found on page xiv.

Contracts open will be found on pages xiv and xv. This week, proposals are invited for the following new contracts: No. 1083, Water-Works; No. 1084, Water Works; No. 1085, Pumps and Boiler Engine House; No. 1086, Iron Bridge; No. 1087, Bridge; No. 1088, Light-House Dwelling; No. 1089, Dredging; No. 1090, Dredging; No. 1091, Excavating Channel and Building Dyke; No. 1092, Dredging; No. 1093, Construction of Breakwater; No. 1094, Dredging; No. 1095, Materials for Boilers and Machinery; No. 1096, Construction of Iron Bridge.

A. M. Shannon & Co., of Galveston, are the lowest bidders for the construction of the government jetty at that port, at the price of \$402,475.

The Standard Underground Company, of Pittsburg, has closed two large contracts for electric light cables for Chicago. One contract was made with Prof. J. P. Barrett, superintendent of the Electrical Department of Chicago, for 5 miles of electric light cable, which will connect with the municipal light station of that city, and distribute the current to 65 arc lamps, each having a lighting capacity of 2,000 candle-power. The other contract is to furnish 50,000 feet of cable for the Consumers' Electric Cable Company, of the West Side, Chicago. The incandescent electric light will be used in the latter place, and the Westinghouse Electric Company have secured the contract for furnishing the lamps.

GENERAL MINING NEWS.

Shipments of iron ore from the mines of the districts mentioned below for the season up to and including September 19th, as reported by the *Marquette Mining Journal*, were as follows:

	Tons. 1888.	Tons. 1887.
Marquette, Marquette District	569,716	617,322
St. Ignace, " "	85,487	70,943
Escanaba, " "	591,575	662,287
" Menominee District	750,341	863,286
" Gogebic District	128,647
Ashland, " "	781,771	828,643
Two Harbors, Vermillion District	253,965	285,640
Total tons	3,161,502	3,333,121

ALABAMA.

JEFFERSON COUNTY.

At the Pratt mines, near Birmingham, Ala., there are 690 coke-ovens in blast, which use daily about 1500 tons of coal. A good quality of coke is made. Fifty ovens are about ready to go in blast, and work on seventy-five more was begun this week. This coke department is under the charge of Mr. P. B. Sims, an experienced coke burner from Tracy City, Tennessee. The output of the Pratt mines last month was over 85,000 tons, which is some 10,000 tons above any previous record. The daily output for this week has been over 3600 tons.

TALLADEGA COUNTY.

MAY VIRGINIA COMPANY.—This company has driven over 200 feet of tunnel, and the superintendent reports the ore at this level richer in free gold than ever before. Two or three veins outcrop on the property. The vein in the present tunnel is from six to ten inches thick. The hoisting machinery and concentrators have arrived and been placed in position. Stopping will be commenced this week and the mill run to its full capacity.

ALASKA.

We have received the following from an occasional correspondent:

TREADWELL MINE.—The additional 120 stamps at the mill commenced to drop August 11th. Everything worked smoothly, not a hot-box in the mill. This speaks volumes in favor of the engineer, millwright, and all employed. Alaska has now not only one of the largest gold mines, but also one of the best built, perhaps the largest stamp-mill under one roof, in the world. At present steam and water are used as motive power. This season has been an unusually dry one, but Superintendent Fuller informs your correspondent that he thinks the 6-foot Knight's Hurdy Gurdy wheel will drive the whole works alone. It has been raining the last few days and it is hoped the supply of water will be ample shortly.

At the chlorinization works the foundation for four more furnaces is being laid which when finished will give a row of 12 furnaces having a total length of hearths 820 feet by 3 feet wide.

The other parts of the works are amply sufficient for the additional work.

TAKOU UNION COMPANY.—The stamp-mill for this company arrived on the last boat, and will be erected as fast as circumstances will permit.

On Sheep Creek, just across Gastineau Channel, opposite the Treadwell mines, very fine ore has been found, consisting of galena, zinc blende and quartz mostly, but runs well in gold and high in silver. The camp is very conveniently located, and the owners of claims there are now investigating their prospects. This class of ore, of course, leaves the erection of stamp-mills out of question; but, if found in sufficient quantities, will lead to other industries. Reports from Berner's Bay, Glacier Bay and other districts continue favorable, and development work done has in most cases proven satisfactory.

ARIZONA.

PIMA COUNTY.

CRITTENDEN.—Marder, Luse & Co. are erecting a 30-ton copper furnace, which will be ready for business in two weeks. This will give them a good-sized plant and will enable them to handle a great deal of ore.

PINAL COUNTY.

REYMERT COMPANY.—The mill at De Noon is running ten stamps on ore. The remaining ten stamps will soon be ready to drop.

SOUTHERN BELLE.—This mill is running with excellent results on ore from Mr. Brajevich's gold mines at that place.

WOODPECKER MINING COMPANY.—It is rumored that this company, near De Noon, is preparing to resume development work.

CALIFORNIA.

STANDARD CONSOLIDATED MINING COMPANY.—The official statement sent us by the company shows: balance on hand August 1st, 1888, \$39,145.06; expenses, \$9,901.64; balance on hand September 1st, 1888, \$29,243.42.

AMADOR COUNTY.

SUTTER CREEK GOLD MINE.—The superintendent writes us: "The mill is closed down at present on account of the slackness of water. We are driving the main tunnel, and the ore looks much better. We will resume milling about November 1st. Bids have been asked for ten more stamps. With this addition to the mill and with water brought from a different source, we will be able to declare dividends."

CALAVERAS COUNTY.

CARSON HILL MINE.—The *San Francisco News Letter* says: The sale is now reported of this celebrated mine to an English company for the sum of over \$300,000. This property is located near the celebrated Morgan mine, now owned by Senator Fair, where the first gold quartz was discovered in California, a piece of which raised such an excitement in England in 1852, when exhibited by Senator Guinn in Exeter Hall. It was the means of bringing the first large amount of English capital into this State. The Carson Hill sale was effected through the agency of Mr. Lawson.

STANISLAUS COUNTY.

KEYES MINING COMPANY.—The stockholders election of this mining company, ordered by the Superior Court to take place last week in San Francisco, resulted in the removal of the old board of directors and the election of an entirely new board, with Frank Shea still President, and Col. P. J. Keyes Superintendent.

TRINITY COUNTY.

The Cinnabar mines are now being worked, and the cost of producing quicksilver therefrom is but 17 cents per pound, says the *San Francisco News Letter*. The Altoona mines are being worked by a force of 12 men in getting outore and developing the ledge.

TUOLUMNE COUNTY.

The mine near Columbia, recently sold by John Leechman to the London Company of Mines, is said to have turned out a failure. The home management being dissatisfied with the way matters were running at the property, had an examination made in their interests, the result of which has been an order from London to close down.

COLORADO.

DENVER.—A meeting was held in this city on the 25th instant of considerable interest to Colorado smelting operators. Some time ago the Burlington & Missouri River Railroad reduced the tariff on Colorado ores from \$5 to \$4 per ton. The smelter men objected to this reduction, on the ground that it did not apply

also to bullion shipments. They claimed that it gave the buyers at Omaha and Kansas City an advantage over the Colorado buyers, and have been making vigorous protests. The representatives of Colorado and other eastern roads met to hear the reasons of the Colorado smelter men protesting against the reduction.

BOULDER COUNTY.

[From an Occasional Correspondent.]

As you are aware the Caribou has shut down. No one seems to know exactly why. The pumps have been removed and the portion of the mine below the 600 allowed to fill with water. One man says: "It is because the expense of cross-cutting from the shaft to the lode is so great." But this cannot be the case, as the cross-cutting is already done. Another says: "They have lost the lode and cannot find it again." Possibly this is the real reason for the action taken, but I hardly think so. Another account says that a new shaft is to be sunk and so on. All agree, however, on one point, viz.: that the closing of the mine hurt Boulder County.

The Poorman seems to be doing well, and is said to have large reserves of rich ore in sight.

The concentrating mill at Nederland is running and seems to be successfully treating the low-grade ore which forms so large a portion of the dump at Caribou.

At Ward the interest centers about the old Niwot, which has been leased and bonded by the Tabor Investment Company, of Denver. The mine has been cleared of water, and a force of about 15 men is engaged getting things in shape for mining. There is undoubtedly a large body of ore in the Niwot, and as the new management has been told where to look for it, success should follow this new opening of the old property. The mine has been closed since December 31st, 1881, and in the interval many things have happened that will materially aid the present management in attaining the success that was denied its predecessors. The railroad is running within five miles of the mine, transportation is cheaper and more certain, supplies of all kinds are much cheaper, and last, but not most important, smelting methods have been greatly improved and charges for treatment reduced, so that Niwot ore of the same grade is worth 30 per cent more now than it was worth seven years ago.

Among the other mines now working at Ward, may be mentioned the Columbia, owned by Mr. Hulings, and leased to Mr. Brown, who is operating it in connection with his concentrating mill; the Boston, in which large bodies of good ore are opened up; the Utica, into which the Boston ore bodies extend; the Baxter, Modoc, Morning Star, Morning Star Extension, Celestial Extension and Gage.

The Niwot, Columbia, Baxter, Boston, Utica, Sucker and a number of smaller claims are all on the Columbia vein, which seems to be the "mother vein" of the district, and is "opened up" for a distance of about six thousand feet. If these claims could all be consolidated under one management, they would make a grand property, but they will never be consolidated, and therefore will never be worked as they should be. It seems a pity that a consolidation so desirable in every way cannot be effected; but the owners never have been able to agree on any plan, and I do not believe it possible to devise a plan that would be satisfactory to all concerned. It is the old trouble, too many owners.

Colonel Brainerd, President of the Chicago & Colorado Mining Company, is developing some of the company's properties, and one of them, the Gage, is looking very well indeed. I hope the colonel will be successful. He deserves success. He and Mr. Hastings have been the faithful ones who stood by the district through storm and sunshine, and by their steady faith in the value of its mines encouraged others to persevere. That the district is prosperous to-day is due almost entirely to their work. I do not wish to be understood as saying that Ward is booming; far from it. It has had its booms, been injured more or less by all of them, and, it is to be hoped, will never boom again.

In the list of producing mines given above I omitted the names of the Puzler and Gold Chief. Both are running and doing well.

The last rich "strike" reported in the county is in the Smuggler, at Ballarat. The mine is owned by S. S. Kennedy and others, of Denver, and is operated under the lease system. The lessees in whose ground the "strike" was made report that in ten days they have opened up fully thirty thousand dollars worth of ore. The Smuggler ore is very rich, and I have no doubt of the correctness of the statement.

CHAFFEE COUNTY.

GARFIELD LIMITED.—The superintendent reports that the production of this mine for the month of August amounted to \$18,140; expenses, \$8900; tons milled, 316.

EAGLE COUNTY.

Our correspondent at Red Cliff sends us the following:

The Manville Smelter, of Leadville, is handling the bulk of the Iron Mask ore. The Warrior's Mark, the largest fissure vein of this section, will shortly let another 100 foot contract. The owners are driving a tunnel to cut the vein 300 feet below the 3d level, which, when completed, will afford them several hundred feet of stopping ground. A 1000 foot contract has been let on the Star of the West, a once largely productive quartzite mine. The outcome may be favorable enough to induce the owners to resume operations. The Sylph, a carbonate lode, owned and operated by some St. Louis ladies, looks as though it might soon repay them for their perseverance. They have encountered a dyke of dolomite lime, standing on edge, which is highly impreg-

nated with some very fine mineral. The Belle shaft is pushing the incline from the bottom of the shaft, in order to pass the corner of the Polar, which, when effected, will enable them to work to more advantage, by the fact of their then having unlimited ground to operate in. They are extracting large quantities of iron, milling on an average \$40 per ton. The Garbutt, a carbonate mine, has uncovered one of the most singular chutes ever opened in the lime. It lies horizontally, like a quartzite chute. It is composed of one main ore channel, with numerous spurs leading from it. The most peculiar feature, by far, is the immense body of joint clay which caps the ore; this is something never heretofore witnessed outside of the quartzite. Mr. R. Hawkins and Mr. W. Maupin have a lease on the Bertha, which is looking very encouraging. Twenty tons shipped recently netted \$320, a very fine grade of ore for the lime. The long expected litigation upon the Apex question between the quartzite and lime contacts as to the rights of each, is in all probability soon to be put to test. The claims of both parties are in brief as follows: The quartzite men claim that it is their right to follow any ore chute cropping out upon the apex (the wall where erosion has taken place) continuously into the mountain, provided they are located with their side lines along the apex of the vein. On the other hand, the lime men make claim that, according to law, which reads that a claim shall hold all ground beneath it included within its side lines and end lines, they possess the right to the ore occurring in the quartzite strata underlying them. Messrs. Cheeseman and Clayton are now putting this question to test by sinking a shaft on their property to intercept the chutes in the quartzite immediately in the rear of the Champion's side line, and not far distant from the extension lines of the Ground Hog group. It is understood that three shifts will be put on, with machinery, and the work pushed. The event of this action will be watched eagerly by all parties interested about here and elsewhere. The average output of the camp at present is 125 tons per day.

GARFIELD COUNTY.

GRAND RIVER COAL AND COKE COMPANY.—A correspondent sends us the following:

Three miles above Glenwood in the valley of the Roaring Fork is Cardiff, where a spur track leaves the Midland and runs seventeen miles up into Jerome Park, tapping the coal mines of that district. Here the Grand River Coal and Coke Company have three mines in operation, one at Sunshine, in a hard anthracitic coal for household use, one at Marion, in coking coal principally used as fuel for the Midland locomotives, and one at Spring Gulch in a coking coal now utilized by the ovens at Cardiff for coke. All three mines are now in active operation. At Cardiff the coking industry is being pushed. Fifty ovens are now burning, fifty more almost ready to be fired, and fifty additional to be shortly started. The coke is found to be very low in ash, and is much desired by the lead smelters. The coal and coke industry is at present only in its infancy, and the mines under the personal supervision of Mr. W. J. Morgan, late of Pittsburgh, are being opened up as rapidly as wise engineering warrants. Contrary to the belief at one time prevalent, that the Sunshine seam was cut off, it is found in the second entry south to show a fine breast 8 feet thick.

The Glenwood people expect either the Midland or the Rio Grande Railroad, or both, to be shortly extended to Newcastle, and active coal mining to be begun on the excellent seams there outcropping.

LAKE COUNTY.

We take the following from the *Leadville Herald-Democrat*:

ADAMS.—This mine has increased its rate of shipments from 75 tons per day to 100. The output for the present month will be between 2500 and 3000 tons. This includes the concentrates produced by the mill.

HENRIETT & MAID CONSOLIDATED.—This mine is producing about 250 tons of lead ore per day. In the first part of the month the output was not at so large a rate.

IRON SILVER COMPANY.—The concentrating mill of this company is now running on low-grade ore taken from some of the old dumps around the McKeon shaft. The mill is dressing about 250 tons of ore per day. This ore is of considerably better grade than any ever run through the mill before, and consequently is run more slowly. The ore assays from 6 to 10 per cent lead and about 10 ounces of silver. From 5 to 6 tons are reduced to one and concentrates assaying about 40 ounces silver and from 30 to 40 per cent lead are produced. The *Mining Industry* says: The Iron Silver mill has been doing some remarkable work this summer. Although the mill was only designed to dress 250 tons of ore every 24 hours, as high as 550 tons have been run through in that time. There are only two sets of ordinary rolls in the mill and one Blake crusher. At this time the mill was dressing extremely low-grade ore. For six weeks the stock averaged only 1 per cent in lead and 3 ounces in silver. The concentrates that were produced assayed about 20 per cent lead and 25 ounces silver. It is said the mill made money, even when running on this very low-grade ore.

LEADVILLE.—It looks as if there were an impending revival in smelting in Leadville. The leasing of the La Plata for a number of years, and the fact that all the other smelters are running full, argues that the railroads have at least made concessions in some direction. Should this surmise be correct, it is safe to assume that the last quarter of 1888 will be one of the liveliest in the history of Leadville. The reported shutting down of the American smelter November 1st, has not been verified, says the *Dispatch*.

OURAY COUNTY.

VANDERBILT.—This mine is now outputting two carloads of ore per day. The character of ore is changing from galena to copper and the silver values are increasing rapidly. The last lot run 38 per cent copper. The tramway from the mine to the Mears Railroad will soon be completed, and when it is in working order two cars per day will be loaded.

PARK COUNTY.

BUCKSKIN.—The Phillips 50 stamp mill started up Wednesday of last week for steady running. The machinery all works very smoothly, and we understand gives entire satisfaction. The mill will treat from 60 to 100 tons of ore per day.

MUDSILL COMPANY.—The first bar of silver bullion from this amalgamating mill was shipped last week.

PITKIN COUNTY.

ASPEN.—This mine is having a wire tram erected by Mr. W. A. Loane.

SUMMIT COUNTY.

IRON MASK MINING COMPANY.—This company is our largest shipper of smelting ore, and is owned by Rogers Brothers and Riddell & Jones, the latter being the present Republican candidate for Attorney-General. Regular shipments are being made of eight carloads per week, which net the owners about \$3000. The formation is a lime-porphry contact, very similar to the Leadville contacts. According to a recently published statement, there are now about 700 men employed in mines about Breckenridge—over double the number employed a year ago.

The most important deal, says the *Leadville Daily Journal*, recently consummated is the sale of what is known as the Ware-Carpenter property, on the western slope of Farncomb Hill. The property consists of several hundred acres of valuable territory, originally located as placer ground, but which has proven eminently valuable on account of the rich veins of gold-bearing quartz that have been discovered.

Among the purchasers are Senators Hearst, of California, Fair and Mackey, of Nevada, and Gorman, of Maryland. The consideration was \$1,250,000—\$80,000 of this amount is to be expended in the erection of a mill for making tests of the ore, the balance to be paid if the tests are satisfactory. If they are not satisfactory, the entire property is to revert to the original owners. Under this arrangement about sixty men are now employed under Superintendent Havens, formerly of Leadville.

WIRE PATCH MINING COMPANY.—On the western slope of Farncomb Hill this company is operating the Elephant-Ontario property with great success. It started in under Superintendent Hutchins, with a milling capacity of but 30 tons. Since then, four Huntington mills have been added, and it is proposed to again increase the milling facilities to 160 tons daily.

CONNECTICUT.

FAIRFIELD COUNTY.

It is reported that about 20 miles east of Danbury in the neighborhood of Southbury, there has been discovered a six-inch vein of coal at a depth of 87 feet, which is said by a Pennsylvania expert to be a superior bituminous coal.

DAKOTA.

It is stated by the *Deadwood Pioneer* that during the next three months the Harney Peak Tin Mining Company will pay out, for mere assessment work on its Pennington and Custer County mines not far from \$40,000.

MICHIGAN.

COPPER MINES.

The Calumet & Hecla officials have come to the conclusion that the great fire was caused by incendiarism, as they are advertising a reward of \$2000 for "information which will lead to the conviction of the person or persons who set fire to Hecla shaft No. 1 at the sixteenth level on the 20th of November, 1887."

MONTANA.

LEWIS & CLARKE COUNTY.

MONTANA COMPANY, LIMITED.—Official advices to us show that the production for August amounted to \$71,500 from 7234 tons of ore, and the working expenses were \$42,000.

The report of the company states that the accounts show on net revenue account a balance of £49,530 for the half-year, out of which two quarterly interim dividends have been paid at the rate of 20 per cent and 5 per cent per annum respectively, amounting in the aggregate to £41,250. The profits earned in the months of July and August, 1888, and the estimated profit for the current month, enable the directors to declare a first quarterly interim dividend for the half-year ended December 31st, next at the rate of 5 per cent per annum, and it will be paid free of income-tax on October 15th next.

SILVER BOW COUNTY.

BLUE BIRD MINING COMPANY.—A shipment of two carloads of roasted ore from this company's mill is being made to the Marsac Mill, Utah, for trial treatment by the Russell process.

LEXINGTON MINING COMPANY.—The annual statement of the Société Anonyme des Mines de Lexington has been filed. The report shows that the capital stock of the company is 15,000,000 francs, and the amount actually paid in is 2,500,000 francs and the remaining 12,500,000 francs is represented by the Lexington mining property and the old Telegraph mine and smelters of Utah, which were bought and paid for prior to the formation of the above mining company. The cash value of the assets, including 1,000,000 francs in money, is estimated at 7,500,000 francs. The corporation has no liabilities and the operating expenses are paid monthly.

We take the following from the *Butte Daily Miner*:
PACIFIC MINE.—This mine is daily producing 40 tons of ore, which is reduced at the Butte Reduction Works. It is said that over \$240,000 has been produced from the mine from the time the Parrot Company threw up their bond on it for that amount.

POLLOCK MINING AND MILLING COMPANY.—The annual report of the condition of this company was filed with the county recorder last week. The amount of capital stock is \$1,000,000, and all paid in by the purchase and conveyance to the concern of the Pollock and Glengerry mines. They have no liabilities.

STEVENS AND BELLE OF BUTTE.—The Silver Bow mill is at present putting through 40 tons of ore from these mines, and also working considerable custom ore.

NEVADA.
UREKA COUNTY.

THE CORTEZ MINES, LIMITED.—This company has been formed with a capital of £300,000, of which £290,000 is paid as the purchase price in shares for the property, which is stated to consist of 29 distinct claims. The undertaking is represented as bringing in a net profit of \$48,000 a month, and the vendor, Mr. Simeon Wenban, states that he has organized the company to provide for its management in the case of his death for the benefit of his wife and daughters. The property may be a good one, and the directors in London are most respectable, but it does seem a little strange that the owner should prefer English management to American, as it would have been just as simple to organize here and probably secure better administration.

HUMBOLDT COUNTY.

ADELAIDE COPPER COMPANY.—The manager of the company writes us under date of September 20th: "Owing to the drought prevailing this summer causing a suspension of nearly all the works in the State, we are compelled to suspend our smelting operations, but we are hoping to resume at an early date, possibly by the last of October. The property has been well developed by drifts and cross-cuts, showing an immense body of ore. On the first of the month we shall commence sinking the main shaft to a greater depth, preparatory to opening up another level."

PARADISE VALLEY MINES.—A five-foot ledge is reported cut in this mine, 18 inches of which averages \$100 to the ton. How extensive this ore-body may be is not yet known, as the ledge was cut last week. Three shifts of men are at work upon it, and the rich ore streak is steadily widening. In the Wild Goose, which is owned by the Paradise Valley, a shaft has been sunk 100 feet in the tunnel, at the bottom of which there is a large body of good ore. The Cliff mine is looking well and yielding very rich ore.

STOREY COUNTY.

We learn that the principal mining companies contemplate sending 10 carloads of Comstock ore to the Marsac Mill, Utah, for an experimental run by the Russell process.

STOREY COUNTY—COMSTOCK LODGE.
 We condense the following from the *Daily Report* of San Francisco:

CONSOLIDATED CALIFORNIA & VIRGINIA.—On the 1500 level the retimbering of the main south drift has been completed. On the 1435 level the east cross-cut from south lateral drift No. 2 has a total length of 46 feet and is still in porphyry and quartz carrying some value. Have continued to extract the usual quantity of good ore from the stopes east of the winze below this level. On the 1500 level the parallel north drift is in 148 feet. They continue to extract ore from the southeast drift, which runs from the upraise above the parallel north drift, 58 feet above the track floor of this level. On the 1600 level they are still extracting ore from the stopes around upraises Nos. 1, 3 and 4; also from the drift south from the Ophir line 36 feet above the track floor of this level. On the 1650 they continue to stope out ore from the end of the south drift. During the past week they have shipped to the Morgan 1066 tons of ore and to the California mill 1447 tons. The average assay value of all the ore worked at the above mills during the week was \$36.33 per ton. Bullion was shipped to San Francisco during the week valued at \$123,679.77. There is bullion now on hand in the Virginia City office valued at about \$42,000.

THE OTHER NORTH-END MINES.—At the Ophir the repairs to the shaft on the 1465-foot station are about completed. They are still retimbering the old east drift from this station. Exploratory work will soon be resumed in the mine. The joint Mexican and Union Consolidated north lateral drift on the 1465-foot level from the Ophir shaft is in 210 feet. There is no change in the ground passed through. This drift will soon reach the Mexican line, and will be taken up and carried through Mexican ground to the Union. In the Sierra Nevada the face of cross-cut No. 3 on the 520 level is still in porphyry, clay, and quartz. In the Utah Consolidated the east cross-cut on the 472 level is out 140 feet, and is in porphyry and clay with small streaks of quartz. At the Andes they will begin to retimber the shaft this week, as it is greatly out of repair. There is no change to note in the Scorpion workings. At the Keyes mine the shaft will be put down deeper, as there are signs that it is entering a body of good ore. There are 40 tons of ore on the dump worth about \$200 per ton.

BEST & BELCHER.—The main northwest drift has been advanced 39 feet; total, 57 feet. West cross-cut No. 1 from the drift advanced 29 feet; total, 145 feet.
GOULD & CURRY.—The El Dorado level east cross-cut has been extended 21 feet; total, 56. Formation, low grade ore. The north drift started from west cross-cut

No. 2 has been extended 25 feet; total, 45. Upraise 45 feet south of cross-cut No. 2 has been carried up 5 feet; total, 109. East cross-cut from top of this raise has been advanced 8 feet. Formation, porphyry. The drain tunnel south drift started from east cross-cut No. 2 has been extended 27 feet; total, 39. Face in good milling ore.

SAVAGE.—On the 400 level work is resumed in the face of the northeast drift in favorable ground for good progress. The south drift, on the 300 level continues in a fair quality of ore, giving average car samples of \$28 per ton. This drift is extended 32 feet. Considerable repair work is being done in various parts of the mine.

HALE & NORCROSS.—Complete returns from the United States Mint have been received of the bullion produced from 2615 tons of ore worked last month at the Nevada mill. Following are the figures: Gross yield, \$87,142.52; gold, \$44,310.96; silver, \$42,841.56. A west drift has been started from the vertical shaft station on the 800-foot level.

YELLOW JACKET.—Good work is being done repairing the foundations to the machinery and other surface arrangements, all of which was found to be very much needed.

CONFIDENCE, CHALLENGE AND IMPERIAL.—Nothing but light repair work is being done in these mines owing to the temporary shut down at the Yellow-Jacket shaft.

CHOLLAR AND POTOSI.—The work in the Chollar mine during the week has been on repairs to the different levels and the opening of a new station on the 750 level, which is in and timbered 26 feet. The south drift on the 650 level of Potosi is in 384 feet. It is all in quartz giving low assays.

ALPHA AND EXCHEQUER.—The east cross-cut on the 982 level of Exchequer is in 90 feet. The face is in clay and porphyry. On the 500 level of Alpha the east drift is in 96 feet. The last eight or ten feet is showing fair assays.

CROWN POINT.—On the 700 level, cross-cut No. 1, west, has been extended to cut the ledge. The formation in the face is favorable. The drift from the Suro Tunnel is in 700 feet.

BELCHER.—On the 500 level the cross cut is now in 214 feet without change. The station at the head of the incline has been repaired and is in good order.

SEGREGATED BELCHER.—Seams of very rich black sulphuret and green chloride ore are being cut which are upraising from the 1300 level. The south raise is up 98 feet.

ALTA.—The extraction and concentration of ore from the 825 and 1150 levels goes regularly ahead as usual.

JUSTICE.—Work progressing well in the mining sections, and the erection of the new mill being pushed ahead as fast as possible.

OCCIDENTAL CONSOLIDATED.—On the 48 and 100 levels are stoping out. Have extracted 144 tons of ore, and shipped to the Atlantic mill 150 tons. Value of wagon samples, \$29.50 per ton.

NEW MEXICO.
GRANT COUNTY.

CARLISLE GOLD MINING COMPANY.—We have had sundry statements made to us with reference to the extremely low cost of mining and milling at this mine, and we have taken pains to ascertain the exact figures, which, under the conditions existing are most satisfactory. We are in a position to give authoritatively the costs of one of the months of this year: 7000 tons of ore broken in the mine, 4700 tons crushed in the 60-stamp mill, the total cost being per ton milled, no credit being taken for the ore remaining in the stopes, and which is monthly increasing: Mining, including timbering, tramming and hoisting, \$1.20 per ton; milling and concentration on 36 Frue vanners, 99c. per ton; general expenses, including management, 34c.; pumping and settling water, 36c.; total cost per ton, \$2.90. Owing to the high price (\$7 a cord for inferior quality) of fuel, with dear supplies and with labor at \$3 a day for a minimum, and with great shortage of water, these figures of cost must be considered as highly creditable to the management and satisfactory to the stockholders.

SOCORRO COUNTY.

Three furnaces of the Rio Grande Smelting and Refining Company's plant at Socorro are in blast. The fourth stack will blow in within a week.

NEW YORK.
COLUMBIA COUNTY.

BURDEN IRON MINES.—These mines, below Hudson, N. Y., are on fire. The fire is 300 feet from the opening, and is fed by scaffolding, railroad ties and timber supports. It will no doubt burn for several days, or until the food for the flames is exhausted.

NORTH CAROLINA.
CLEVELAND COUNTY.

We learn from a correspondent that for some months past prospecting for tin has been going on near King's Mountain, and a mill and concentrating plant are in course of erection and will be finished in about a month. This would point to a substantial find, especially if it be true, as is reported, that Messrs. Phelps, Dodge & Co., of this city, are interested in the venture under the advice of Dr. Ledoux and other experts.

PENNSYLVANIA.
SCHUYLKILL COUNTY.

LAWRENCE COLLIERY.—The vein at this colliery, operated by Lawrence & Brown, crops out directly under Mahanoy Plane, which is the great outlet for the Reading Company's coal from the Mahanoy Valley. If the breasts were worked out to the surface it would subside, and the result would be the utter destruction of the plane. Consequently the court has

only permitted Lawrence & Brown to cut in the upper lift to a distance of fifty yards from the surface and appended the condition that the coal must not be removed from the breasts.

Now, however, Lawrence & Brown propose to draw this coal and market it. On the 24th inst. the Reading company obtained a preliminary injunction to restrain them, and a hearing was fixed for Monday next. The operators claim that nearly a million tons of coal are involved, that they have been at great loss in cutting it and maintaining that portion of the mine, and as they assert that there is no danger they ask to be relieved.

On the other hand, the railway company is equally positive the plane will be destroyed if the operation goes ahead.

Exports of refined, crude, and naphtha from the following ports, from January 1st to September 22d:

	1888.	1887.
	Gallons	G. lbs.
From Boston	2,844,006	3,243,657
Philadelphia	96,677,037	118,476,397
Baltimore	5,641,387	6,490,152
Perth Amboy	16,591,941	11,632,006
New York	252,897,828	271,805,211
Total exports	374,633,199	411,653,833

It is reported from Pittsburgh that William L. Elkins, Peter A. B. Widener and Dr. A. B. Martin, Philadelphia capitalists, are largely interested, with the Globe Pipe Line Company, to work in competition with the Standard monopoly. Lines will be run from the Gold oil-field to Sharpburg and from the Marshall township field to Rochester, Pa., and Beaver Falls. It is stated that the project is backed by \$30,000,000 cash.

TEXAS.

Jesus Canales, Richard George, Samuel Richards and others have chartered the Mexican Tin Company, at Asland, Tex., to develop tin, copper, gold and silver mines. The authorized capital stock is \$1,000,000.

UTAH.

ENTERPRISE GOLD AND SILVER MINING COMPANY.—This company has been organized, with a capital stock of \$1,500,000, shares, \$5 each, to work the Enterprise mining claim, situated in Little Cottonwood mining district. The officers are: Thomas Capoon, President; J. B. Champion, Vice-President; E. C. Champion, Secretary, and Guy Willis, Treasurer, and they, with F. E. Schoppe, form the board of directors.

SUMMIT COUNTY.

We take the following from the *Salt Lake Daily Tribune*:

ONTARIO MINING COMPANY.—Mr. Russell recently made an experimental run at this company's mill with No. 10 screen on the 20-stamp battery, and crushed in 24 hours 98 tons Ontario ore, which was roasted in the same space of time in one Stedefeldt furnace without difficulty. The result of the treatment by the Russell process was an extraction of 94 per cent of the assay value. Mr. Russell will make another experiment with a No. 6 screen to ascertain whether the capacity of the stamps can be further increased advantageously. The product for the week was \$43,355 from ore sales; no bullion.

DALY MINING COMPANY.—The Marsac Mill now being erected to treat this company's ores by the Russell process is expected to be in operation by the end of October. The capacity of the mill will be 100 to 120 tons, which is to be roasted in one Stedefeldt furnace. The output for the week was 11,999 ounces.

WYOMING.

An Oil City (W. T.) correspondent of the *Pittsburg Leader* desires to be placed on record as saying there is more oil in Wyoming Territory than in Pennsylvania.

The Canadians claim that along the line of the Canadian Pacific Railway and in the Mackenzie Basin there is more oil and natural gas than in the whole United States. We are, therefore, comforted with the assurance that our supply will not be exhausted for some time yet, and as Canada will, one of these days, become a part of the United States, it will all be in this country.

The report of Inspector C. G. Epperson, for the quarter ending June 30th, shows the number of coal mines and their production, etc.:

NAME AND LOCATION OF MINE.	No. of tons.	Days worked.	Total No. men.	Average tons per miner.	Average tons per day each miner.
No. 2 carbon	62,884	75	333	209	2.8
No. 6 carbon	29,477	72	220	160	2.2
No. 1 Rock Springs	49,647	75	252	237	3.2
No. 3 Rock Springs	31,736	78	277	144	1.8
No. 4 Rock Springs	12,132	78	173	307	4.7
No. 5 Rock Springs	15,776	73	115	172	2.3
No. 4 Almy	39,040	67	306	163	2.4
No. 5 Almy Red Cañon	47,589	66	251	245	3.7
No. 6 Almy Red Cañon	687	71	15	15	0.2
Blair, Rock Springs	5,133	41	49	128	3.1
Vandyke, Rock Springs	3,108	60	18	207	3.4
Fetterman, Converse & Co.	3,000	70	34
	339,104		2,023		

No. 4 Rock Springs is run with machines. No. 6 Red Cañon and Fetterman are doing only entry work.

The output of the mines compares most favorably with the years 1886 and 1887 for the same period. In 1886 there were mined 189,983 tons, in 1887 there were 228,130 tons, and for the same months in 1888 there were mined 339,104 tons.

FOREIGN MINING NEWS.

CANADA.
NOVA SCOTIA.

A scheme that has been talked of for a year past is again said to be on foot for the investment of several millions of dollars of American capital in the coal mines of Cape Breton. Rufus Hatch is now in Nova Scotia and has under consideration several propositions of sale from some extensive mine operators.

COLOMBIA.

The Cana mines, in Colombia, lately developed by an English company under the title of the Darien Gold Mining Company, Limited, are, according to a French paper, in a fair way of redeeming their former reputation as to fabulous riches. The manager states that the new discoveries show ore enough for 100-stamp mill during 20 years, the quartz assaying 2 to 4 ounces in gold. There is nothing yet shown to establish the accuracy of these estimates.

MEXICO.

We take the following from the El Paso (Texas) Bullion:

The following table indicates the amount and value of the imports passing through the El Paso Custom House for the past week:

SILVER ORE.		
	Tons.	Value.
C. K. C. S. & R. Co	246	\$28,314
R. G. W. & R. Co	473	30,431
Don Enrique M. Co	58	4,257
Harmon & Rollins	30	2,825
	807	\$55,827
Mexican silver coin, Wells, Fargo & Co		118,134
Silver bullion,		13,074
Gold		5,987
Silver sulphides,		6,730
Total		\$199,752

A correspondent at Laredo, Texas, sends the following:

The mining interests around Villaldama are looking up, and the prospects for a steady output of bullion and ore for some time to come were never brighter than they are at present. The Mexican Guadalupe Company have their railroad completed from the Hacienda to the old El Carmen and St. Nicholas mines, a distance of about 18 miles. The company formerly paid from three and a half to four and a half dollars per ton to get the ore hauled on carts or pack animals. Now, however, the entire expense, including wear and tear of rolling stock, will not exceed fifty cents per ton, and the general manager, Capt. James Baxter, states that the output from these mines will shortly be doubled. At this place there is a 225-ton capacity "concentrator plant" ready to begin operations. The mining companies have large quantities of concentrating ore already mined and on the surface, but cannot get freight facilities from the railroad. This, however, will be remedied in a few weeks, when the running of construction trains will cease.

The Omaha & Grant agency have removed their headquarters from Monterey to Villaldama, the latter district furnishing about nine-tenths of all the ore produced on the northern frontier along the line of the Mexican National Railroad.

CACHAMOLE MINE.—We hear from a correspondent that Mr. Haggin and his partners have paid \$20,000 of the purchase money for this mine at Guanacavi, to which our special correspondent in Mexico referred in our issues of September 8th and 23d. The balance, \$180,000, is to be paid in two equal installments in six and nine months. Mr. R. C. Chambers, manager of the Ontario mine, Utah, visited the mine in August. It is intended to erect a large Russell process plant.

DURANGO.

IRON MOUNTAIN COMPANY.—We learn from one of our correspondents that this company is producing about 20 tons of charcoal pig a day. The puddling furnaces, foundry and rolling mill are all in operation and convert the product into wrought iron and castings as needed. The International Railroad is expected to reach Durango some time next year, when the iron company, with coal as fuel, can largely increase their output. Mr. Williams, of Philadelphia, has bought the Viejo mine, at San Lucas, about 50 miles north of Durango, and has got out good ore ranging from 100 to 200 ounces, and is now arranging to put up a smelter.

Mr. McCormack, of Pittsburg, has purchased the Bella Vista mines, about 100 miles to the north. This is believed to be a good gold property.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Sept. 28.

Production Anthracite Coal for week ended September 22d and year from January 1st:			
1888.			
Tons of 2240 lbs.	Week.	Year.	1887.
P. & Read, R.R. Co.	179,693	4,749,924	5,174,245
Cent. R. R. of N. J.	139,785	3,980,642	3,584,241
L. V. R.R. Co.	188,832	4,720,961	4,588,914
Dr. L. & W. R.R. Co.	152,797	4,792,823	3,945,650
D. & H. Canal Co.	106,585	3,177,731	2,707,431
Penna. R.R.	65,746	3,272,820	2,565,401
Penna. Coal Co.	30,537	1,204,419	1,080,630
N. Y., L. E. & W.	14,000	626,087	566,908
Total	877,975	26,505,407	24,185,420
Increase		2,319,987	

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.

Production for corresponding period:	
1883	22,907,226
1884	22,350,857
1885	21,250,857
1886	22,170,420

Production of Bituminous Coal for week ended September 22d, and year from January 1st:

EASTERN AND NORTHERN SHIPMENTS.			
1888.			
Tons of 2240 lbs.	Week.	Year.	1887.
Phila. & Erie R.R.	1,831	45,375	12,001
Cumberland, Md.	78,000	2,572,884	2,274,072
Barclay, Pa.	1,000	118,680	134,537
Broad Top, Pa.	7,000	250,826	232,684
Clearfield, Pa.	63,686	2,426,664	2,287,205
Alleghany, Pa.	14,301	559,706	626,906
Pocahontas Flat Top	25,992	1,001,747	728,369
Kanawha, W. Va.	31,276	1,141,113	968,179
Total	220,786	8,116,995	7,265,153
WESTERN SHIPMENTS.			
Pittsburg, Pa.	12,686	514,014	407,099
Westmoreland, Pa.	32,406	1,105,436	996,748
Monongahela, Pa.	9,111	293,001	272,516
Total	54,203	1,912,461	1,676,363
Grand total	274,989	10,029,456	8,941,516

Anthracite.

The anthracite trade keeps in excellent condition, better in fact than could have been expected, though but little coal comparatively has been sold at the last circular rates. The demand is active for stove and chestnut, fairly good for egg, weak for broken, and very bad for pea coal.

Nothing was done at the meeting this week of the sales agents, politics seeming to absorb more attention than the coal trade, which was left to take care of itself. There is little to be said about the future. The demand will slack off next month and will lessen a good deal during November. Every one expects this, and though some have talked of higher prices being quoted, the fact that they would simply make a basis for higher railroad tolls, and would not be obtained by the sellers, will, we think, effectually prevent any further advance.

The companies will all be very well pleased to be able to hold their present prices during the balance of the year. Undoubtedly the consumptive demand has absorbed a larger amount of coal than last year, though a portion of the enormous increase in marketed coal has gone to supply the stocks which the last hard winter had exhausted to a degree quite unusual, especially in the West. After next month a great many of the ports will be closed, and the demand for coal will naturally fall off in many directions.

The Western trade continues to take more coal than can be sent there, and from every point we learn that this year will stand at the very head of the record in the consumption of coal.

Chicago quotes, f.o.b. cars, \$7.25 for Lehigh Lump; \$6.25 for Grate, \$6.50 for Stove, Chestnut and Egg. The reports do not indicate that there is any accumulation of stocks even in second hands in any part of the country. The consumers themselves are filling up their bins, and, no doubt, have more on hand than they had at the same time last year. It is quite impossible to estimate the amount of coal which is carried in this manner, but it is guessed at, all the way from one million to two and a half million tons. Probably it is less than two millions. Chicago alone will take two million tons of coal this year.

The *Black Diamond* says that "while the consumption in the East has increased at the rate of about 4 per cent per annum, the growth in the West averages about 13 per cent. In Chicago it was nearly 23 per cent in 1887 over 1886; in Milwaukee, about 21 per cent, and at the head of the lakes, over 30 per cent." And it claims that this year will show a still heavier increase than last year.

Our remarks on the enormous waste in anthracite coal mining have attracted a good deal of attention, and are being discussed in many quarters. We shall have something more to say on this subject in an early issue.

Prices remain as follows for free-burning coal f.o.b. New York shipping ports:

Broken	\$3.95	Chestnut	\$4.65
Egg	4.30	Pea	\$2@22.25
Stove	\$4.65		

Bituminous.

There is nothing new to report in bituminous coal. The market moves along in the same steady manner as for a long time past, with no indications of a change.

In the West, reports of bituminous coal indicate as rapid an increase in consumption as of anthracite.

Prices remain as heretofore, namely: \$2.60 f.o.b. Baltimore and Georgetown, and \$3.25 for New York Harbor.

Several months ago the different railroads leading from Pittsburg agreed to a rate of 90 cents per ton on all coal shipped within a radius of 40 miles of Pittsburg to the lake ports. For some time past the Pittsburg operators have claimed that firms outside the 40-mile limit are securing the benefits of the 90-cent rate, and these, it is said, can have coal mined at from 25 to 30 cents per ton cheaper than operators nearer Pittsburg. At the last meeting of the Pittsburg Railroad Coal Association a committee was appointed to protest against the abuse. The new scale of 79 cents per ton to be paid the miners goes into effect November 1st, as per agreement of the interstate convention of miners and operators held in Pittsburg the first of the year. It will be an advance of 5 cents per ton over the present rate.

Boston.

Sept. 27.

[From our Special Correspondent.]

The best market for anthracite coal at this port is for cargoes afloat. Those sell readily at or close to full prices. Buyers know when they can expect the

coal and do not hesitate as in the case of f. o. b. offers. The waiting disposition on the matter of new orders is still a marked feature of the market and there is less of that buoyancy than last week even. However, it is a good market now. Coal is not in any troublesome supply and shippers do not complain if orders are few and far between. The cream of the season has undoubtedly passed but good prices will rule unless the unexpected happens. Only in the case of broken coal and pea is there any surplus to speak of. There is an abundance of broken, some of it as low as \$3.90 f.o.b. at New York, and pea coal is hard to sell at any thing like a fair price. As low as \$2 f.o.b. is mentioned. Stove and egg are fairly firm; and nut coal is the strongest size on the list just now. It is said that the Western trade is taking more nut than heretofore. It is selling readily at an even price with stove. Stove and egg range from full circular to 15 cents off.

The movement in bituminous coal is without notable change. The Boston Steam Heating Company did not buy any bituminous finally, although they proposed to do so at first. They bought 20,000 tons of pea, probably at a very low price, in view of the present over-stocked market on that size. It is said that the success of the New York Steam Heating Company with pea coal induced them to buy it in preference to bituminous. The quotations on bituminous remain \$3.25@3.50 delivered.

Freights remain strong at former figures. We quote vessel rates, exclusive of discharging: New York, 80@85c.; Philadelphia, 90c.@1; Baltimore, \$1@1.05; Newport News and Norfolk, 90c.@1; Richmond, \$1.15@1.25; Provincial, \$1.60@1.75.

Retail trade is quite satisfactory. There is some falling off, but this is to be expected. Prices as advanced early in the month remain unchanged. Delivered prices as advanced 25 cents now are: Stove and Nut, \$6.50; Egg, \$6.25; Broken, \$6; Franklin, all sizes, \$7.75; Lehigh Egg, \$6.50; Broken, \$6.25. Wharf prices 50 cents less than the above. Bituminous coal, \$4.25 on the wharf.

The death of Col Austin C. Wellington removes a prominent figure in Boston retail coal circles.

Buffalo.

Sept. 27.

[From our Special Correspondent.]

The anthracite coal trade is without any features of importance to note. Prices are unchanged and business good.

Coke quiet and unchanged. The bituminous trade shows that the demand is good, that stocks are light of all varieties, that cars are scarce and wanted badly, that prices are firm and the market is developing toward an advance in quotations in the near, very near, future.

All engaged in the coal trade, whether producers, forwarders or dealers, are in a happy frame of mind, and are sanguine that everything connected with business, except the lack of cars, is working lovely.

The scarcity of cars continues and seems likely to exist for some time. All railroads are in the same condition, that is, their supply is totally inadequate to the demands made upon them. If any permanent advance is made in railroad grain freights the situation would be helped somewhat, as then shippers to the East would take the lake and canal route more freely, provided the charges are not excessively high.

The Lehigh Valley Company has commenced building another big coal trestle at East Buffalo, to be completed by December 1st. It will be used for handling bituminous coal for locomotives, and for transferring to line cars for Western shipment. It will contain 60 pockets, and be 1200 feet long with 2400 tons capacity. This company a few days since gave out contracts at Cleveland for two steel propellers to be ready early next spring, making a fleet of nine first class steam craft to commence the season of 1889 with.

Lake freights on coal opened with an advance of 5c. to Chicago (on Friday), much to the dislike of some of the shippers, who kicked considerably, but agents said they "would soon fall into line," which they did very soon. Since the freight market has been firm, notwithstanding the arrival of a large fleet of vessels, and to-day closes firm and unchanged. Severe storm prevails. The going figures were as follows: 80c. to Chicago; 75c. to Milwaukee; 60c. to Duluth and Superior; 25c. to Detroit, Windsor and Toledo; 60c. to Washburn, and 75c. to St. Ignace and Escanaba.

The shipments by lake westward from September 20th to 27th, both days inclusive, were 68,545 net tons, namely, 30,410 to Chicago, 20,280 to Milwaukee, 10,750 to Duluth, 3680 to Toledo, 1500 to Superior, 1540 to Detroit, 360 to Windsor and 25 to Saginaw. Total shipments thus far this season, 1,788,000 net tons, including cargoes on vessels from Tonawanda not reported at custom house.

The receipts of coal by canal for third week in September, 7868 net tons; shipments, 625 net tons.

Pittsburg.

Sept. 27.

[From our Special Correspondent.]

Coal.—We have nothing very new or important for our readers on this subject. The local demand is increasing. The heavy increase in cost of natural gas has caused many to return to coal. The pools have an ample supply of empties waiting to be loaded; in most of the pools the coal men refuse to pay the price demanded for mining. The lower markets have sufficient coal on hand to last for some time.

PRICE OF COAL PER 100 BUSHELS = 7600 LBS.

First pool	\$4.75	Fourth pool	\$3.25
Second pool	4.25	Railroad coal	5.00
Third pool	3.75		

Connellsville Coke.—As soon as an active demand springs up for coke the old familiar cry of scarcity of

cars is heard throughout the entire coke and coal region. From all we can learn, there is not a road in the country—certainly not in Pennsylvania—that has sufficient cars to transport their business. It appears strange that some enterprising company don't take the matter in hand and supply the deficiency. Old contracts are being filled at contract prices; new contracts are refused unless at the advance.

The new rates are: Blast-Furnace, \$1.25 per ton; to dealers, \$1.35; foundries, \$1.40.

Freight rates to Pittsburg, 70c. per ton to the Matanov and Shenango valleys, \$1.35; East St. Louis, \$3.20; to Cleveland, \$2.80; to Chicago, \$2.75; to all other points the same proportions.

FREIGHTS.

The latest charters to September 28th, per ton of 2240 lbs

From New York to:—Beverly, .80@90¢; Boston, .80¢; Bridgeport, Conn., .55@70¢; Cambridge, Mass., .80¢; Cambridgeport, .80¢; Chelsea, .80¢; Com. Pt., Mass., .80¢; E. Boston, .80¢; E. Cambridge, .80¢; E. Greenvich, R., .80¢; Fall River, .80¢; New Bedford, .85@90¢; Newburyport, .95¢; New Haven, .85@70¢; Newport, .80¢; New London, .70@75¢; Norwalk, Conn., .55@60¢; Norwich, .80¢; Portland, .80¢; Portsmouth, N. H., .90¢; Providence, .80¢; Quincy Point, .90¢; Salem, .80¢.

From Philadelphia to:—Annapolis, .70¢; Bangor, 1.05¢; Baltimore, .60¢; Bath, Me., .95¢; Boston, .90@1.05¢; Cambridgeport, 1.15¢; Charleston, 1.00¢; Charlestown, 1.00¢; Chelsea, .95¢; Com. Point, Mass., .95¢; East Cambridge, 1.17¢; Fall River, .80@90¢; Gardner, Me., 1.10¢; Galveston, 3.00¢; Gloucester, 1.05@1.17¢; Georgetown, D. C., .85¢; Lynn, 1.10@1.30¢; Marblehead, 1.05¢; Medford, 1.10¢; Milton, 1.20¢; New Bedford, .80@90¢; Newburyport, 1.20¢; Newberne, .80¢; New York, .90¢; Norfolk, .65¢; Portland, .95@1.05¢; Portsmouth, N. H., 1.00¢; Portsmouth, Va., .65¢; Providence, .80@.90¢; Richmond, Va., .75¢; Rockport, 1.22¢; Saco, Me., 1.20¢; Saem, Mass., .90¢; Savannah, 1.00@1.10¢; Washington, .85¢; Weymouth, 1.15¢; Wilmington, N. C., .60¢.

From Baltimore to:—Bangor, Me., 1.00¢; Bath, 1.10@1.15¢; Boston, 1.15¢; Bridgeport, Conn., 1.10¢; Cambridgeport, .90¢; Charleston, 1.10@1.15¢; Fall River, 1.00¢; Galveston, 3.00¢; Gardner, Me., 1.00@1.10¢; New Bedford, 1.00¢; Newburyport, 1.30¢; New Haven, 1.10¢; New London, 1.00¢; New York, .95¢; Portland, 1.15¢; Portsmouth, N. H., 1.25¢; Providence, 1.00¢; Quincy Point, 1.10¢; Richmond, Va., .70¢; Salem, Mass., 1.15¢; Savannah, 1.25¢; Somerset, .90¢; Williamsburgh, N. Y., .95@1.00¢; Wilmington, 1.10@1.20¢.

* And discharging, 3c. per bridge extra. † Alongside. And towing.

METAL MARKETS.

NEW YORK, Friday Evening, Sept. 28.

Prices of Silver per ounce troy.

Sept	Sterling exchange	London Pence.	N. Y. Cents.	Sept.	Sterling exchange	London Pence.	N. Y. Cts.
22	4.87	44 1/2	+	26	4.87	43	—
24	4.87	43 1/2	+	27	4.87	43	9.3/4
25	4.87	43	+	28	4.87	43 1/2	—

* 96 1/2 nominal, † 94 1/2 opening, 94 1/2 closing, ‡ 93 3/4 opening, § 93 1/2 closing, ¶ 95 1/2 opening, 9 3/4 closing, ¶¶ 1-16.

The market reacted from recent sharp advance, dropping from 96 to 93 1/2. It closes steady at 94, with no marked tendency.

London writes, under date 15th: "Market has improved rapidly, with a continental order, and the continued rise in Indian Exchanges, together with a speculative demand."

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in its rate for discount, and it remains at 4 per cent. During the week the bank gained £234,000 bullion, and the proportion of its reserves to its liabilities was reduced from 42.07 to 41.58 per cent, against a reduction from 45.08 to 43.76 per cent in the same week of last year, when its rate for discount was 4 per cent. Thursday the bank gained £160,000 bullion on balance. The weekly statement of the Bank of France shows a loss of 8,150,000 francs gold.

Copper.—The business transacted in copper during the past week has been confined within very narrow limits, and beyond reporting a very firm tendency, little can be said. A few lots of Lake copper sold on the exchange realized the same prices as last week, and although the general tone of the market is decidedly strong, there is very little doing independent of the operations of the Syndicate. Our present quotations for Lake copper are: Spot, 17 1/2¢; October, 17 1/2¢; November, 17 1/2¢; December, 17 1/2¢. For casting qualities the demand is increasing and quotations are again somewhat higher, which has checked business to some extent. We now quote good brands 15 1/2¢@15 1/2¢.

In London the market for Chili bars has been strong, and it would seem that the "bears" have not yet covered all their shorts. Our cable gives the latest closing prices: Spot, £102; three months prompt, £79 5s., while G. M. B. has advanced to £78 10s. for spot and £78 15s. for three months prompt.

Mail advices from England report a fair demand for manufactured copper for home consumption, but the export business is almost entirely at a standstill, and this condition of affairs is likely to continue for some time to come, as the French smelters are now taking all the orders in the foreign countries usually supplied from England, whilst the large stocks known to be held by the Syndicate in India are more than sufficient to supply that market for a considerable period.

One of our correspondents telegraphs us that he has just examined an immense copper belt in northern Nevada that he thinks to be equal in quality to the

Arizona deposits. We hope to have fuller particulars at an early day.

Tin.—Assisted by a good demand from consumers, our market has continued very strong. It is expected that the statistics will again show a marked improvement at the end of this month. Spot tin appears to be rather scarce here at present. We quote spot 33 1/2¢; October, 23 1/2¢; November, 23 1/2¢; December, 23 1/2¢. In London prices have remained very steady during the week and close firm at about the same figures as last reported, viz.: Spot, £103 17s. 6d @£104; three months, £103 7s. 6d @£104.

Lead.—It is said that up to the present time the quantity of lead actually tendered to the large bull operator in completion of the heavy sales made for October delivery is comparatively small and that this being the case proves that a large "short" interest exists. If the rumors turn out to be well founded it is quite in the power of the operator in question to give the "bears" a squeeze by putting prices up still further against them as it is well known that little spot lead is available beyond that under his control. In the meantime consumers have been buying a little more freely lately, and have taken several hundred tons off the market. Altogether it seems not at all an unlikely thing that we shall see higher prices before long for spot lead. The St. Louis & Chicago markets are also strong, and have gone up above the parity of New York quotations. We close to-day at the best figures of the week, viz., 45¢ for spot, with \$5.05 paid for October. November and December deliveries are comparatively neglected, and Western lead can still be bought for November at \$4.85, and December at \$4.75, delivered New York.

The London market has also been gradually and steadily improving from day to day, and while last week we had to quote Spanish lead at £14 7s. 6d., the closing price to-day is £14 15s., and for English lead £14 17s. 6d @£15.

Whatever may happen to the lead market in the future the present indications are that the parties interested in higher prices are now in the ascendant, and it would seem that they are quite able to control prices for the time being.

A NEW WHITE LEAD TRUST.

The makers of white lead are reported to have made an iron-clad combination. The first edict of the new combine was given to the paint trade two or three days ago, when the price per ton was advanced \$15 on large orders and \$25 on small ones. All the white lead manufacturers in the country, with one exception, are in the combination. The exception is the Atlantic White Lead and Linseed Oil Company of this city; but while this concern is nominally out of the trust, it is in as much as, if not more than the others, for the firm has agreed not only to maintain the combination prices, but to sell its productions at one quarter of a cent in advance of the prices fixed by the trust. The explanation of this is that the firm thinks that the quality of white lead it turns out will command the higher price.

The movements toward the trust have been on foot several months. The final arrangements, however, were only made a few days ago. The leading spirits in the enterprise as far as this section of the country is concerned, are the Jewett White Lead Company, the Bradley White Lead Company, the Brooklyn White Lead Company, and the Union White Lead Company. Besides these and the other New York and Brooklyn concerns, all the big white lead establishments in Pittsburg, Boston, Philadelphia, St. Louis, Chicago and Omaha were represented at the meetings, and the result is that the 30 or 35 manufacturers in the country have an organization that will affect the paint and oil trade throughout the country in a marked degree.

They have agreed to limit the output, and if any of the factories do produce a surplus they are compelled by the terms of their agreement to turn it over to those factories that may not produce as much as they are allowed to do. The agreement is so iron-clad that the combination can examine the books of the different concerns included in it if it becomes necessary. About a year ago the first white lead trust was formed. About sixteen of the manufacturers were interested in it, but the combination was not successful, and the new one is its outgrowth. It is a close kin to the linseed oil trust which has been so hurtful to the paint and oil trade, and which was formed about eighteen months ago. According to the trust's price list the advance per pound is about three quarters of a cent. In lots of 500 pounds the price is 7 cents, less a discount of 2 1/2¢ per cent. for cash in 15 days and a rebate of half of a cent per pound if paid within 60 days. In addition to this there is a rebate of a quarter of a cent per pound to buyers of 10 tons during six months.

Messrs. Everett & Post telegraph us to-day as follows: Market closed strong; 495c. bid. Sales will probably amount to 600 tons futures.

Spelter remains scarce, the offers from producers being scanty and the price of ore is again reported higher. For domestic spelter for early delivery and up to the end of the year 5-05 has been paid, and higher prices are now asked. The foreign market is in a somewhat similar position to ours, and in London the quotation for ordinary brands has been raised to £19. No foreign spelter can now be imported into this country under 6c., and the general tendency of the market is reported as very strong.

Antimony.—Prices have again been advanced by the makers in London. Spot antimony is very scarce here and the dealers have put up quotations to 14 1/2¢@15c. for Cookson's, and 10 1/2¢@10 1/2¢ for Hallett's.

CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, Sept. 28.

Heavy Chemicals.—The marked improvement in the trade noted last week continues. Prices show a decidedly upward tendency, the demand is good, stock on the spot is scarce, ocean freights high, and advices from aboard report a condition of affairs that will inevitably continue to strengthen prices on this side for some time to come. This opinion is freely but firmly expressed by the largest and most conservative importers in this city. It seems fair to presume that the prevailing prices at this time in 1879 will be exceeded before long, unless unexpected contingencies occur on the other side.

Advices from Liverpool report that makers are sold out for some time to come. The caustic soda makers have agreed to decrease their output to the extent of one week's make per month. This, of course, means a very large decrease in production and a consequent scarcity of supplies both in Liverpool and New York.

Caustic soda, acting in sympathy with the above reports of the action of the combination, has risen rapidly in price, and shows a tendency to go still higher. Stock on the spot is scarce. The market may be written for 60 per cent, 2'50@2'62 1/2¢, according to quantity. For very small lots a considerable advance on these figures is asked. For high test, 70 and 74 per cent, 2'35@2'40c. is quoted. A reliable authority expects 70 per cent to reach 2'50c. Sales are estimated at 2000 drums.

Carbonated soda ash, 48 per cent, is in such better demand for consumptive purposes, and this, coupled with the firm advices from abroad, has given the market a tone of strength. Prices have been advanced this week to 1'25@1'27 1/2¢ to arrive. For stock on the spot the nominal quotations remain at 1'27 1/2¢@1'35c., according to quantity. Jobbing sales are reported at a slight advance upon these figures.

Caustic soda ash, 48 per cent, shares the general improvement, although the effect upon prices has not been so pronounced. This may be due to the fact that transactions have been limited. The feeling, however, is firm. We quote to arrive, 1'25@1'27 1/2¢, according to quality and quantity. On the spot, 1'32 1/2¢@1'35c. is asked.

Sol soda is steadier, with firmer prices. A stronger feeling than we have been able to record for some time past is now apparent. Ruling quotations are about as follows: On the spot, .95@1c.; to arrive, .92 1/2¢@95c.

Bleaching powder continues in excellent demand at slightly higher prices. Stock available is very limited, both on the spot and to arrive. Boston continues to quote lower prices than New York, but has not sufficient stock to offer to exercise any effect upon this market. New York dealers at present can sell everything obtainable at an advance over Boston prices. The market quotations on the spot is 2'05@2'12 1/2¢, and for stock to arrive, 2c. These prices are for large lots only.

Acids.—"Continued improvement" seems to be an accurate statement of the tendency of the acid market. The demand is very good and seems likely to increase. Stocks in the hands of both manufacturers and consumers are very light.

Acetic Acid.—The nominal market price at present is 2c. A number of large consumers have recently entered the market for a years supply, and in consequence of the competition among acid manufacturers to secure these contracts a general weakening in price has ensued.

Nitric and muriatic acids are quiet, at unchanged prices. Both articles are in fair demand. We quote for muriatic, 18", 1'10@1'15c.; 20", 1'25@1'30c.; 22", 1'50c. Nitric acid is held as follows: 36", 3 1/2¢; 38", 4c.; 40", 4 1/2¢.

Oxalic acid shows a fair volume of business at the advanced prices. The demand continues good. Quotations have not changed as yet. We quote 8 1/2¢@9c. per pound, according to quantity.

Tartaric acid moves fairly at unchanged prices. The market is without feature of special interest. This week's quotations are as follows: Crystals, in lots of 3000 lbs. or more, 43c. per lb.; smaller quantities in barrels, 44c. per lb.; 50-lb lots in boxes, 45c. per lb., and one cent advance on these figures for powder.

Sulphuric acid is in good demand. The advance in the prices of brimstone and nitrate of soda increases the cost of production, and consequently the market price of sulphuric acid should be higher. The competition among manufacturers is such, however, that an increase in rates, with the present disorganized condition of the trade, is impossible.

Fertilizers, Potashes, etc.—The demand continues good and prices are firm. Little change either in prices or in business is expected for the next few weeks, which will close the busy season. Supplies at present, however, are limited. The ruling quotations are as follows: Azotine, \$2.30@2.35, as to quality; dried blood (city), low grade, \$2.32 1/2@2.37 1/2 per unit; Western high grade, \$2.35 @2.40 per unit for ground material; tonnage, high grade, \$23@25 per ton; low grade, \$21@23 per ton. Fish scrap, \$24@26 per ton f.o.b. factory. Sulphate of ammonia, \$3.20 per cwt. Steamed bones, \$20 per ton.

Charleston rock, undried, \$5 per ton; kiln dried, \$6 per ton, both f.o.b. vessels at the mines. Charleston rock, ground, is held at \$10@10.50 ex steamer at New York.

Our Charleston correspondent sends the following statistics of the shipment and consump () () ()

phate rock from and at Charleston and Beaufort, S. C., during the year ended August 31st, 1888:

	SHIPMENTS.	Crude.	Ground.
Coastwise from Charleston	154,664	5,430	
Foreign		3,650	
By R. R.		35,536	
Coastwise from Beaufort		10,844	
Foreign		159,891	
Consumed at Charleston		60,000	
Beaufort		13,000	
Total for year		437,635	5,430

Refuse bone-black is quoted at \$18 per ton. Dissolved bone black is 90c. @ \$1 per unit for available phosphoric acid, and acid phosphate 75@80c. per unit for available phosphoric acid.

Double Manure Sales.—Transactions have been limited, owing to the scarcity of available supply. No important improvement in prices is noted, however. We continue to quote 1.15 on a basis of 48 per cent potash. Sulphate of potash is scarce. Prices rule at 2.20@2.25c. on a basis of 90%.

Muriate of potash is in better demand and prices are a little firmer. \$1.80@1.85 is asked for both spot and arrivals.

Kainit.—There is no change in the situation. No stock on the spot is to be had. Ocean freights are still very high, and we hear of nothing on the way to ease the market. Owing to the scarcity of stock during the past week transactions have been limited. The quotations are nominally \$11 per ton on the spot, and for shipment \$9.75. These prices are purely nominal.

Brimstone is firmly held at the old figures, with apparently little prospect of any weakening. We continue to quote \$21 for best unmixed seconds on the spot; to arrive, \$20.50; thirds, to arrive, \$19.50.

Nitrate of soda is firm at the advanced figures. It is estimated that the stock on the spot amounts to 70,000 bags. There have been no arrivals during the past week. Stock on hand is held at 2.17 1/2 @ 2.20c., according to quantity. Stock to arrive is quoted at 2.10c.

Acetate of lime shows jobbing sales at the old figures.

Arsenic is very firm, and prices show an upward tendency, owing to the high rates of freight.

Cream of tartar is in fair demand. The trade is without special feature of interest, and prices remain as last week.

Minerals.—Trade is very fair, and prices show little or no fluctuation.

Sulphate of barytes is quiet. Prices are unchanged, and only jobbing sales are reported.

China Clay.—New arrivals have greatly increased the supply on hand. Transactions during the week have not been large. We continue to quote \$13.50 for Southern, and \$15@18 for foreign, according to quality.

Talc is in fair demand. Feldspar and silica are unchanged. For prices of chemicals and minerals see our list of current prices on another page.

BUILDING MATERIAL MARKET.

NEW YORK, Friday Evening, Sept. 28.

There is very little change to record in the building material market. In the city there seems to be little improvement. The new buildings projected during September, 1888, are less both in value and in number than those projected in the same month in 1887.

Although there are rumors of several large buildings shortly to be constructed, we fail to note any quickening in the demand for materials.

Outside of the city, and generally throughout the country, trade has been brisk at prices that are apparently very satisfactory. Business, however, varies in the different lines of the trade. Dealers in bricks, building stones, and in some grades of cement complain of a rather dull market, while the higher grades of cement, lime and roofing slates seem to be moving very satisfactorily.

Bricks.—There is little improvement either in prices or in the volume of business. While the season is gradually closing and quite a number of makers have stopped, there is always an over supply on the market, which depresses prices and prevents a really healthy condition of affairs.

Lime.—Although the supply this week has been scarce, the demand has fallen off proportionately, and little improvement in prices is apparent. During the week, we have heard of no new supplies, but, weather permitting, there will be arrivals within the next few days that will ease the market, although it scarcely needs to be eased in this way until a better consumptive demand is felt. There have been rumors that lime could be bought below Association rates. A member of the Association indignantly denies this. We also fail to find anything offered below regular rates.

Cement.—Trade is of the usual proportions, the importations are soon absorbed for consumption, and prices in the whole are well sustained.

In the trade, the opinion is expressed that little change in price is probable for some time to come.

Roofing Slate.—The demand is exceptionally good. This is especially true of Pennsylvania slate, which can hardly be obtained in sufficient quantities to meet current requirements. Vermont slate is also moving very fairly. The general tone in the market is better than for some years past, and prices are decidedly firm.

Building Stones are moving rather slowly. In some quarters there seems to be a disposition to shade the regular circular rates adopted by the Joint Association of Quarrymen and Stonecutters on the 1st of last February to continue for one year. Last year's wild speculative building has reacted upon some firms, who have been obliged to accept mortgages, in place of cash, for their stones.

This, together with the present depression in city building, does not have an exhilarating effect upon the trade generally.

For latest prices of building materials and wages of laborers, see our current prices.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Sept. 28.

American Pig.—The improved tone of the market, which has been noticeable for several weeks past continues, and during the week under review there has been a marked increase in the demand. Makers and dealers report a decided hardening of prices, and that buyers have at last come to the conclusion that bottom has been reached, and that they cannot expect to have their orders taken at lower rates than current quotations.

The Thomas Iron Company have made recently large sales of forge irons to rolling mills and pipe foundries, amounting to over 20,000 tons. Prices in the West are fully \$1.50 a ton higher than a month ago. Agents of Southern furnaces also report an excellent demand, and that they readily obtain \$18@18.50 for No. 1 iron, and even \$19 in exceptional cases. Southern makers have agreed upon a system of grading which will correspond with that used in the North, which will be a great convenience to the trade. Heretofore many of them have been in the habit of calling "No. 1" only their choicest, most open irons, of which no furnace makes a large amount. Southern "No. 2" has heretofore been equivalent to Northern "No. 1." This grading has been made intentionally in some cases, in order that there might not be an appearance of cutting the market. This making the Southern grades correspond with the Northern is another index of the firm foothold which Southern irons have obtained in this market.

The Southern Railway and Steamship Association, under date of the 18th inst., have issued a new schedule of freight rates, to take effect on October 1st, the following being the principal rates, all per ton of 2,268 pounds:

	Birmingham.	Chatanooga.	Sheffield and Florence.
Chicago, Detroit, Hegewisch, Grand Crossing, Peoria, Pullman South Bend	\$4.15	\$3.90	\$3.80
Allegheny, Bellare, Pittsburgh, Steubenville, Wheeling	4.80	4.30	4.55
Cincinnati	3.90	2.40	2.65
Columbus, Dayton	3.65	3.15	3.40
East St. Louis, Belleville, St. Louis	3.40	3.15	2.95
Indianapolis, Terre Haute	3.40	3.15	3.15
Kansas City, Leavenworth, St. Joseph, Atenison	5.98	5.98	5.53
Louisville, East Cairo	2.65	2.40	2.40
Springfield, Ill., Bloomington	4.40	4.15	4.15

The Queen & Crescent route have issued a circular announcing an advance of 15 cents a ton over their tariff No. 7, dated August 1st, 1888, to go into effect October 1st.

We note a recent sale of 2000 tons forge iron from a Northern furnace at price equivalent to \$16 tide-water.

Scotch Pig.—Prices in Glasgow have declined slightly, but are still too high, with freights remaining at 10c., to allow of any business being done here, except with some foundries working on specialties, which are willing, from long continued use, to pay the present high rates.

Bessemer Pig is in some demand, although no actual business is reported. Quotations are purely nominal.

Steel Rails.—Eastern mills report recent sales of about 8000 tons, and as much more has been sold by Western mills. The inquiry for next year's delivery, which we noted last week, continues to be large, and the indications all point to an excellent business for the rail mills in 1889. Makers, as a rule, are not willing to book large orders for future delivery at current rates.

A dispatch from Pittsburg to-day announces that information has reached there of the consummation at Glasgow of the International Rail Association, to which we have alluded. The combination includes the English, French, Belgian and German rail makers, and its object is stated to be "to prevent the continuance of the unnaturally low prices which have so long prevailed." The new syndicate is promised an existence of five years. It is further stated that Andrew Carnegie promised that the American Rail Manufacturers' Association will do all in its power to assist the European syndicate in improving the condition of the rail trade.

Structural Iron and Steel.—A large business is doing and prices are firmer in all articles. The bridge builders have plenty of work; in fact, this is usually a busy season with them, in preparation for winter.

Steel Plates.—Messrs. Carnegie, Phipps & Co. have issued a circular announcing that they will make prices as low as for iron plates for tank and bridge work. Quotations are practically unchanged since our last price list.

Rail Fastenings are quoted a little higher.

Scrap Iron has been in good demand, and the cheap lots have practically been cleaned up; \$21 is asked for good yard scrap, and \$22 for choice lots.

Old Rails.—There have been some large sales to Western mills at prices ranging from \$25@26. In the East there are no new transactions reported, except one small lot of tees sold at a price equal to about \$22.50 New York. Holders of large lots are very firm in their asking prices. Quotations are very difficult to make, and the margin is wide. Buyers, as a rule, are fully \$1@1.50 below sellers in their views.

For current quotations we refer to our weekly register of prices.

Louisville. Sept. 25. (Specially reported by Messrs. HALL BROTHERS & Co.)

There has been no material change in the situation, the market remaining in about the same condition as last reported. Few furnaces in the South can offer any iron of any consequence for early shipment, and most of them are sold up for several months ahead to their full capacity. Various orders are being offered by the different classes of consumers, but for smaller quantities than have been booked during the past two weeks. There has been no change in quotations.

Philadelphia. Sept. 28. [From our Special Correspondent.]

In some quarters undue importance is attached to the advance in pig iron which has been made, and to the advancing tendency alleged to exist. It is true that there is an improvement at work, and very probably it will continue its favorable influence on the market for some time to come. The iron that has been sold at the advance is much less than some reports would make it appear. Large buyers hesitate before placing orders at the quotations named by some makers, and generally find parties ready to supply them, although, in some cases, iron is not quite as favorably received. Outside quotations have been advanced about 25c. per ton. Actual selling prices for large lots of iron show an improvement of 25 cents per ton. While there is a great deal of iron to be had at old figures, there is sufficient capacity awaiting invitation that if set to work will help to turn prices in the opposite direction. Buyers are in many cases buying new irons or cheaper irons, and in this way escaping the advance which is being attempted and which for some brands has been established. The increase in the demand for forge iron is not very marked. Buyers are now looking for concessions from outside asking prices and assert that they will receive them. Makers, on the contrary, feel quite confident that they will be able to hold prices where they are, and some feel confident that with a more steady condition of the public mind later on, the pig iron demand will expand till the present asking prices will be the average figures paid.

Foreign material is without any activity whatever. The favorable condition in the bloom market which has been alluded to so frequently still continues, and prices have not been modified in any respect excepting where a belated buyer finds it necessary to pay a little more for early delivery and the consequent accommodation. The same favorable condition of the muck bar market is to be reported. A good deal of business is being done, but not in as large lots as a week ago. This is due to the opinion that exists here that when the mills run down to the end of their orders they will shade prices a little to get fresh orders. The mill men say that now prices are up, they will do their best to hold up the improvement.

The bar mills have booked a large amount of business for the next sixty days, perhaps on a fair guess at 2c. Concessions are still made from quoted rates, but not for any but large lots for November delivery. Some buyers are in the market for winter deliveries, and are willing to place orders if a few extra inducements could be offered. So far manufacturers show an unwillingness to cut prices down to the summer basis simply to get business, anxious as they are for it. Stores are getting 2c. for refined bars in a small way. Several small orders have been placed for skip iron at full prices. The gradual closing down of the building season makes nails dull. The anxiety of manufacturers for winter business for wrought iron pipe keeps business away down. Sheet iron manufacturers report a good deal of business and but little sign of full capacity being engaged.

The previous favorable comments on the merchant steel trade need to be repeated. Everything is moving along finely, and full prices are paid for nearly all kinds. The only concessions made are on crucible. The mill owners report a good demand in small orders. Several railroad managers have recently come into the market and placed business. Full prices are paid. In the past few days considerable structural iron work has loomed up, most of it for Southern railroads. Traffic seems to be improving, and earnings are a little better than in some quarters. So far as this market is concerned, there is very little to report in steel rails. There are inquiries for two or three large systems, but the orders are booked elsewhere, unfortunately. Makers say here that only small lots are booked. Old rail dealers have secured a good many old rails within a short time, but they are holding them at fancy prices, hence there are no sales to be reported. Excepting an occasional 100 ton lot, the scrap yard men seem to be pretty well sold up, and a number of them have orders for selected and No. 1 scrap delivered.

Pittsburg. Sept. 27. [From our Special Correspondent.]

Raw Iron.—On account of three holidays, followed by a circus, business of all kinds has been very much neglected. The Allegheny Centennial does not come very often, and it was decided to have a real good time extending over three whole days. The weather was all that could be desired; many of the streets were impassable. There was very little time to spare for business. Some holders are demanding rates that were current at date of last report for standard and favorite brands. Mixed lots and unknown brands are being disposed of at various prices. Such transactions have little or no bearing on the market. Furnace men, being well sold up, show no anxiety for more orders unless at outside rates; in fact, their present condition is certainly healthy, and, like true business men, they prefer delivering most of the orders now booked before entering on new engagements, and on that account prefer waiting.

The stock of raw iron is reported limited. Con-

sumers are well provided with stock; this may probably check a further advance for the present. A continued demand similar to that we had recently would soon bring about a further advance, but such an event is not likely to occur just now, as consumers have provided liberally for their requirements for some time to come; besides additional furnaces have been started that will increase the output in the near future. On this account it is not likely that there will be any scarcity, at least for some time to come, the output and consumption being about equal.

Old Halls find ready purchasers at current rates. Ferro Manganese shows a further advance. Muck Bar steady, with fair inquiry. Bessemer is without quotable change. Large sales previously reported have not yet been worked up. Steel blooms, billets and nail slabs hold their own in values. Scrap material: Demand fair, sales regular. Skelp Iron: Last week's prices maintained. Other kinds unchanged.

Coal and Coke Smelted Lake Ore.

1000 Tons White Bessemer	16.00 cash
1000 Tons Bessemer	18.00 cash
1000 Tons Gray Forge	16.50 cash
1000 Tons Gray Forge	16.50 cash
1000 Tons Gray Forge	16.50 cash
1000 Tons Bessemer	18.25 cash
500 Tons No. 2 Bessemer	18.25 4 mo.
1000 Tons White and Mottled Bessemer	16.00 cash

Native Ore.

250 Tons Gray Forge	15.85 cash
100 Tons Gray Forge	16.00 cash
100 Tons Gray Forge, Storage	15.50 cash
350 Tons Gray Forge, Storage	16.00 4mo.

Charcoal.

100 Tons Warm Blast	22.00 cash
150 Tons Cold Blast	26.50 cash
75 Tons No. 2 Foundry	23.25 cash

Steel Wire Rods.

500 Tons American	43.50 cash
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Muck Bar.

1000 Tons Neutral, October and November	29.50 cash
1000 Tons Neutral	29.70 cash
500 Tons Neutral, October	29.50 cash
1500 Tons Neutral, Spot	28.50 cash
200 Tons Neutral, Spot	28.75 cash

Steel Slabs and Billets.

1000 Tons Billets	29.25 cash
1000 Tons Slabs	29.25 cash
500 Tons Slabs	29.00 cash
500 Tons Billets	29.50 cash

Ferro-Manganese.

300 Tons 80 per cent	56.50 cash
200 Tons 80 per cent	56.50 cash

Skelp Iron.

1000 Tons Wide Grooved, per 100 pounds	1.95 cash
300 Tons Narrow Grooved, per 100 pounds	1.85 cash
300 Tons Sheared Iron, per 100 pounds	2.15 cash

Steel Wire Rods.

500 Tons American	43.50 cash
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FINANCIAL.

NEW YORK, Friday Evening, Sept. 28. There is nothing really new in the mining market. During the past week there has been nothing to break the prevailing dullness or to awaken the dormant mining stocks. That "Hope long deferred maketh the heart sick" can be easily seen on the countenances of our mining brokers. They have long since ceased talking of the "boom" (except to a lamb-like outsider) and now are simply waiting, like Micawber, for "something to turn up."

At the close to-day prices were a little stronger all through the list, although advices from San Francisco gave little encouragement in that quarter. Sales during the week aggregate over 100,000 shares, which is a considerable increase in the volume of business as compared with last week, although much smaller than during the same period in 1887.

To-day Tuscarora stocks were rather firm, although transactions were not large. Tornado shows sales of 2400 shares at 25@30c. Belle Isle and North Belle Isle were neglected, however. Barcelona was active at 90@1.00. Sales aggregated 3400 shares.

Eureka Consolidated was sold at \$3.50. The annual meeting of the company will be held in San Francisco, October 15th.

The Comstocks were quiet, being controlled by the sluggish California market. Consolidated California and Virginia sold at \$9.25@9.50, with sales of 900 shares. Ophir was not dealt in. Union Consolidated is on the list at \$3.05@3.10, with only 200 shares sold. Sutro Tunnel, owing to favorable reports concerning the company's financial condition, was very active. The common stock was dealt in to the extent of 10,700 shares at 9@11c. Trust Certificates are quoted at 55@62c., a slight depreciation from last week's prices.

The following statement gives the company's income or earnings since 1884, as prepared by the assistant secretary, Mr. H. H. Thayer.

1884	\$133,508.92	1887	271,314.47
1885	193,280.25	1888-8 months	227,890.92
1886	259,249.27		

During the first eight months of 1887, the earnings amounted to \$170,766.81. In 1888, during the same period, they amounted, as given above, to \$227,890.92, an increase of \$57,124.11.

None of the other Comstock properties appear upon the list of the week's transactions. Plymouth Consolidated was in favor, with sales of 1300 shares at prices ranging from \$8 to \$8.50.

The president of the company informs us that the fire in the mine is out and that it will be opened shortly. He also states that there have been few complaints from the stockholders, and the stock will probably show an improvement in price when the mine is opened. He says that the officers of the company

IMPORTS AND EXPORTS OF METALS AT NEW YORK SEPTEMBER 21 TO SEPTEMBER 25, AND FROM JAN. 1.

IMPORTS.			EXPORTS.		
Spelter.	Week. Tons.	Year Tons.	Wright & Son, P.	Week. Pounds.	Year Pounds.
American Metal Co., Lf.	303	303	Total	1,120	41,805
Friedensville Zinc Co.	26	26	Corres. date 1887	3,387	116,386
Hendricks & Bros.	54	54			
H. Lamarche's Sons	33	33	Copper.		
Lewisohn Bros.	3	3	Lewisohn Bros.	161,824	
J. Macy's Sons	28	28	from Liverpool		
Naylor & Co.	131	131	Steel Sheets, Billets, Forgings, etc. Tons.		
Osgood, F.	83	83	Abbott & Co., Jere.	1,951	
Perkins, C. L.	725	725	Arkell, Jas.	17	
Pope's Sons & Co.	28	28	Belcher, H. U.	13	
			Bowker, C. F.	206	
Total	1,418	1,418	Bruce & Cook	7	
Corres. date 1887	190	2,746	Carey & Moen	24	
Zinc Sheets.			Carter, G. T.	273	
G. A. & E. Meyer	1	594	Cohn, M.	159	
H. Lemanche's Sons	1	594	Cohey, D. J.	20	
Milne & Co.	1	81	Crooks, E. & Co.	765	
Naylor & Co.	1	81	Dana & Co.	236	
			Crossbey, H.	500	
Total	677	677	Downing & Co., R. F.	1,352	
Nickel.			Henderson Bros.	31	
McCoy & Sanders	Lbs.	Lbs.	Holt, H. N.	4	
	169,586	169,586	Hondolette & D.	136	
Total	169,586	169,586	Hugill, Chas.	162	
Antimony.			Irwin & Son, Thos.	1	
	Casks.	Casks.	Lalance & G. Mfg. Co.	260	
Total	30	2,376	Lazard Freres	53	
Corres. date 1887	135	2,947	Lebenberg, N.	36	
Pig Lead.			Littlejohn, Jas.	40	
Caswell, E. A.	46	46	Lundberg, G.	205	
N. Corwith & Co.	111	111	Mersack & Co.	128	
Hendricks Bros.	122	122	Milne & Co., A.	192	
Phelps, Dodge & Co.	122	122	Montgomery & Co.	1,532	
Total	122	401	Moore's Son & Co.	25	
Corres. date 1887	420	3,083	Muller, Schall & Co.	25	
Tin.			Manas, J. & Son	10	
Abbott & Co., Jere.	39	389	Naylor & Co.	10,800	
American Metal Co.	39	389	Newton & Shipman	4	
Birdwell & French	89	89	Ogden & Wallace	63	
Crooks, S. & R. Co.	395	395	Phelps, Dodge & Co.	245	
Davol & Sons	8	8	Phoenix Steel Co.	20	
Dickerson, Van Dusen	10	10	Pilditch, F. S.	323	
Funch, Edye & Co.	10	10	Power, C. W.	50	
Hendricks Bros.	123	123	Pratt, Whitney & Co.	33	
Knauth, W. & K.	21	21	Prosser, Thomas	102	
Lehaier Sons & Co.	15	15	Roebbling's Sons, J. A.	390	
Lewisohn Bros.	15	4,452	Sanderson & Son	42	
Muller, Schall & Co.	269	2	Seaburg, C. B.	2	
Nathan, Trotter & Co.	2	2	Shotts Iron Co.	5	
Naumann, F.	2	1,468	Strouse & Co.	37	
Naylor & Co.	112	1,468	Temple & S.	10	
Phelps, Dodge & Co.	727	28	Union Bridge Co.	288	
Pope, Jas. E., Jr.	50	28	Wagner, W. F.	11	
Pope's Sons & Co.	124	203	Walbaum, W. H.	2,479	
Schwartz Bros.	7	11,704	Wallace, W. H. & Co.	41	
Thomson & Co., A. A.	28	11,073	Webb, J. B.	1	
Thomson & Co., D.	203	2	Wetherall Bros.	2	
Total	422	11,704	Wetherill & Co.	12	
Corres. date 1887	172	11,073	Whelan & Co., E. S.	5	
Tin Plates.			Whiting, E. W.	11	
American Metal Co.	Boxes.	Boxes.	Whitney & Co.	51	
Bridge & Beach Mfg. Co.	509	339	Williams & Whitney	2	
Bruce & Cook	609	80,171	Wilson, J. G.	3	
Byrne James	7	23,914	Whittemore & Co.	6	
Central Stamp Co.	2	27,573	Wolf, R. H.	65	
Codrington & Co., T. B.	126,855	2,249	Wright's Sons & Co.	10	
Corbette, Fellows & S.	2,249	82,796	Total	897	26,986
Cort & Co., N. L.	1,248	16,322	Corres. date 1887	3,330	71,513
C. ns. Fruit Jar Co.	849	202,380	Bar-Iron.		
Crooks & Co., R. Robert.	312	112	Abbott & Co., Jere	2,990	
De Mill & Co., H. R.	16,322	264	Abel Bros.	3	
Dickerson, Van Dusen	5,753	362	Bacon & Co.	150	
Dolly, T. G. F.	112	38	Hugh Cranshaw	1	
Fairbanks, N. H.	264	119	Downing & Co.	151	
Hamilton & M.	362	3,996	Holt, S. N.	10	
Henry & Earle	38	14,562	Jacobus, E. Y.	16	
Iron Clad Mfg. Co.	119	13,958	Lilienberg, N.	5	
Lalance & G. Jean	3,996	4,856	Lundberg, Gustaf	700	
Lombard, Ayres & Co.	14,562	35,589	Mersack & Co.	29	
Merchant & Co.	845	8,978	Milne & Co., A.	133	
Mersack & Co., C. S.	4,856	50	Naylor & Co.	176	
Morewood & Co., G.	35,589	511,964	Ogden & Wallace	4	
Naylor & Co.	8,978	131,637	Page, Newell & Co.	122	
Newall Bros.	50	330	Philip, C. M.	20	
Phelps, Dodge & Co.	17,488	430	Stroud & Co.	8	
Potts, W. A., Son & Co.	2,942	75,764	Wallace & Co., W. H.	19	
Pratt Mfg. Co.	2,942	686	Wilson, J. G.	4	
Saunders Bros.	430	540	Totals	14	3,945
Shepard & Co., Sidney	75,764	1,665	Corres. date 1887	1,018	10,528
Somers Bros.	686	6,208	Steel & Iron Rods.		
Stroud & Co.	430	43,327	Abbott & Co., Jere	6,522	
Taylor, N. & G.	540	22,550	American Screw Co	848	
Thomson & Co., A. A.	1,636	161	Bacon & Co.	223	
Warren & Co.	1,665	31,618	Baldwin Bros. & Co.	53	
Wheeler & Co.	273	62,291	Bowker, C. F.	3	
Whittemore & Co., H.	43,327	1,434,360	Carey & Moen	50	
Wolf & Reesing	22,550	600	Cohn, M.	9	
Wright & Sons, Peter	161	100	Dana & Co.	100	
A. M. Underhill	265	100	Downing & Co., R. F.	247	
Total	31,618	1,611,561	Galpin, S. A.	2,420	
Corres. date 1887	62,291	1,434,360	Hugill, Chas.	8	
Pig-Iron.			Jacobus, E. Y.	41	
Abbott & Co., Jere	600	250	Lilienberg, N.	12	
Austin, B. & Co.	100	200	Lundberg, Gustaf	120	
Baldwin Bros. & Co.	103	1,895	Milne & Co., A.	1,408	
Bartlett & Co., N. S.	100	50	Montgomery & Co.	8	
Crocker Bros.	200	50	Muller, Schall & Co.	150	
Crooks & Co., E.	30	15	Naylor & Co.	10,448	
Dana & Co.	17	325	Newton, & Shipman	2	
Downing & Co.	20	2467	N. Y. Barb Wire Co.	20	
Drummond, McCall & Co.	51	5,717	Page, Newell & Co.	152	
Eric Despatch	250	5	Perry & Ryer	100	
Foley, H.	200	5	Pierson & Co.	31	
Henderson Bros.	220	13	Pilditch, F. S.	10	
Holt, H. N.	50	15	Prosser, Thos.	132	
Irvin & Co., Richard.	50	10	Roebbling's Sons, J. A.	1,614	
Knaub, N. & K.	15	67	Sanderson & Son	67	
Gee & Co., James.	325	11	Sheldon & Co., G. W.	11	
Milne & Co., A.	2,467	15	Waischid C. A.	15	
Naylor.	5,717	35	Wasburn Mfg. Co.	35	
Perkins, C. L.	5	1,705	Whittemore & Co.	26	
Pierson & Co.	13	26	Wilson, J. G.	26	
Page, Newell & Co.	15	1,0528			
Pope, Jas. E., Jr.	150	30,643,426			
Pratt Mfg. Co.	10	Corres. date 1887			
Sanderson & Sons.	2	9,198,373			
Stetson & Co., G. W.	200	Copper Matte.			
Tonsils, M. R.	120	Abbott & Co.	601,145		
Walbaum, W. H.	200	Amer. Metal Co.	3,729,796		
Williamson & Co., Jas.	100	Kunhardt & Co.	41,652		
		Ledoux & Co.	409,720		
		Lewisohn Bros.	1,126,822		
		Nichols & Co.	516,785		
		Wilm's, Terhune.	35,865,569		
		Total	123,084	42,151,487	
		Corres. date 1887.		30,196,506	
		Copper Ore.			
		American Metal Co.	524,698		
		Kunhardt & Co.	37,682		
		Mallory & Co.	167,065		
		Total	729,445		
		Corres. date 1887.		681,088	

CURRENT PRICES.

Table of current prices for various commodities including chemicals, acids, alkalis, and building materials.

Table of current prices for building materials such as bricks, cement, and stone.

Table of current prices for various metals including iron, steel, and copper.

Table of current prices for rarer metals such as aluminum, zinc, and lead.

Table of current prices for iron and steel products, including pig iron and various grades of steel.

Table of current prices for Scotch pig iron and other iron products.

Table of current prices for Bessemer pig iron and other iron products.

Table of current prices for structural iron and steel products.

Table of current prices for merchant steel and other iron products.

Table of current prices for boiler tubes and other iron products.

Table of current prices for hot blast iron and other iron products.

Table of current prices for coke and bituminous pig iron.

Table of current prices for charcoal pig iron and other iron products.

Table of Philadelphia prices for various iron and steel products.

Table of Baltimore, Md. prices for various iron and steel products.

Table of Birmingham, Ala. prices for various iron and steel products.

Table of Pittsburgh, Pa. prices for various iron and steel products.

Table of foreign quotations for various iron and steel products.

Table of Pittsburgh prices for various iron and steel products.

Table of Pittsburgh prices for various iron and steel products.

Table of Pittsburgh prices for various iron and steel products.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Main table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES, ASSESSMENTS, DIVIDENDS, and NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES, ASSESSMENTS. Lists various mining companies and their financial details.

G. Gold, S. Silver, L. Lead, C. Copper. * Non-assessable. † This company, as the Western, up to Dec. 10th, 1881, paid \$1,400,000. ‡ Non-assessable for three years. § The Deadwood previously paid \$275,000 in eleven dividends, and the Terra \$75,000. ¶ Previous to the consolidation in Aug., 1884, the California had paid \$31,320,000 in dividends, and the Con. Virginia, \$24,000. ** Previous to the consolidation of the Copper Queen with the Atlanta, Aug., 1885, the Copper Queen had paid \$1,350,000 in dividends. †† 1,300,000.

NEW YORK MINING STOCKS QUOTATIONS.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Main table of New York Mining Stocks Quotations, divided into Dividend-paying and Non-dividend-paying mines. Columns include Name and Location of Company, dates from Sept. 23 to Sept. 28, and Sales figures.

*Ex. dividend †Dealt in at the New York Stock Ex. Unlisted Securities ‡Assessment unpaid. Dividend shares sold, 54,105 Non-dividend shares sold, 54,850 Total New York, 108,955.

BOSTON MINING STOCK QUOTATIONS.

Table of Boston Mining Stock Quotations, listing various mining companies and their stock prices from Sept. 21 to Sept. 27, along with sales figures.

* Assessment paid. Boston: Dividend shares sold, 10,890. Non-dividend shares sold, 9,955. Total Boston, 20,845.

COAL STOCKS.

Table of Coal Stocks, listing various coal companies and their stock prices from Sept. 22 to Sept. 28, along with sales figures.

San Francisco Mining Stock Quotations.

Table of San Francisco Mining Stock Quotations, listing various mining companies and their closing stock prices from Sept. 21 to Sept. 27.

*Bid. †Asked. **Of the sales of this stock, 41,413 were in Philadelphia, and 134,060 in New York. Total sales, 309,321.

have acted discreetly, and are not to be blamed for an accident which is liable to befall any property.

Brunswick shows no sales. The Amador properties as usual were active. Amador was held at \$2.25 all the week, with total sales of 2500 shares. Astria closed at 20c. with aggregate sales of 8700 shares. Middle Bar opened at 44c., and closed at 39c. Sutter Creek remained at \$1.15, but was slightly stronger at the closing. Hollywood was dealt in to the extent of 6500 shares at 39@40c.

Among the Colorado properties, we were treated to something new in sales of Adams Consolidated at \$2.50@2.85, closing at the latter figure. Robinson sold at 90@95c. to the extent of 1,450 shares, Iron Silver at \$3.50, Leadville Consolidated at 7@18c., closing at 10c., with total sales unusually large, 27,100 shares. Little chief was firm at 22@23c. Plutus closed at 95c., a decline of 5c. from the highest price of the week. Cashier shows sales at 9@12c., closing at the former figures. Monitor was quiet with limited sales at 12@13c. Dunkin sold at 88c. on Saturday last, but closed strong to-day at 95c.

Horn Silver closed firm at 90@95c., with aggregate sales of 1000 shares.

Silver King was active at \$2.15@2.20. El Cristo sold at 95@94c. Santiago was neglected.

Silver Mining of Lake Valley, New Mexico, was largely dealt in at 25@24c. Silver Cord showed some animation at 65@70c.

Rappahannock remained at 11c., with sales of 3300 shares.

Homestake closed at \$10.63. Deadwood and Iron Hill were not sold. Caledonia was fairly active at \$2.75.

Quicksilver Preferred was very firm and quite active. The opening price was \$37.25, and the highest \$39.75, at which price sales were made to-day.

Bodie Consolidated was weaker at the closing, owing to the assessment of fifty cents per share which has just been levied upon the stock. Sales were made at \$1.12@1.40, the former being the closing figure. Transactions amounted to 450 shares. Bulwer was neglected at 53c. Standard shows limited sales at \$1.20. Mono was not dealt in. The stock of the North Star Gold Mining Company, of California, appears on the list at \$6.75. This company has paid one dividend of fifty cents per share, or \$50,000.

The stock of the Deer Creek Gold Mining Company has been placed among the unlisted securities dealt in at the New York Stock Exchange. The capital stock of the company is \$1,000,000, divided into 200,000 shares of \$5 each. The officers are: John W. Ripley, President; J. C. Hall, Secretary; W. A. Bennett, Secretary; A. Sellers, Assistant Secretary, all of New York. The property is situated in Boise County, Idaho, one hundred miles north of Boise City. Mr. J. C. Hall, who has made extended reports upon the property, says: "It is a placer property, with valuable water rights and eighteen miles of ditches which were completed in August. When washing was commenced, and partial clean ups made, the results were such that the company are assured of being able to pay dividends at an early date." The opening sale of the stock, 100 shares, was made to-day at \$1.10.

Assessments are now pending on Bodie, Belcher, Ophir, Exchequer and Mexican, all Comstock properties. Assessments are insurmountable obstacles to "booms."

Meetings.

Eureka Cons. Mg. Co., San Francisco, Cal., October 15th, at half past eleven o'clock A.M.

Dividends.

Boston & Colorado Smelting Company has declared a quarterly dividend, No. 79, of 2½ per cent, payable October 1st.

Dunkin Mining Company, of Colorado, will declare a dividend, No. 26, of five cents per share, or \$10,000, payable October 15th.

Assessments.

COMPANY.	No.	When levied.	D'nt'g't in office.	Day of sale.	Am't per share.
Atlas, Dak.		July 11	Aug 15	Oct. 10	.00134
Baker Divide, Cal.	16	Aug. 13	Sept. 17	Oct. 8	.25
Beaver Oil, Dak.	1	July 23	Sept. 11	Sept. 28	.001
Belcher, Nev.	36	Sept. 18	Oct. 23	Nov. 12	.50
Bodie, Cal.	9	Sept. 25			.50
Cedar Rapids, Dak.	5	Aug. 25	Sept. 30	Oct. 17	.05
Desire, Dak.	3	Sept. 7	Oct. 9	Oct. 26	.002½
Dicker & Myers, Utah	1	Sept. 4	Oct. 9	Oct. 30	.50
El Dorado, Dak.	4	Aug. 17	Sept. 19	Oct. 9	.001
Exchequer, Nev.	26	Sept. 6	Oct. 10	Oct. 31	.20
Golden Fleeca, Cal.	13	July 31	Sept. 5	Oct. 1	4.00
Lady Wash., Nev.	7	Aug. 21	Sept. 26	Oct. 16	.25
Leami, Cal.		July 30	Sept. 15	Oct. 1	.01
Locomotive, Nev.	3	Aug. 21	Sept. 26	Oct. 16	.25
Live Oak Drift	10	Aug. 20	Sept. 27	Oct. 19	.05
Mayflower, Cal.	42	July 31	Sept. 3	Sept. 25	.50
Mexican, Nev.	36	Aug. 9	Sept. 13	Oct. 3	.25
Montreal, Utah	1	Aug. 17	Oct. 1	Oct. 20	.01
Mono, Cal.		Sept. 20			.50
New Era, Dak.	4	Aug. 9	Sept. 10	Sept. 26	.01
Ophir, Nev.	54	Sept. 1	Oct. 4	Oct. 24	.50
Pondera, Cal.	1	Aug. 10	Sept. 18	Oct. 10	.05
Savage, Nev.	70	Aug. 3	Sept. 5	Sept. 25	.50
Virginia Creek, Cal.	6	Aug. 29	Oct. 9	Oct. 23	.06
West Salem, Dak.	1	Sept. 5	Oct. 8	Oct. 26	.00134

Pipe Line Certificates.

Messrs. Watson & Gibson, petroleum brokers, report as follows for the week:

We believe a big deal in crude oil is near at hand. The Standard appears to have more complete control of the situation than ever before. The recent sale of Lombard & Ayres' large refinery to the Tidewater interest, which we believe is subordinate to Standard control, disposes of the largest outside refinery, and w

understand that the product of the other outside refineries has been contracted for by the Standard. The Ohio oil is in their hands, and we are satisfied they own nearly all the Pennsylvania article. Refined was advanced ½c. yesterday to 7½c., and we believe it will go higher.

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Sept. 22	91¼c.	92¼c.	90¾c.	91¼c.	375,000
24	91½	94¼	90¾	93½	1,018,000
25	93½	94½	92½	92½	892,000
26	93	93¾	93	93¼	684,000
27	93½	94½	93½	94¼	888,000
28	94½	96½	93½	94½	1,772,000

Total sales in barrels..... 5,593,000

NEW YORK STOCK EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Sept. 22	92c.	92¾c.	90¾c.	91¼c.	439,000
24	91¼	94	91	94	1,023,000
25	92½	94½	92½	93	618,000
26	93	93¾	93	93¼	477,000
27	93½	94½	93	94¼	640,000
28	94½	96½	93½	94½	1,295,000

Total sales in barrels..... 4,492,000

A dispatch from Philadelphia has announced the transfer of the refining interests of Lombard & Ayres to the Ocean Oil Company and Chester Oil Company, of Philadelphia. Mr. Ayres has stated to the press that a controlling interest in the Lombard & Ayres Company had been sold to the Tidewater Pipe Line, and it is understood that the result of the sale will be a consolidation of the Lombard & Ayres and the Ocean Oil companies, for the purpose of economy. The purchaser, the Tidewater Pipe Line, is believed to be controlled by the Standard Oil interests, and the transaction probably completes the transfer of property to the Standard of an organization formerly a competitor.

[From our Special Correspondent.]

Boston Mining Stocks. Sept. 27.

The market for copper stocks the past week has shown evident signs of weakness and a disposition to realize profits, resulting in lower quotations throughout the list. The interest has centered more largely in railroad stocks, and for the time being mining stocks are neglected. The sales the last few days have been very small and prices have yielded whenever there has been any pressure to sell. We still believe in a very active market this fall and much higher prices, especially for the low-priced mines, which have as yet not participated in the boom. Calumet & Hecla declined from \$288 to \$285 on very small sales, and \$280 was the best bid for it to-day. Boston & Montana declined from \$51¼ to \$50, but at this price the stock is wanted. Quincy was the only real firm stock on the list, with sales at \$85.

Franklin has been very weak, and declined from \$19½ to \$17½, with considerable pressure to sell it.

Atlantic opened at \$18, advanced to \$19½, and receded to \$18½, with more than usual activity in the stock. Osceola sold up to \$20½, but later sales were at \$20½.

Tamarack declined from \$180 to \$178 on small sales. Kearsarge barely steady, at \$9@9¼.

Allouez fairly steady, at \$3½@3¾.

National sold at \$5½@5.

Huron declined from \$5½ to \$5, while Pewabic advanced to \$4.

Bonanza, on the report alluded to last week, sold up to \$1½, with later sales at \$1¼.

Silver stocks are quiet. Dunkin advanced to 95c. on the strength of a remittance of \$5000 from the mine and the prospect of a dividend next month. Breece firm, at 80c. bid. It is intimated that a dividend on this stock is among the possibilities of the near future. Catalpa and Crescent dull, at about 20c. for the former and 10c. for the latter.

For Nervous Debility

Use Horsford's Acid Phosphate.

Dr. A. M. BILBY, Mitchell, Dak., says: "I have used it in a number of cases of nervous debility, with very good results."

FOR SALE.

Stamp-Mill, two batteries of 5 stamps (450 lbs.), made by Fraser & Chalmers, used only a few months, with an extra set of shoes and dies, and with timbers, \$500. A Heater and Filterer, No. 6 (Stillwell & Bierce), good as new. Price \$60. Sold for want of use. Address WILLIAM P. BARD, Reading, Pa.

MINES AND MINERAL STATISTICS OF MICHIGAN,

By Chas. D. Lawton, A. M. C. E., Commissioner of Mineral Statistics, 1888. Price 50c.

The Scientific Publishing Co.,
27 PARK PLACE, NEW YORK.

MEETING.

OFFICE OF THE EUREKA CONSOLIDATED MINING COMPANY. SAN FRANCISCO, Sept. 20, 1888.

The annual meeting of the stockholders of this company will be held on Monday, October 15th, at 11:30 o'clock A.M., at this office.

Transfer-books will close here on Friday, October 12th, at 3 o'clock, and at New York transfer-agency on Thursday, October 4th, at 3 o'clock.

H. F. BUSH, Secretary.

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	9	¼	2.25	6.84	15.84	27.65	37.71	47.17
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	15	¼	3.75	9.28	20.49	30.42	40.48	50.25
	18	¼	4.50	11.10	24.98	36.14	46.90	56.70
	21	¼	5.25	12.92	29.47	41.86	52.91	63.15
	24	¼	6.00	14.74	33.96	46.78	58.00	68.10
	27	¼	6.75	16.56	38.45	51.69	63.03	73.05
	30	¼	7.50	18.38	42.94	56.60	68.04	78.00
	33	¼	8.25	20.20	47.43	61.51	73.05	83.00
	36	¼	9.00	22.02	51.92	66.42	78.06	88.00
	39	¼	9.75	23.84	56.41	71.33	83.07	93.00
	42	¼	10.50	25.66	60.90	76.24	88.08	98.00
	45	¼	11.25	27.48	65.39	81.15	93.09	103.00
	48	¼	12.00	29.30	69.88	86.06	98.10	108.00
	51	¼	12.75	31.12	74.37	90.97	103.11	113.00
	54	¼	13.50	32.94	78.86	95.88	108.12	118.00
	57	¼	14.25	34.76	83.35	100.79	113.13	123.00
	60	¼	15.00	36.58	87.84	105.70	118.14	128.00
	63	¼	15.75	38.40	92.33	110.61	123.15	133.00
	66	¼	16.50	40.22	96.82	115.52	128.16	138.00
	69	¼	17.25	42.04	101.31	120.43	133.17	143.00
	72	¼	18.00	43.86	105.80	125.34	138.18	148.00
	75	¼	18.75	45.68	110.29	130.25	143.19	153.00
	78	¼	19.50	47.50	114.78	135.16	148.20	158.00
	81	¼	20.25	49.32	119.27	140.07	153.21	163.00
	84	¼	21.00	51.14	123.76	144.98	158.22	168.00
	87	¼	21.75	52.96	128.25	149.89	163.23	173.00
	90	¼	22.50	54.78	132.74	154.80	168.24	178.00
	93	¼	23.25	56.60	137.23	159.71	173.25	183.00
	96	¼	24.00	58.42	141.72	164.62	178.26	188.00
	99	¼	24.75	60.24	146.21	169.53	183.27	193.00
	102	¼	25.50	62.06	150.70	174.44	188.28	198.00
	105	¼	26.25	63.88	155.19	179.35	193.29	203.00
	108	¼	27.00	65.70	159.68	184.26	198.30	208.00
	111	¼	27.75	67.52	164.17	189.17	203.31	213.00
	114	¼	28.50	69.34	168.66	194.08	208.32	218.00
	117	¼	29.25	71.16	173.15	198.99	213.33	223.00
	120	¼	30.00					