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WE have seen in operation this week an extremely simple and effective magnetic separator for iron ores, called the Venström magnetic separator. It is a Swedish invention and has been in use in that country for several years, where by its means they are working up old dumps much poorer than most of the waste material in this country. The largest machine now in use in Sweden requires two horse-power to drive it, including the power for dynamo, and this will handle anything that will go through a three-inch mesh screen. Its output of clean ore is stated to be 14 tons per hour. The successful separating of coarse ore seems to us to be worthy of special notice, and should prove an immense boon to our iron mines. We shall on a future occasion give a full description of the separator.

CHINA AS A MARKET FOR AMERICAN PRODUCTS.

In our issue of last week we referred to the prospect that is now before us of China becoming a larger buyer of silver than hitherto, in consequence of the commencement which has taken place in the construction of railroads. This, fortunately, has been at last undertaken by the

Chinese themselves, and though the extension of the system may be opposed by those who think they will be losers by it, it will go on, as has the telegraph system in Chinese hands; whereas while this and the first attempt at a railroad were in the hands of foreigners, no roadway could be made, and the short railroad that was built had to be taken up, because it was decided by the authorities that it endangered the lives of the people. Another instance has just occurred of this stubborn opposition to foreign devices in a memorial addressed by CHANG CHITUNG, Viceroy of Canton, to the Emperor, begging him to prohibit the importation of kerosene oil into China; and from the wording of it, as it is reported, it is also an attempt at a retaliation measure because of the restriction of Chinese immigration into this country. Kerosene is accused of having done incalculable injury to life and property; four hundred houses in Swatow are said to have been burned by it, one thousand in Canton, and \$10,000,000 worth of property destroyed. The Viceroy frankly says that he had done his best last year to kill the trade in kerosene by raising the inland transit dues, but that he had not succeeded, and therefore he now invokes imperial aid.

This is a matter that concerns both the petroleum producer and exporter, and it is to be hoped that this promising market will not be lost after having made such a good beginning.

ECONOMICAL MINING AND MILLING.

In our last issue one of our correspondents, writing from Boulder County, Colorado, refers to the reopening of the Niwot mine, remarking that under existing conditions of improved railroad facilities, and consequent reduction in the cost of supplies and freight of ore, and the reduced smelting charges now current, the ore of the same grade in this mine that was being taken out unprofitably in 1881, when the mine shut down, is now worth 80 per cent more to its owners of the mine, and that it could probably now be extracted at a profit. A similar result may be, no doubt, looked for in many other districts, and some mines formerly abandoned can now be reopened and worked to advantage.

It is important for prospectors and investors in mining properties to bear in mind that by improved machinery and methods of working, as well as by increased freight facilities, the cost of production has been so greatly reduced that low-grade ores, which would not have been thought worthy of attention ten years ago, can now be treated at a profit, the result of experience and close attention to economy. Indeed, it is to these causes and agencies at work quite as much as to new strikes that we must look for the growth of our output of the precious metals.

All of our readers are familiar with the wonderfully economical treatment of the Lake Superior copper ores, by which a ton of ore is stamped and separated at a cost of 27 cents per ton. Also many will remember the figures we gave in full detail in our issue of May 5th of this year with reference to the low cost of mining and milling in the Spanish gold mine, Nevada County, California, where the cost of mining averaged in six months 84 cents per ton, and the milling and amalgamating in Huntington mills amounted to only 23 cents per ton, thus showing that with a large body of free milling ore, yielding even much less than \$1 a ton a fair profit to the investor may be obtained. We also know officially that at the Treadwell mine of the Alaska Mine and Milling Company the cost of mining and milling was under \$1.25 per ton. This when the company was running 120 stamps, and now that they have 240 running it is possible that the cost is reduced even below this figure.

Silver milling and amalgamation is always looked upon, and properly so, as much more costly than free gold treatment; but to show what can be accomplished in this also we give the following particulars of two cases which have come under our notice: At the Gloster mine, Montana, where supplies are dear, with 60 stamps of 850 pounds, there were milled and amalgamated by the Boss continuous process in six months 26,201 tons of ore at a cost of \$1.99 per ton. There were 169 days working time, giving an average of 144 tons per 24 hours, and the expenditures were as follows: Quicksilver, \$4955; wood, \$8274; salt, \$3222; shoes and dies, \$6480, the balance being made up of labor and management. Subsequently, in one month at the same mill, the average number of tons put through amounted to 191 tons in 24 hours, and the cost was reduced to \$1.20 per ton. Considering the price of labor, the cost of mining was low also, amounting to \$3.36 for the six months referred to, including all expenses. This shows that free milling silver ore can be mined, milled, and amalgamated for \$4.56, a result that reflects great credit on the management.

The other instance that we shall quote in support of what can be done is the St. Helena mine in Sonora, Mexico, where 4320 tons were milled and amalgamated at an average cost of \$2.72 in Mexican money, or about \$1.90 in United States currency. What makes this case more striking is the fact that more than one-third of the cost was the fuel, which was poor wood at \$8 per cord. We have not before us the cost of mining in this case; but to show that the cost of the treatment of the

4320 tons was not exceptional, the figures of the whole year's operations showed a cost of about \$3.30 in American currency for milling, amalgamation and superintendence.

#### HOW TO PROMOTE ARKANSAS MINING INTERESTS.

The Arkansas "boomers," or rather the people who are urged on by those interested in the worthless mines mentioned by Dr. BRANNER in his letter to the Governor of Arkansas (which we published in the ENGINEERING AND MINING JOURNAL of August 18th, 1888), are on the war-path for Dr. BRANNER'S scalp, and all because he had the courage to say the truth and publish the facts as his competent and trustworthy assistant, Prof. COMSTOCK, found them.

Now, the course of honest men, who are not afraid of the light, would certainly not be blustering and threatening the State Geologist and his assistant for stating a notorious fact, namely, that much "salting" and fraud has been practiced in floating Arkansas bubbles. What honest men would probably do, if they thought these gentlemen had been mistaken, would be to get some competent expert, who enjoyed public confidence, to examine and report on the mines thus denounced. The ENGINEERING AND MINING JOURNAL has offered to publish the report of such an expert.

The parading of assays made by good chemists on ore some interested party sent them stating that it came from a certain mine is no testimony whatever to the value of the mine. In the first place, the samples may or may not have been from the mine they are said to represent, and they may be selected samples and worth nothing as a measure of the value of the property.

The question is not one which can be decided by abuse and by denunciation, nor yet by endeavoring to suppress the Geological Survey reports. The facts of fraud having been perpetrated, and mines salted, and the investors swindled, in some of these Arkansas schemes are notorious; and the best friend Arkansas mineral interests have, is he who exposes these nefarious schemes and prevents the utter disgust which follows the reign of the successful "bubble blowers." It is quite possible the State Geologist may have underestimated the value of some of the undeveloped claims examined—who is omniscient or infallible?—but, even if he has done so, every honest man should give him his support in endeavoring to show up a lot of "wild cat mines," any one of which schemes is infinitely more injurious to the mining interests of the State than any underestimate of value that may have been made, if, indeed, any such has occurred.

So far as we have seen, the Arkansas papers which are filled with denunciation of and threats against the State Geologist, Dr. BRANNER, and even against the Governor of the State, give no proof whatever that the mines stated to be worthless are not in reality as described. They simply abuse the geologist for saying so, and cite assays of samples selected by interested parties who have been more or less instrumental in blowing these very bubbles. It is scarcely necessary to say that such testimony is absolutely valueless as a proof that the geologist's statements are incorrect. Let the owners of these so-called mines show bullion returns, or let them furnish some competent and disinterested expert testimony to support their statements. Until some such competent rebutting testimony is offered, the public, and especially the investing public, will certainly accept that of two such able and reputable engineers as Dr. BRANNER and Professor COMSTOCK, as to the values of the properties they have mentioned in their report.

#### EARTH EMBANKMENTS FOR RESERVOIRS.

The terrible catastrophe at Valparaiso, owing to the bursting of the Mena reservoir, which resulted in the loss of more than seventy lives and the destruction of an immense amount of property, has taught another lesson to those who needed it of the insecurity of earthen embankments as retaining walls for reservoirs, unless built with the greatest care and with very large safety factors. Of course the reason for the adoption of this form of construction is economy, and under certain conditions, and in certain localities, removed from a population exposed to destruction in case of accident, it is not only permissible but advisable. The Mena reservoir was situated in the immediate vicinity of Valparaiso, and in a ravine dividing the Bellavista and Yungai hills at an elevation of about 900 feet above the level of the sea; its capacity is estimated to have been about 64,000 cubic meters, and the dimensions of the dam are represented to have been 50 meters in length, 17 meters in height, 40 meters at base and 15 meters at top. That excellent authority, Mr. AUG. I. BOWIE, Jr., in his admirable work on Hydraulic Mining, names 60 feet as about what is usually considered the safety limit for earthen dams.

There was nothing, therefore, in its height to have created alarm in this case, for even much higher earthen reservoir dams have been constructed by engineers in this country without accident resulting. Mr. BOWIE quotes the Pillarcitos reservoir, San Mateo County, Cal., which

has an earthen dam 640 feet long, 26 feet wide on top and 95 feet high. Also the San Andreas dam, 25 feet wide on top and 95 feet high. These California dams were provided with puddle walls to prevent leakage, and these were carried down respectively 46 and 47 feet deeper than the base, while in the various accounts of the disaster in Chili we see no mention of a puddle wall in the construction of the Mena reservoir dam, though it probably existed, for the life of an earthen dam is absolutely dependent on its being perfectly watertight. A leak, no matter how small, is a source of the utmost danger, for it speedily becomes unmanageable and the dam rapidly washes away.

It appears, however, that the proportion between the width at the base and height of this dam was little more than 2½ to 1, while, according to TRAUTWINE and most engineers of experience, the slope should never be less than 2 to 1 for the inner side and 1½ to 1 for the outer, which proportions would have provided a much wider base; even after reducing the unnecessary width at top. In fact, to show the caution considered necessary on this point, the two high dams in California already referred to have the following proportions: The Pillarcitos dam has a slope of 2½ to 1 on the inner and 2½ to 1 on the outer side. The slope on the inner side of the San Andreas dam is 3½ to 1 and the outer 3 to 1. With proper precautions in construction, there is no reason to think that earthen dams can not be made safe; but they are more liable to accident from various causes than are masonry or concrete dams, and should scarcely be trusted when so many lives are at stake, or if they must be used in such places the usual precautions for safety should be greatly increased.

From the New York Times we condense the following, as presenting a vivid picture of what occurred:

"The reservoir was formed 15 years or so ago, and two or three years since the proprietor solicited and obtained permission from the authorities to add four meters to the height of the retaining wall, thereby largely increasing the capacity of the reservoir, and augmenting enormously the risk to be apprehended from the possibility of the dam giving way. The catastrophe, however, appears to have been precipitated by a land-slide on the side of one of the hills overhanging the reservoir. Of course, the breach once begun, the destruction of the dam was the work of a moment.

"The catastrophe was so sudden and so unexpected that there was no time for warning of any kind, and some time elapsed before it became known to what cause the sudden irruption of water which had inundated the streets from the Café del Pacifico, in the Calle de la Esmeralda, to the Calle de Carreras, in the direction of Almendral, was owing.

"The stream of water and mud as it rushed down the Yungai River, carrying with it human beings, houses, trees, furniture, boulders, etc., in one confused mass, is reported by eye-witnesses to have resembled a gigantic advancing wall of water from 15 to 20 ft. in height. The destruction further down was also immense, while the loss of life was great, as over 50 bodies were recovered the following morning, and upward of 20 patients were received in the hospitals, and many others received attendance in private houses.

"The damage done is estimated to amount to nearly \$3,000,000, and the sufferings caused thereby have been immense. Generous, open-hearted hospitality and assistance were tendered the sufferers on all hands, and subscriptions have been raised to assist many who have been thrown from comfort into complete destitution."

#### THE EXHAUSTION OF OUR ANTHRACITE COAL FIELDS.

In the ENGINEERING AND MINING JOURNAL of September 22d we called attention to the enormous and disgraceful waste of anthracite coal going on in our Pennsylvania mines, and which is rapidly exhausting the supply of that inestimably valuable fuel, and in a brief space of time will deprive many industries of a necessary supply of cheap coal. A consideration of the statistics of production showed that at the present rate of output and the present percentage of waste, the entire anthracite coal-fields of Pennsylvania will be exhausted in seventy-five years. This statement is startling and alarming, and though it is not the custom of our people to have much thought for posterity, the prospect of exhausting our anthracite coal-fields within the lifetime of some who are now living it is certainly worthy of the most serious consideration.

It is evident that for some years to come the rate of production of anthracite will continue to increase, until the maximum output is reached at, perhaps, sixty, or it may be at seventy million tons a year; then for some years the output will remain near the maximum, and after that it will gradually decline again. The prices of anthracite will, however, increase when the market calls for more than the mines can supply, consequently the critical period for those industries which depend on cheap anthracite for their prosperity, if not for their very existence, will be that in which the price is no longer controlled by a redundant supply, but is governed simply by the cost of competing fuels and the limit the public will pay for the luxury of burning anthracite.

When will the maximum output be reached, and when will anthracite cease to be available as a cheap fuel for manufacturing purposes? It is highly probable that in about 15 years, and certainly within 20 years, the maximum output will have been reached, and within 25 years the consumption of this coal will be limited by the ability to produce and by the higher prices which will naturally follow this condition of affairs. In twenty-five years, therefore, if not before that time, the practical economic limit of the use of anthracite in manufacturing industries will have been reached, unless the present wasteful methods of mining be modified or abandoned. If instead of utilizing only 33 per cent of the coal in the bed, 70, 80, or 90 per cent should be made available, the evil day would be postponed correspondingly.

The economies which may be made by the introduction of better methods of burning coal, through which one ton may be made to do the work for which two or more tons were previously required, will result rather in increasing the demand for coal than in diminishing it. It is probable that progress in this direction will be both rapid and important, but it will apply equally to all kinds of coal. It is probable also that the coal which now is wasted in forming unsightly "culm banks" throughout the mining regions will be utilized, but this waste is estimated at only six per cent of the coal in the bed. The great source of loss is in the pillars and waste left in the mine, and which is unavoidable under the present system of mining. This loss is estimated to average from nearly fifty per cent in exceptionally favorable conditions to seventy per cent, and even more than this in many cases.

This enormous proportion of waste is unnecessary. Large and high pitching coal beds are worked in other countries with but a small part of this loss, and there is absolutely nothing in our anthracite beds to prevent the adoption of methods of work which would get nearly the whole of the coal. Now when the great coal producing corporations are making enormous profits they should inaugurate systematic and intelligent efforts to arrive at a creditable system of mining, in which the proportion of waste will be greatly reduced. That this has not been done already is not because our mine managers are incapable men or that they are unable to devise a suitable system, but they are kept fully occupied with the details of their present work and are not allowed to make expenditures in experiments which for the time being might increase their average cost of mining, even though eventually they might result in important economies. This is one of the cases where the services of the consulting engineer would be of very great value, for by ascertaining what is being done elsewhere and advising the directors of the company, he would be a most efficient coadjutor to the mine manager, and would show the directors the desirability of the experimental work and the improvements that would result from them. We shall be greatly obliged to our mining engineers and the managers of our anthracite mines for an expression of their views on this extremely important subject.

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. Initials 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.

Sudbury Copper Deposits.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In order to prevent possible misapprehension, I think it proper to state that my testimony in relation to the Sudbury, Ont., mineral deposits, as published originally in the *Toronto Globe*, and copied in the *ENGINEERING AND MINING JOURNAL* of September 22d, does not apply exclusively to the mines of the Canadian Copper Company. The article consists of my answers to some scores of questions, condensed into a few paragraphs, and applies rather to the deposits at large scattered throughout the district, than to any special mine, except where so stated. I do not feel at liberty to give the exact grade of the ore mined by the Canadian Copper Company, but it certainly varies very considerably from the figures here given, which referred mostly to the entire body of ore as mined from the average undeveloped deposits in this section.

SUDBURY, Ont., Sept. 27th, 1888. Very truly, EDWARD D. PETERS, JR.

American Methods of Copper Smelting.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In the issue of *Engineering* for August 10th, 1888, Mr. James W. Westmoreland, F. I. C., of Leeds, England, deals somewhat severely with my brief remarks on copper assaying in my lately published "American Methods of Copper Smelting," and especially with what he calls my "eulogistic description of the electrolytic method." And quite possibly he is right, and it may have been somewhat rash on my part to attempt to teach anything about copper assaying, when more urgent duties have prevented me from practically attending to that important branch of business for so many years.

Still, my book would have seemed imperfect without some mention of the best methods of copper assaying, and my principal excuse for venturing to write on a subject on which I was perhaps not fully posted, beyond me by my ignorance that the art of assaying had advanced so far beyond me.

I prefer to leave the defense of the electrolytic method to some one better fitted than I am for the purpose, if any such person feels enough interest in the matter so to do; but I cannot help feeling that Mr. Westmoreland is a little too severe on it, and too contemptuous of all benighted persons who have not adopted the Brown iodine process, which I did not describe in my book, as I knew nothing about it practically.

Still, though as manager of smelting works for a good many years I have not actually done the assaying myself, yet I have been responsible for my chemist's results, and in every case, for many years, these results have been obtained by the electrolytic method, and have been so satisfactory as to almost constantly agree with remarkable exactness with the assays of foreign and domestic purchasers and miners; and when any disagreement occurred, the umpire's decision, as well as I can recollect, has been in our favor in a good deal over 50 per cent of the cases.

But I bow to Mr. Westmoreland's superior knowledge of assaying, and if the opportunity ever occurs, shall endeavor to make my chapter on assaying more worthy of the art and its professors.

Yours very truly, EDW. D. PETERS, JR.  
SUDBURY, Ontario, Sept. 24, 1888.

Manufacture of Iron in Mexico.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I write to ask if your journal can give me any information regarding the prospect for pig-iron manufacturing in Mexico. I have written the Mexican Minister at Washington, and he refers me to your journal as the best authority on Mexican mining affairs in this country. I would like as much matter relative to this subject as you are able to give me, especially as to where the iron lies, its quality, and also if hard wood timber is reasonably abundant for charcoal pig-iron; also if there are at present any iron furnaces in Mexico. By affording me this information, or referring me to where I can get it, I will be very much obliged.

ELYRIA, O., Sept. 29, 1888. Truly yours, W. G. S.

[In our last issue we gave the latest and most reliable information from one of our own correspondents, with reference to the manufacture of iron in Mexico. The only iron works that we know of in operation are those of the Iron Mountain Company, of Durango. We reprint the information with a few additional details.

This company is producing about twenty 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.

The puddling furnaces are in charge of Ricardo Darby, who has been handling this ore at the old Durango Iron Works for 20 years. The rolling-mill is in charge of Mr. Lewis, from Ohio, and the new American Company seems to be, after many delays, in successful operation.

The ore is of very fine quality and is practically inexhaustible, and could not be more favorably situated for cheap extraction and delivery to the furnace. The charcoal is, we believe, of fair quality, but rather dear, as it has to come from a distance.

In our issue of August 4th, we referred to a new iron undertaking in Mexico as follows:

J. P. Witherow, the well-known engineer of Pittsburg, Pa., has about closed the contract for the erection of an immense steel and iron plant at Sabinos, Mex. The plant will consist of two blast furnaces, a Bessemer rail and nail mill and structural iron works. Sabinos is a small town in the heart of a mineral country, where coal and iron ore abound. It is about 115 miles distant from the town of Eagle Pass. The entire structure will be made of iron, and will be shipped ready for building from Pittsburg. The financial backers of the new project are English, American and Mexican capitalists. Eugene Kelly, of New York, is a large stockholder, Patricio Milmo, of Monterey, is also largely interested.

If any of our readers can give us more information we should be glad to hear from them.—ED. E. AND M. J.]

Mineral Railroad Development near Bristol, Tenn.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: There has recently been consummated here a deal in mineral and coal lands and railroad properties of not only vast proportions, but of vital importance to the development of this whole Southwestern country.

Dr. John M. Bailey, of Bristol, Tenn., has purchased the entire issue of stock and bonds of the South Atlantic & Ohio Railroad; also all the lands belonging to the Virginia, Tennessee & Carolina Steel and Iron Company (including over 1000 acres of town lots in the city of Bristol and 1,075 acres in and near the town of Elizabethton, Tenn.), aggregating about 50,000 acres of the finest coal and iron lands in Southwestern Virginia and East Tennessee. Some two weeks ago he purchased the Atlantic, Tennessee & Western Railroad. He has a contract to build the Bristol & South Atlantic Railroad, and is president of the Bristol & Danville Railroad. This latter railroad becomes an absolute necessity, in view of the lease of the East Tennessee, Virginia & Georgia Railroad to the Richmond & Danville Railroad, which seems to be about consummated.

The South Atlantic & Ohio Railroad starts at Bristol, Tenn., at the junction of the Norfolk & Western and the East Tennessee, Virginia & Georgia railroads, and runs in a northwesterly direction to the coal-fields of Southwestern Virginia, passing through the great fossil, red and brown hematite iron ore deposits of Southwest Virginia. The railroad is now completed for a distance of 42 miles, and the grading and masonry for seven additional miles is nearly completed. The track (60 pounds steel) is being laid as rapidly as possible. Dr. Bailey will push the construction of this road through to Big Stone Gap, when connection will be made with the Louisville & Nashville Railroad, now extending its Cumberland branch from Pineville via Cumberland Gap to Big Stone Gap. The Virginia Coal and Iron Company (E. B. Leisenring, of Mauch Chunk, Penn., president) own 60,000 acres of choice coal and iron lands at and around Big Stone Gap, and are preparing to open these mines and erect 500 coke-ovens.

The Atlantic, Tennessee & Western and the Bristol & South Atlantic railroads are both Tennessee corporations, and formed for the purpose of uniting the magnetic iron ores of East Tennessee and the coking coals of Southwestern Virginia. By the purchase of the former by Dr. Bailey, their practical consolidation is affected, and the large private, municipal and county subscriptions can be united and the construction of the Bristol & South Atlantic Railroad greatly accelerated. This railroad will, in fact, be an extension of the South Atlantic & Ohio Railroad from Bristol to the magnetic iron fields of East Tennessee and Western North Carolina, of which the Cranberry mines of Mitchell County are the most extensively developed and widely known.

The Bristol & Danville Railroad was chartered by the State of Virginia for the purpose of building a short line connection between the East Tennessee, Virginia & Georgia Railroad and the Richmond & Danville Railroad. When the importance of this connection is considered, the query is not "Will it be built?" but "Why has it not been built before?" It will connect the East Tennessee, Virginia & Georgia, the South Atlantic & Ohio, the Bristol & South Atlantic railroads at Bristol with the Richmond & Danville, the Virginia Midland and the Atlantic & Danville railroads at Danville, Va. By the railroads converging at Bristol, it will have connections with all points west, northwest, and southwest. By the roads radiating from Danville, it will have direct communications with all points on the South Atlantic coast; with Norfolk (which by this route will be sixty miles nearer Bristol than by the Norfolk & Western); with Richmond,

Washington, Baltimore, Philadelphia, and New York. In addition to all these railroad connections, it will furnish another and competing outlet for the great mineral resources of Southwestern Virginia, East Tennessee, and Eastern Kentucky.

The following extracts from a report by Professor Proctor, State Geologist of Kentucky, will give an idea of the mineral wealth and natural resources of the region opened up by the South Atlantic & Ohio and the Bristol & South Atlantic railroads:

"Big Stone Gap is one of the few natural passes leading from the South Appalachian coal-field to the great coalless area stretching south-eastward to the Atlantic Ocean.

"Immediately north of the Gap the coal measures have a very great thickness above drainage, and there are a number of thick coals of exceptional excellence. One coal has a thickness over a large area immediately tributary to the Gap of from six to eight feet of coal, is most advantageously located for cheap mining, and makes a superior coke having from 93 to 95 per cent of fixed carbon, with from 3 per cent to 5 per cent ash and very low in sulphur. In addition to this very superior coking coal, are cannel, splint, and excellent gas coals. In Powell's Mountain there is a southern extension of this field where three coals are present; an excellent coke has been made from one of these coals. This outlying portion of the coal-field is but 50 miles from Bristol.

"These coals are the more valuable because of the proximity of the iron ores along the line of the South Atlantic & Ohio Railroad, and because they are the nearest coal to the great deposits of high grade Bessemer steel ores in East Tennessee and Western North Carolina.

"The 'red fossil' or Clinton iron ore is a reliable, stratified ore, and three beds are known to be present, one ranging from 30 feet to 65 feet thick of excellent soft ore, averaging from a large number of analyses, from 45 per cent to 54 per cent of metallic iron; another ranging from 18 feet to 24 feet thick. This ore can be mined at low cost, say from 50 cents to \$1 per ton, and I think it safe to assume that there are on the line of the South Atlantic & Ohio Railroad 20,000,000 tons of this ore that can be put upon the cars at the above-named rate. This will give a freighting of 1000 tons a day for fifty-four years. Recently a new ore horizon has been developed from Big Stone Gap along the line of this road, parallel to the above-mentioned, and again along the southern base of Clinch Mountain. This is a limonite or 'brown' ore, and is a reliable and extensive deposit. It is in the Oriskany of the upper Silurian. I superintended the openings made in this ore at a number of places along the line of the road, enough to convince me that there is a deposit of very fine limonite ore exceeding in quantity the Clinton or red fossil ore above referred to. At one point where several openings were made I was convinced that along a line of only 3500 feet 780,000 tons of ore can be had above drainage. At one opening more developed than others solid ore 19 feet thick was reached. This ore will yield from 50 per cent to 55 per cent of iron, and is low in silica and phosphorus. There is enough of it along the line of the road to furnish freight sufficient for a long time to pay a large interest upon the cost of construction.

"The South Atlantic & Ohio Railroad will penetrate a coal-field equal if not superior, and passes through deposits of ore more abundant and superior in quality to anything yet reached by the Norfolk & Western Railroad. I know of no road with a greater combination of advantages: coals, iron ores of exceptional excellence and in the greatest abundance; timber and building stone, fertile soils, and the certainty of favorable connections with important railways at both termini."

very pure and compares favorably with various rock salts and with products of evaporation-pans, springs, wells, and lakes. The following table of analyses of salt speaks for itself. In the analysis of the Avery salt, many eminent chemists agree.

ANALYSES OF SALT.

VARIETIES OF.	Chloride of sodium.	Chloride of potassium.	Chloride of calcium.	Chloride of magnesium.	Sulphate of lime.	Sulphate of magnesia and soda.	Alumina and iron.	Residue.	Water.	Authorities.
Rock salt—										
Avery salt mine...	98.88	...	trace.	trace.	0.79	...	...	...	0.33	Goessmann.
Wieliczka, Austria...	100.00	...	...	trace.	...	...	...	...	...	Bischof.
Berchtesgaden...	99.92	...	...	0.07	...	...	...	...	...	"
Hall, Tyrol...	99.43	...	0.25	0.12	0.29	...	...	...	...	"
Hallstadt, Austria...	98.14	trace.	...	...	1.86	...	...	...	...	Heine.
Stassfurt, Prussia...	94.57	...	...	0.97	0.89	...	1.12	2.23	0.22	"
Vic, Ger. Lorraine...	99.30	...	...	...	0.50	...	0.20	...	...	Berthier.
Jebel-Melah, Algeria...	97.00	...	...	...	3.00	...	...	...	...	Fournet.
Ouled-Kebbah, Algeria...	98.53	...	0.93	0.54	...	...	...	...	...	"
Carriek-fergus, Ireland...	96.28	...	...	...	3.50	0.08	...	...	0.14	G. H. Cook.
Santo Domingo...	98.33	...	...	0.04	1.48	...	...	0.01	0.07	Goessmann.
Salt from wells and lakes—										
Onondaga, N. Y. ...	97.41	...	0.15	0.18	1.26	...	...	...	1.00	G. H. Cook.
Pittsburg, Pa. ...	98.70	...	0.53	0.07	...	...	...	...	2.70	"
Kanawha, W. Va. ...	91.31	...	1.26	0.43	...	...	...	...	7.00	"
Hocking Valley, O. ...	95.07	...	0.61	0.04	0.10	...	...	...	3.40	Goessmann.
Pomeroy, O. ...	96.42	...	0.53	0.18	...	...	0.05	0.16	2.66	E. S. Wayss.
Cheshire, England...	98.36	...	0.01	0.02	1.17	...	...	...	2.44	G. H. Cook.
Dieuze, Ger. Lorraine...	97.59	...	...	...	1.02	0.89	...	...	0.50	"
Droitwich, Eng. ...	96.93	...	...	0.02	3.05	...	...	...	...	"
Golderich, Ont. ...	97.03	...	0.01	0.03	1.43	...	...	...	1.50	Goessmann.
Saginaw, Mich. ...	92.97	...	1.09	0.50	0.33	...	...	0.01	5.10	G. H. Cook.

The galleries of the second level are run 80 feet in width and 45 feet in height, leaving supporting pillars 60 feet in diameter. The lower pillars are so left that the weight of the upper ones rests upon them in part, if not wholly, with a thickness of at least 25 feet of salt-rock between. There are 16 to 25 feet of earth above the salt-deposit. The contour of

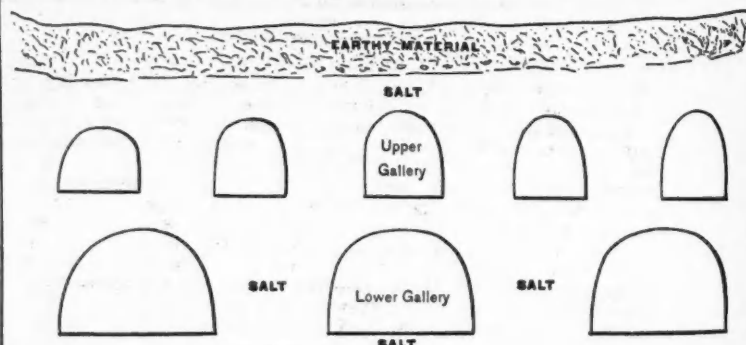


Fig. 3.

the latter conforms nearly with that of the surface. The working-shaft is 168 feet deep. The depth to the first level or floor is 90 feet; to the second, 70 feet further. The remaining 8 feet are used for a sump. The galleries of the first level were run, on an average, 40 feet in width and 25 feet and upward in height, leaving supporting pillars 40 feet in diameter.

Fig. 3 is a rough draft of a vertical section. The galleries cross each other at right angles and the ground plan strongly resembles a chess-board.

Galleries aggregating nearly one mile in length have been run on the upper level and some 700 feet on the lower.

The stratification plans are clearly denoted, and at first sight appear to have been thrown into a vertical position throughout; but a close examination reveals the fact that the structure is folded, and shows three anticlinal axes in the first level, with the corresponding synclinals in the lower level. In Harper's Monthly Magazine for May, 1888, will be seen (p. 909) a cut of a salt-quarry at Ilets, in which the structure is folded. The method of working shown is similar to that formerly employed at the Avery salt mine.

In running a gallery the first work is the "undercutting" on the level of the floor, of sufficient height to enable the miners to work with ease. The salt is then blasted down from the overhanging body. The yearly output is about 50,000 tons.

I am indebted to Major McCalla, the mining engineer of the company, for important data, and also for the following statement, which I give on his authority:

"The salt as it comes from the mine is dumped into corrugated cast-iron rolls, which crush it. Next it goes into revolving screens, which take out the coarser lumps for 'crushed salt,' and let the fine stuff pass to the buhr-stones. These grind the salt, and from them it goes to the pneumatic separators, which take out the dust, and separate the market salt into various grades. Taking the dust out is essential to the production of a salt that will not harden, since the fine particles of dust deliquesce readily, and on drying cement the coarse particles together. The drill used in the mine is what is known as the 'Russian auger.' It is turned by hand, and forced by a screw of 12 threads per inch. The holes take cartridges 1 1/2 inches diameter. Two men will bore 75 feet of hole per working-day of 8 hours."

THE PETITE ANSE SALT-MINE.\*

This mine, known also as the Avery mine, is situated on Petite Anse Island, New Iberia Parish, Louisiana. The island is about four miles from Vermillion Bay, an arm of the Gulf of Mexico, and is one of four islands or hills surrounded by the sea-marsh, as shown in the accompanying map (Fig. 1). A fifth, Joe Jefferson's Island, or hill, is some distance from the sea-marsh. These five islands—Belle Isle, Cote Blanche, Grand Cote, Petite Anse and Jefferson—appear to be the tops of submerged hills, and occupy a line having nearly a northwest trend. To the north are a series of hillocks that extend at intervals to the hills of Northern Louisiana, which in turn appear to run into the Ozarks of Arkansas. Near the mine there is sandstone, also a thick vein of lignite. Bones of the mastodon have been found in considerable quantity in this neighborhood, and some specimens have been sent to the Smithsonian Institution.

I will not give here a geological description of the country, since this has been abundantly done already by Hilgard, Goessmann, Thomassy and other able writers. It will, doubtless, be sufficient to call the reader's attention to the accompanying geological section of Petite Anse Island (Fig. 2), copied from Prof. E. W. Hilgard's map.

The salt-mine and Petite Anse Island are owned by the Avery family, an old and honored family in Louisiana. The New Iberia Salt Company is the lessee, J. C. Haskell being general superintendent, S. L. McCalla mining engineer, and John Hamilton mill superintendent. As far back as the beginning of the present century salt springs were known to exist on the island, wells had been dug and salt made for local consumption. During the war much of the Southern country was cut off from its supply of salt, and the island became a busy place for its manufacture. The supply of brine proving insufficient, an old well was cleaned out under the direction of Mr. John M. Avery. In digging this well still deeper the negro at work told his master that he had struck a log and could go no further, whereupon Mr. Avery descended and discovered a hard rocky substance, which, upon examination, proved to be pure rock salt. This, the first discovery of the salt, was made at a depth of only 16 feet. It put an end to the manufacture by evaporation. Pits of rectangular form were sunk and the earth was stripped from the salt, which was blasted out by underhand stoping. Wagons by the thousand were used to transport the rock salt. Upon the occupation of the country by the Federal forces the work of mining was suspended.

The depth of the salt has never been determined, but the surface area underlain by the deposit is estimated to be about 150 acres. The salt is

\* A paper by Richard A. Pomeroy, New Iberia, La., in the Transactions of the American Institute of Mining Engineers.

Petite Anse Island is ten miles from New Iberia, with which it is connected by rail. Unlike the barrenness that so often surrounds mines, the island is a beautiful park, with forests, grassy parterres, miniature lakes and streams. Sugar cane, cotton, corn, the Tabasco pepper, and a profusion of flowers grow here. The scenery is indescribably charming. The Teche is a lovely meandering bayou, the banks of which are fringed with live

acustomed in the North to interruptions from snow and ice, can here work out of doors every week in the year. Invalids and others, worn out by the rigors of winter, can recuperate their wasted strength in this balmy atmosphere. The sea-breezes roll over the country and give health and long life to its inhabitants. The climate is, in short, a medium between the tropical and north temperate, combining most of the advantages of both and the evils of neither.

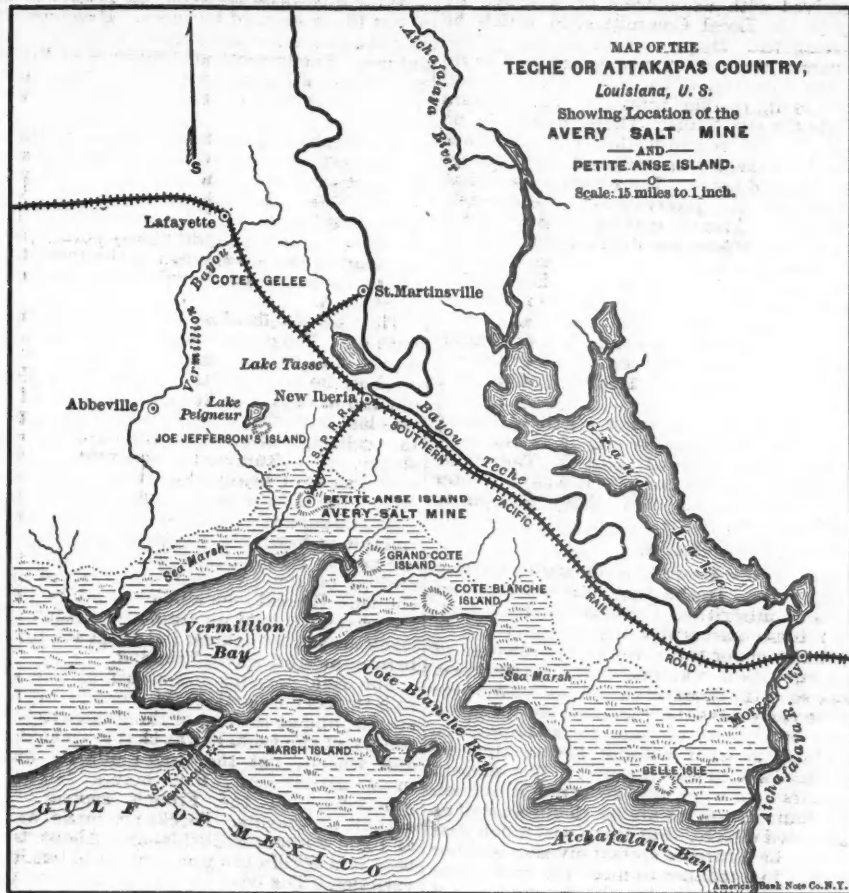


Fig. 1.

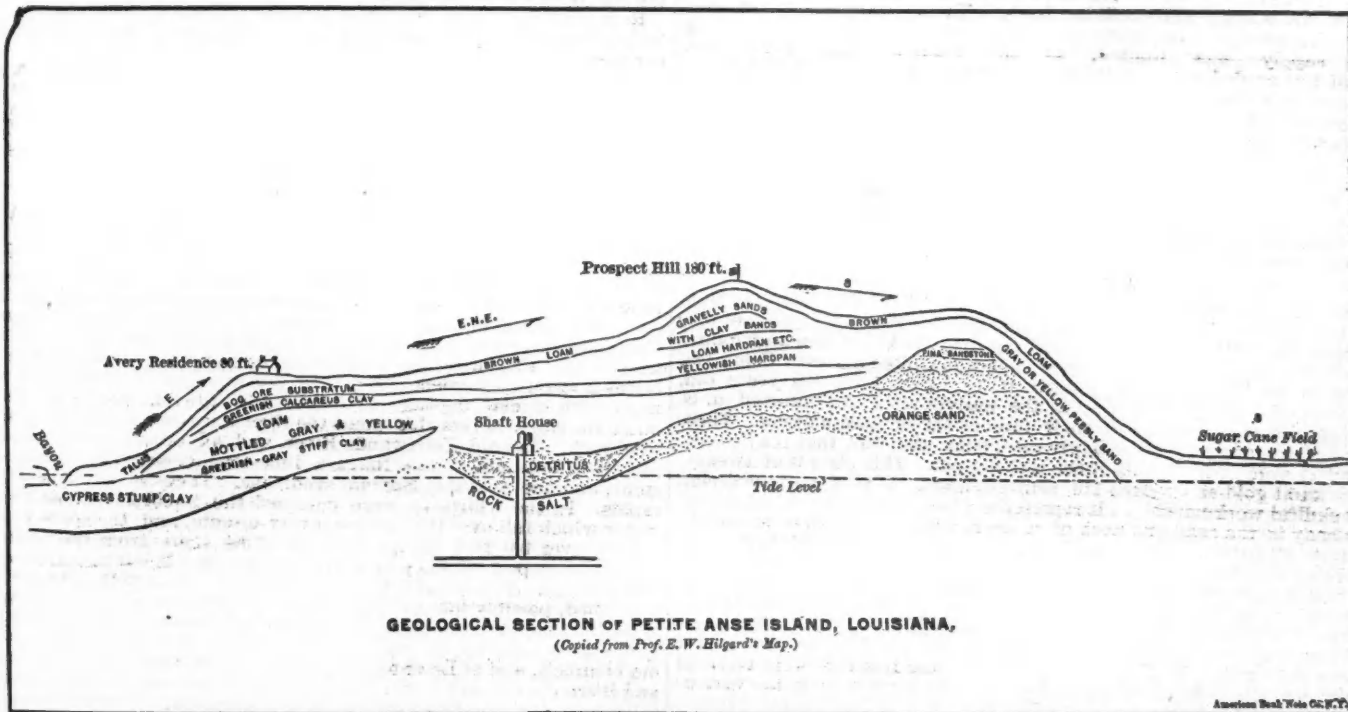


Fig. 2.

oak, cypress, pecan, ash and willow. It is the scene of busy industry. Along it are saw-mills, shingle-mills, brick-kilns, ice-factories, machine shops, cottonseed-oil mills, sugar factories and cotton-gins. Cotton and other factories would certainly thrive here. Steamboats are constantly plying upon the bayou, some to New Orleans, some to Morgan City, and some between minor local points. The Teche is not a sluggish stream, its banks are high and the country is never overflowed. The soil is excellent and the climate healthy and delightful. The farmer

To the geologist this is a country of constant surprises, in the form of materials brought from distant sources, and traces of ancient channels now abandoned. He finds clay from the Red River, alluvium from the Mississippi, and sand and gravel that remind him of the Bijou Basin in Colorado. Red River has been a fickle stream in its journeyings to the sea, changing its course from time to time, until finally it has been mostly lost in the waters of the Mississippi. But it has left its marks from the Sabine to the Atchafalaya.

## BUFFALO MEETING OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

A number of the members of the American Institute of Mining Engineers assembled in Buffalo on Tuesday evening to hold their fifty-second meeting. They were received with an address of welcome by Dr. Julius Pohlmann, Secretary of the Local Committee, in which he warmly greeted the assembled delegates. He promised that the people would not boom Buffalo in the ears of the visitors, nor would they be induced to buy town lots located ten miles out of the city. There would be no effort made to induce them to dig the big tunnel to the Niagara River, nor to bring the falls inside the city limits. There would be no talk about the beautiful residences, drives and walks, or of handsome women, yet the delegates would be expected to note all these things and talk about them after they returned home. There used to be a time when pure science and applied science, the professor said, were widely divided. The pure scientist scorned the idea of making money on the ground that putting science to such a purpose was degrading to himself and to his profession. Of late years the lines had grown more diffused, and for this the mining engineer was largely responsible. His profession was largely a combination of sciences, and it was hard to tell where he left off his geology and began his engineering. He was glad to welcome the engineer to this city of coal and iron industries, and to a building dedicated to literature and the arts and sciences, which stood as a monument to the intelligence of the citizens of Buffalo, and in their name he bade the delegates welcome.

President Potter said he took pleasure in responding to these hearty words of welcome. This was the first time that the engineers as a body visited Buffalo, but they knew that it had many attractions. They came not merely because of its mining interests, but because it was a center of intelligence, business thought and social polish. They desired to meet the representatives of these interests.

## PRESIDENT POTTER'S ADDRESS.

He followed these introductory remarks with a carefully written paper on the needs of mining engineers. In the past, the student had been obliged to study the English authorities, but latterly these textbooks had been outgrown. In these gatherings the delegates gained much by personal contact and the opportunity for an interchange of ideas. The subject of technical education was one of vast importance, and was growing more and more so as the demand for special knowledge in special fields increased. In the early days the student who had pored over his foreign authors was obliged to go out to add practice to his theoretical knowledge, and it went without saying that he met but a cool reception at the mines and in the furnace. The present school had its working drawings, its field work and its summer school, and the student was obliged to demonstrate his ability to do, as well as to learn in order to secure the coveted degree. But there was much that needed to be done yet. There must be a further special division of labor if the work was to be well done and in a manner to meet the increasing and uncompromising competition. The schools for the development of technical training must keep the pace of this demand or fall into disfavor. To all experienced engineers it was clear that there was a lack of exact knowledge and definite laws. There was plenty of general knowledge, but when exact information was wanted the supply was limited, as the student soon found out. What was needed was practice in large public engineering laboratories, filled with full-sized machinery for trying timbers and testing ores. They should be operated on a public basis, and used for the testing of matter, processes, and appliances. Sound experts should be there to guide and superintend the work, so that authentic records might be kept and reports made. Such a laboratory was the St. Louis Sampling and Testing Works. The objects attained were to afford instruction to the students at Washington University, to protect the public from wild-cat and unsafe enterprises, and to supply the whole people with a better means for advancing their best and truest interests.

## A GOLD BREASTPLATE.

Secretary Raymond now read a paper on "A Gold Breastplate from Central America." His breastplate was recently dug up by miners who were seeking a foundation for a stamp-mill at the Great Remance quartz mines, fifteen miles from the city of Santiago, United States of Colombia, Isthmus of Panama. He judged it to be at least 400 years old, for after the invasion of Cortez the natives were not allowed to be buried with any examples of their famous art of gold-making. These breastplates are now exceedingly rare, from the fact that the Spanish invaders were great friends of the melting-pot. This plate is of twenty-three karat gold and weighs 110 pennyweights. It is of curious design and skillful workmanship. It represents a bat with outstretched wings. The body is the head and neck of a deer, while the antlers are in the form of alligators. It was undoubtedly a totem, or coat of arms, representing the elements, air, water and land. The wings of the bat are of beaten gold welded to the head in a masterly way. The body was cast hollow, and the wonderful thing is that the casting shows a higher degree of workmanship than the hammered work.

Wednesday was devoted to an excursion to the Brooks Locomotive Works at Dunkirk, N. Y. The members of the Institute were received by the courteous officers of the company, who showed them the various departments of this immense establishment, which now employs over a thousand men and turns out four locomotives a week. After this interesting visit, the members were invited to the mansion of the Brooks family, where luncheon was served, and in the afternoon the visitors returned to Buffalo. In the evening the second session was held, and several interesting papers were read.

## THE USES OF ASPHALT.

Was the title of a paper by Capt. F. V. Greene, New York City, vice-president of the Barber Asphalt Paving Company. It was an exhaustive and carefully prepared paper, and was illustrated by the introduction of specimens and samples. The essayist sketched the first mention of asphalt. He found it was used in the building of the tower of Babel and other ancient structures. It is found in Venezuela, but so remote and inaccessible as to furnish a very inconsiderable supply. Gas tar is distilled from bituminous coal in the manufacture of gas, and is not unlike the natural tar. Twenty-five years ago it was worthless, but now is worth so much

as to leave the gas pure profit. The gas tars are mixed with native asphalt for paving purposes, and work well provided the asphalt is proof, or 100 per cent pure. The asphalt of Trinidad is mixed more or less with earthy matter. The bituminous sandstone of California is found in varying quantities between San Francisco and Los Angeles. It contains about 18 per cent of bitumen. Pavements made from it are quite soft and the two years' trial which it has had does not determine its successful use. The bituminous limestone of France has furnished the elegant pavements of Paris, in which city there are 13 miles, and 47 in Europe. The asphalt block pavement in Paris exceeds 5,000,000 square yards and 1000 miles.

A bituminous limestone is found in the Rocky Mountains, but high freight rates have prevented its use in commerce. The Cuban cement is too brittle for use successfully. The asphalt lake of Trinidad is located about 100 feet above the sea. There are estimated to be about 6,000,000 tons of asphalt in it. The excavation of 180,000 tons has made no impression. It is not liquid at any point, and horses and mules can go over it. During the voyage by sea the mass forms again and has to be loosened with picks and shovels. The color of the crude article is a chocolate brown.

The uses of refined asphalt are many, but it generally has to be treated with oil. For paving cement it is mixed with coal-tar residuum. It is also used as underground insulation for electric wires. Asphalt was used on the arch of High Bridge, New York. The work is thirty years old and has never leaked a drop. One of the lake tunnels at Chicago was laid with the same cement. It is a good thing to prevent dampness in cellars, also for the foundations of buildings, in the shape of bituminous concrete, where it acts to stop the concussions of heavy machinery, like rock-crushers and trip-hammers. By far the most important use is in paving, and in the past five years 3,500,000 square yards have been laid. Buffalo at present enjoys the distinction of having more asphalt than any other city in the world. There are now in Buffalo 1,010,000 square yards of asphalt pavements. Here a section of the pavement on Linwood avenue, about six years old, was shown. He had seen a hole twenty feet deep under the asphalt, and yet the pavement held up traffic for years in the form of a concrete arch. Asphalt is proof against the elements, for the changes have all been made before the stuff leaves Trinidad.

The rigid cements do not last, as was shown on a down-town street in New York recently. At the end of four weeks the holes began to appear, and at the end of three months it all had to be taken away. The beauty of the asphalt was that it yielded to the blows of the horses' feet and wheels, but the traces quickly disappeared. On Fifth avenue, in a given time, five horses fell on the Trinidad asphalt and ninety-five on the French asphalt. There are many kinds of asphalt pavements. Blocks are made at a factory, and can be shipped and laid without skilled labor. About twenty-five miles of this have been laid within the past ten years, but it is less durable than the other varieties. The beauties of asphalt were then dwelt upon. The saving, counting the wear and tear to vehicles, was nearly three times the cost. Horses could draw bigger loads, and a great saving was gained in the cost of city transportation.

In answer to a question Captain Greene said that the average price of laying Trinidad asphalt pavement, with five years' maintenance, is \$3 per yard.

Dr. Raymond, a member of the Brooklyn Subway Commission, said they were well suited with their creosoted-timber conduits. They had tried to make tight joints by using asphalt cement, but the ridges had stripped the lead covering off the cables and made bad work. They had, therefore, concluded to be satisfied without air and water-tight conduits.

## LIFE HISTORY OF NIAGARA FALLS.

Prof. Julius Pohlman read his entertaining paper entitled "A Life History of Niagara Falls." The majority of people, he said, saw only the falls, and made up their minds as Paddy did when he saw the water falling over, that there was "nothing to hinder it." He went back to the time when lakes Erie and Ontario were great valleys, emptying their streams through the Mohawk Valley into the Hudson River. From the Tiff farm there was a filled river-bed, and it was due to this old river that Buffalo was on the lake. He thought the whirlpool more interesting as a water phenomenon than the falls themselves. The sides were filled with glacial deposits of sand and gravel. Little creeks ran down the sides. From this point the river excavation was through the solid rock. The old Tonawanda River, and all others of this vicinity, had three falls, one of the Niagara limestone, one of the Clinton limestone, and one over the Medina sandstone. These were connected by rapids. In the whirlpool were confined the 20,000,000 cubic feet of water which fall over the cataract every minute, and the space was but a little over 400 feet across. The ice came there from the north and when it disappeared it changed all the streams. It left one great freshwater ocean. It had many different beaches and outlets. At one time it drained, possibly into the Mississippi, and then into the St. Lawrence. Lake Ontario lowered down, and the cut took place at Niagara, for Lake Erie was looking for an outlet. There was no time to separate into the old channels, and at Lewiston there was a great depth of clay and shale, and there the cut was made. At the railway suspension bridge the first fall began, and not at Lewiston as many supposed. There was the first embankment found heavy enough to hold a river. To come from Lewiston would have taken at least 200,000 years, but from the bridge not over 8,000 years. The first historical picture was given by Father Hennepin in 1678, and he said the fall was 600 feet, and that such a fall did not exist anywhere else. Then the Horseshoe was not so far away from the American fall as now. The American fall, too, used to be in the shape of a horseshoe. From 1841 to 1886 the Horseshoe Fall went back 485 feet, and it was now going back about nine feet a year. The water on the brink was twenty feet deep, and it might be that Father Hennepin was not so very wrong after all.

Every one in Buffalo is trying to earn the \$100,000 prize. They wanted a tunnel to the river below the falls, and they didn't stop to think that there were at least sixteen miles of shale which would have to be walled. The upper rapids fell fifty feet in half a mile, and were the beginning of the Niagara limestone. Above this point there was nothing but shale, and

the river would cut through it with nothing to hinder sufficient to form a fall. It would simply form a rapid, and thus the views of those who expected the falls to come to Buffalo would be doomed to disappointment.

The last paper of the evening was on "Soaping Geysers," by Secretary R. W. Raymond, of New York. It has been found that throwing soap into the geysers caused them to spout, and some months ago the reader of the paper began a scientific research as to the causes. He wrote a letter to Arnold Hague, the geologist in charge of the National Yellowstone Park, and received a very interesting reply, from which the following extract is taken.

In a few words, the results of my investigations for the season were that in one or two of the larger geysers eruptions could be hastened by the application of alkali, and that several of the smaller ones could be forced to throw out columns of water. Where the cauldrons or pools are large but little change takes place, unless the waters are near the boiling-point. The most favorable conditions to accelerate action are those in which the reservoirs are small, the vents or conduits through which the water is forced narrow, and the water near the boiling-point. Of the large geysers, the "Beehive" seemed to be the one in which action could most easily be produced, although even here it fails in most instances. Here the water, for the greater part of the time, stands near the boiling-point. In the "Giant" geyser, which, at the time of my experiments, had not played for several months, I was able to cause most violent agitation and the throwing out of water, but nothing that could be called a genuine eruption. People familiar with the behavior of the "Giant" before an eruption, but ignorant of what I had done, believed the geyser was ready to resume in former activity. In the greater number of instances no action whatever was observed.

Thursday was devoted to excursions to various points of interest about the city of Buffalo and to the subscription dinner at the Niagara Hotel. The weather being extremely unfavorable, many of the members remained at the hotel engaged in instructive discussions.

A session will be held on Friday morning, and a number of papers will be read in the afternoon.

The works of the Cowles Electric Smelting and Aluminum Company, at Lockport, N. Y., will be visited on Friday. The ENGINEERING AND MINING JOURNAL, in previous issues, has published a description of the works and the process employed by this company. On Saturday the rock-salt mine of the Retsof Company, at Pifford's, New York, will be visited.

The following papers have thus far been announced: "The Uses of Asphalt," Capt. F. V. Greene, New York, vice-president of the Barber Company; "The Glenmore Iron Estate, Greenbriar County, Virginia," W. N. Page, Powellton, West Va.; "Anthracite and Coke, Separate and Mixed, in the Warwick Blast-Furnace," Edgar S. Cook, Pottstown, Pa.; "Note on a Tuyere Slagging-Valve," Edgar S. Cook, Pottstown, Pa.; "Note on a Speed and Pressure Regulator for Blast-Furnace Engines," Edgar S. Cook, Pottstown, Pa.; "Chlorination at the Phoenix and Yaddin Gold Mines, North Carolina," William B. Phillips, Chapel Hill, N. C.; "A Differential Hot-Blast Stove, and its Application to an Open-Hearth Blast-Furnace," Jacob T. Wainwright, Pitsburg, Pa.; "Note on a Specimen of Gilsonite from Uintah County, Utah," R. W. Raymond, New York; "Soaping Geysers," R. W. Raymond, New York; "Note on a Gold Breastplate from Central America," Dr. R. W. Raymond, New York; "Notes on the Roasting of the Hudson River Carbonate Ores," Ingersoll Olmstead, Burden, N. Y.; "The minerals of Ontario and their Development," W. Hamilton Merritt, Toronto; "Note on a Cast-Steel Water-Jacket," R. H. Terhune, Salt Lake City, Utah; "The Flue-Dust of the Furnaces at Low Moor," Ellison C. Means, Low Moor, Va.; "Notes on the Rosario Mine, San Juancito, Honduras," Thomas H. Leggett, Fairplay, Col.; "Steel Rails," Robert W. Hunt, Chicago; "Water Analysis," A. E. Hunt and George H. Clapp, Pittsburg; "The Electrical Transmission of Power in Mining," R. P. Rothwell, New York; "An Attempt to Fuse Carbon, and its Bearing on the Genesis of the Diamond," Alfred H. Cowles, Lockport, N. Y., and George F. Kunz, New York; "The Handling of Natural Gas," John F. Wilcox, Pittsburg; "Forestry and Mining," B. E. Fernow, Washington, D. C.; "Pig-Iron of Unusual Strength," Fred. P. Dewey, Washington; "Nickel Ore from Logan County, Kansas," Fred. P. Dewey, Washington; "The Life History of Niagara Falls," Julius Pohlman, Buffalo; "Cement Rock and Gypsum Deposits in Buffalo," Julius Pohlman, Buffalo; "Improved Methods of Refining the Oils of the Findlay Field of Ohio," Prof. William H. Pitt, of the Buffalo High School; "Notes on the Artificial Propagation of Mushrooms in the Abandoned Quarries of the Akron Cement Company at Akron," Uriah Cummings, Buffalo.

THE WAGES PAID IN THE EDGAR THOMSON STEEL WORKS.

According to the Braddock News, the wages at Braddock in August surpassed in most cases anything that had been paid there since the erection of the works, and the converting mill men are said to have been themselves surprised at the amount of wages they had to receive for the month. Machinists and blacksmiths come out about the same as in 1887 and they are apparently satisfied. Many of the converting mill men worked 12 hours, and they received more wages than in any month in 1887, and consequently are wholly satisfied. The scrappers work twelve hours, and were paid for August \$1.63 per hundred tons against \$1.90 per hundred tons last year, but in consequence of the amount of steel turned out in twelve hours being so much in excess of the result of eight hours turns in 1887 they have received larger wages than ever before, viz., \$8.13 per day. The foremen on the cupolas were paid \$1.40 per hundred tons, and they came out with \$184.14 for the month, or an average of \$7.87 per day.

Their helpers are paid \$2 per day. The exact earnings of the vessel foremen could not be obtained, but their wages are not less than \$100 per month. The troungmen got 92 cents per hundred tons, and made \$121.20, or an average day's pay of \$4.27. The ingot pourers work eight hours at \$1.40 per hundred, and made \$123.76, an average of \$4.25 per day. The pull-arounds were paid \$1.10 per hundred tons, worked eight hours, and made \$98.14, or nearly \$4 a turn. Steel blowers got \$1.14

per hundred, and made \$99.63, or an average day's pay of about the same as the pull-arounds. The pulpit boys got 82 cents per hundred tons. They work twelve hours. Last month their net earnings were \$71.66 each, or about \$2.80 per day. The bottom makers in the converting mill made an average day's wages of \$5.50 in twelve hours. Their helpers are paid by the day, and received only ordinary laborer's wages.

The employes of the blooming department made better wages than in any previous month since the erection of the works. Of course they all work twelve hours. The foremen are salaried men, and the wages they receive are known only to themselves and the firm. The first helpers received \$1.39 per hundred. They made \$157.66, or over \$6 per turn. The second helper got \$1.02 per hundred, and made \$126.94, or about \$5 a day. The lever boys in this department made \$40.25. The men who worked about the shearers got 91 cents per hundred. Their month's pay amounted to \$103.22, a fraction less than \$4 a day. The chippers at the hammer were paid the same as the second helpers in the blooming mill, and the helpers at the hammer received the same as the shear men. The rollers in the blooming mill are salaried men and only work eight hours. It is understood that their wages are sufficient to keep them comfortable and still have some left to put by. The table men got \$1.13 per hundred. Their month's pay footed up \$128.17, about \$5 per day.

In the rail mill there is no distinction made, except with the rail-straighteners and gagers, who work eight hours. All the rest work twelve. The amount they get per ton is something less than what they received during 1887, but by working twelve hours they were all able to make wages that even exceeded that of any month during the year of 1887. The rail-mill heaters last month were paid \$1.48 and made \$153—almost \$6 per day. The buggy boys were paid \$2 per day; the lever men at the roughing-rolls get \$2.40 per day; the lever men at the short rolls \$3.50, and the guide-setter at the finishing-rolls \$2 per day; hot-sawyer, \$3 per day; first helper on hot bed, \$2.40; hot-bed, second helper, \$2.

The rail-straighteners work eight hours and get \$1.58 per hundred tons, and made for the month \$113.76, or over \$5 per day. Gagers also work eight hours. Per hundred tons they got 90 cents and made \$64.80, or about \$2.50 per turn. Chippers got \$2.50 for a day of twelve hours. Drillers got \$2.50 per day. They also work twelve hours, and their wages, as well as those of chippers, are gauged with the rise and fall of the market. Rail-loaders got 65 cents per hundred, and their net earnings for the month were \$100. The cold-sawyers got \$1.50 per day for twelve hours' work, and the water-tenders \$2.70, the same number of hours per day. Engineers wages range from \$1.60 to \$1.80 per day, and brakemen from \$1.25 to \$1.40. These are the men who have charge of the dinkey engines that haul the steel from the converting mill to the blooming department.

The only change is that the men work longer hours and make more money. The keepers, whose earnings in 1887 rated at \$2.40 per day, last month made an average of \$2.90. The engineers make \$2.53 in twelve hours this year, against \$2.90 in twelve hours last year. The fillers' wages last month averaged \$1.85 per day, against \$1.55 per day, working eight-hour turns, last year. Keepers' helpers, \$2.32; last year, \$1.97. The stock yard laborers receive \$1.58 per day, against \$1.40 per eight-hour turns last year.

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

(Continued from Page 261.)

A careful study of the facts recorded in the table will, I think, establish the following conclusions:

(1) *Effect of Temperature.*—At 100° C., the volatility of gold in an atmosphere of chlorine is almost zero (No. 1). That the loss begins, above this temperature, to rapidly increase to a maximum at a temperature of about 250° C. (for a one-gramme button, No. 7 shows the loss to become over 1 per cent in half an hour). That it rapidly diminishes to a minimum at a temperature somewhere below a red heat (No. 10 shows a standard loss of 0.02 per cent). That it again increases, but more slowly, to another maximum at a temperature above a melting heat, and that this increase is apparently continuous between a red heat and a white heat.

The ratio of losses at various temperatures is also a very instructive study. At incipient redness, the standard loss is already 0.05 per cent (or 0.052 milligrammes on a one-gramme button) in half an hour; at a low red it is double that; at a cherry red it is five to seven times as great as at incipient redness; at incipient yellow it is more than eight times what it is at incipient redness; while at a melting heat it is nearly thirty times as great.

These facts explain the extremely great importance of a proper regulation of the temperature in the chloridizing roasting of all silver ores that contain gold, and, in fact show, as I have already insisted, that a low temperature is even more important than a short time, as far as the gold loss is concerned. The rather anomalous relation of gold in an atmosphere of chlorine at various temperatures, also offers a probable explanation for some of the contradictory statements that have found their way into the literature of the subject.

In order to determine the effect of heat alone in causing a volatilization of gold in the absence of chlorine, Nos. 32 and 33 were among the first experiments undertaken. They were both conducted at the same temperature, above a melting heat, and for the same time. The only difference in the treatment in the two cases was that No. 32 was conducted in an atmosphere of damp chlorine, while No. 33 was conducted in the open muffle in an atmosphere of air, no chlorine being present. The actual percentage loss was 3.74 per cent with the chlorine, and 0.01 per cent without. Or, reduced to standard, the losses were 4.32 per cent with chlorine, and 0.014 per cent without. In other words, the chlorine at this temperature caused the volatilization loss to become 308 times what it was in the air. At temperatures below melting the losses of gold in the air were too inconsiderable to show themselves in half an hour.

(2) *The Effect of Strength of Chlorine Stream.*—Nos. 19 and 20 were undertaken to determine this point. No. 19 was carried on

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

with a very weak current of chlorine. No. 20, with a stronger one, was carried on for the same time at the same temperature, a cherry-red heat; the loss in the first case was about half that in the second. No. 24 was carried on at a temperature just below a straw-yellow with a very weak current of chlorine, and No. 25 for the same time and at the same temperature with a current perhaps four or five times as great. The loss in the latter case was nearly five times as great as in the former. With these exceptions, and those of Nos. 1, 83 and 84, the chlorine currents were kept as nearly as possible of average intensity.

Evidently, the amount of gold-loss is increased by an increase of the chlorine stream, other conditions remaining the same. Probably the loss will be found to vary directly as the volume of chlorine passed, provided pressure and temperature are constant, and sufficient time is allowed for the chlorine to become saturated at the given temperature.

Another proof of the loss being dependent on the strength of the chlorine stream is by Nos. 17 and 18. Here the two buttons were placed side by side in the same furnace and in the same atmosphere; the losses, reduced to standard, proved less for the smaller than for the larger button. The reason for this fact was that there was a crack on the side of the muffle near the larger button, and consequently the draft was stronger there and more chlorine was drawn out on that side. In Nos. 21 and 22 the positions of the buttons were reversed with reference to the crack, and the relative losses reduced to standard are also reversed.

(3) *Effect of Surface.*—Theoretically, the losses, other conditions remaining the same, should be proportional to the surfaces exposed to evaporation. Experiments Nos. 17 and 18 and also 21 and 22 were originally undertaken to determine whether or not this were true. If this were the case, the percentage losses, reduced to standard, should have been the same when temperature and strength of current were the same. We have seen that when thus reduced the losses were not the same, but the strength of current was different, being stronger on one side than the other; but the position of the large and small buttons being reversed in the two pairs of experiments, the effect of this cause should be eliminated from their average. The losses of the small button in the two experiments, reduced to standard and averaged, was 0.31 per cent, and those of the large one was 0.28 per cent. When we reflect how difficult it is to avoid slight differences in temperature, draft, etc., and also that owing to slight differences in size the shape of the buttons is not quite the same, this agreement is sufficiently close to justify us in assuming that the volatilization loss is, other things equal, proportional to the surface exposed.

Now when we remember the extreme minuteness of the gold in many pyritic ores, it is easy to understand the extreme rapidity with which the gold may be attacked in roasting these ores with salt. Thus we have seen that (No. 14) a one-gramme button loses 0.0018 grammes in weight at a low red heat in half an hour. Suppose now that this same gramme of fine gold were subdivided into small spheres, each weighing 0.01 mg. The weight of the one-gramme sphere would be to that of the small ones as 100,000 to 1, while its surface would be to that of a small one, as 100 to 1. But, as it would require 100,000 of the small ones to make the weight of one large one, the total surface exposed to evaporation would be 1000 times as great with the small spheres as with the large one. Hence, while the single-gramme sphere was losing 0.0018 grammes, the gramme in the finely-divided state would lose (if the rate of loss remained unchanged) 1.8 grammes, or, in other words, if exposed in an atmosphere of pure chlorine, under the circumstances mentioned, at a red heat, the finely divided gold would have been entirely volatilized before the half-hour was up.

In actual practice, many circumstances would reduce this extreme rate of loss. The surface exposed would be constantly diminishing, and hence the rate of evaporation would not be constant. The chlorine would probably finally become saturated with gold chloride, and would take up no more, etc., and in roasting, an atmosphere of pure chlorine is probably seldom produced. Still, it is easy to see how important an influence a finely-divided condition of the gold has on the gold loss. It is easy to understand how Mr. Stetefeldt could obtain a volatilization of 93 per cent of the gold content of the ore he treated, simply on account of the fine state of subdivision in which it existed and its low grade.

The above assumption as to the size of the gold particles in auriferous pyrites may seem, at first sight, unreasonable; but when we remember that the battery screens usually retain the coarse gold, and the plates catch most of the rest, it is not so unreasonable as at first sight may appear. As a matter of fact, I have carefully washed, on a batea, samples of concentrated sulphurets from many California gold mines, and have often been unable to find any signs of free gold, even when the concentrates were examined with the microscope. When these same sulphurets were roasted, however, the same method of treatment would usually show fine particles of metallic gold when the concentrates were thus examined. The roasted samples of Murchie ores (roasted without salt) thus yielded numerous small particles of free gold. The smallest of these, which was nearly round, measured 0.025 millimeters; assuming it to be spherical, its weight would be only 0.00016 mg. The largest that I found was 0.156 mm. long by 0.052 mm. wide, and its thickness was probably much the same. Assuming it to be equivalent to a sphere with a diameter of 0.1 mm., we should have as the weight of this particle only 0.00995 milligrammes, or an amount that a very sensitive assay-balance would barely indicate.\*

Of course, the above remarks are not intended to apply to all auriferous sulphurets, as the contrary is often the case as to the size and distribution of the gold; but it will, perhaps, serve to explain why some ores suffer an extraordinarily greater loss than others of the same richness and apparent composition, when roasted in the same manner and with the same amount of salt.

\* I came across the curious fact in some of the above experiments, that when two of the gold buttons used came in contact, ever so lightly, at a temperature considerably below a red heat, they were welded together at the points of contact so firmly that it took considerable force to separate them. This recalls to mind the similar welding that takes place so often in the annealing-cup when parted fragments of gold are warmed to a red heat. It seems not unlikely that the particles of gold that I measured with the microscope in the roasted ore existed in the raw sulphurets in an even more finely-divided state, and were thus welded together and agglomerated in the act of roasting. The shape of some of them would seem to indicate that fact.

#### THE BEARING OF THE MILLER PROCESS ON THE ABOVE RESULTS.

I come now to a consideration of the method of refining alloys of gold without appreciable loss, as first practiced on a small scale by Thompson and Aiken in 1838, and since successfully introduced on a working scale at the Australian mint by Mr. Miller, and generally known as the Miller process. The remarkable success of this process on a working scale, the total losses from all causes amounting only to 0.011 to 0.019 per cent of the weight of the gold treated, would seem to invalidate the conclusions that I have drawn from my own experiments. But, when the process is carefully studied, it serves rather to confirm than to contradict them.

First, regarding Mr. Thompson's work: No statement of the weight of the gold experimented upon, its surface, or the time of exposure to the chlorine is given in the abstract published by Professor Percy; and it is easily possible that a loss due to the volatilization of the fine gold may have taken place, in a short time of exposure, and with small amounts of gold which his balance may not have been sensitive enough to indicate. Besides, Mr. Thompson had evidently made up his mind the loss did not take place, and no doubt did not push matters very far to establish a point he already regarded as settled. Further, Mr. Aiken states that the method of procedure used was to "put the gold alloy into a small porcelain tray, with a little chalk or common salt." This was then carefully introduced into the hottest part of a porcelain tube, stated to be white hot in some cases, and the chlorine passed through. He goes on further to say that:

"On examining the contents of the tray, after the production of the vapor had ceased, the button of gold was found imbedded in a melted mass of sodium chloride (or chloride of calcium if chalk had been put in the tray) mixed with chloride of silver, the presence of the alkaline chloride seeming to have the property of preventing the volatilization of chloride of silver."

This last sentence is a good illustration of how near one may come to a discovery and miss it. If Mr. Aiken had said instead, that the presence of the alkaline chloride, together with that of the chloride of silver, seems to have the property of preventing the formation and volatilization of the chloride of gold, he would have given a true explanation of the facts. We shall see this more clearly when we come to examine a little into the Miller process.

This process is very clearly and critically described in Professor Percy's "Metallurgy of Silver and Gold," Part I., pp. 405-437. In brief, the chlorine is passed to the bottom of a crucible filled with molten gold by means of a clay pipe stem. The gold to be refined contains several per cent (an average of about 10 per cent) of silver, together with small quantities of base metal. The gold is usually treated in lots of 600 to 700 ounces at a time. The molten gold is always covered by a layer of molten borax glass, which Mr. Miller regards necessary to prevent the volatilization of the chloride of silver. The chlorine is rapidly absorbed by the base metals and the silver, which latter floats above the molten alloy and under the borax cover.

The process is further described in detail thus (Percy, p. 415): "When the chlorine is first passed into the alloy dense fumes of the base metals escape from the lid of the crucible, which consist of the volatile chlorides of some of the baser metals, and not of chloride of silver, and which are particularly dense when much lead is present in the gold. When a cold body is placed in these lead fumes a white deposit is formed upon it. After a time, which varies with the proportion of base metals in the gold, the fumes cease. So long as any sensible quantity of silver remains in the molten gold the whole of the chlorine continues to be absorbed, and the quicker the supply the shorter the operation. When the operation is nearly over fumes of a darker color than those produced at the beginning make their appearance, and the end of the refining is indicated by a peculiar flame, or a luminous vapor, of a brownish-yellow color, due to the escape of free chlorine at this period [probably colored by NaCl, FeCl<sub>3</sub>, etc.], as may be seen by removing the plug from one of the holes in the crucible lid. But this appearance is not of itself a sufficient indication that the operation is finished, for it is not completed until this flame imparts a peculiar reddish or brownish-yellow stain to a piece of tobacco pipe or similar substance when it is held in it for a moment, and so long as any other color is thus imparted to the piece of pipe the refining is unfinished."

The italics are mine. No one seems to have determined the composition of this peculiar stain. From the description I should strongly suspect that it contained gold, as its appearance agrees very well with those I obtained in my own experiments. It is probable that had the treatment been pushed beyond this point the loss of gold would have increased.

There is another fact in connection with this interesting process that bears upon this question. It is found that the average of the Australian gold, when refined in this manner, always leaves as much as two per cent of the gold with the chloride of silver which floats above the molten gold under the borax cover. When this chloride of silver is afterwards reduced by metallic zinc to the metallic state, and then dissolved in nitric acid, the gold remains behind in a finely divided flaky state, and not as rounded globules, as Mr. Miller reasonably suggests would have probably been the case if the gold had been mechanically thrown up into the fused chloride of silver by the passage of the chlorine current. Prof. Thomas Price, who tried some of the California gold bullion by this method on a working scale at his laboratory in San Francisco, informs me that with the California gold, which generally contains more silver, he found this amount of gold carried by the chloride of silver to amount to five per cent, and even ten per cent of the total weight of the gold.\* These facts tend to indicate that the gold exists in the fused mass of chloride of silver as a double chloride of silver and gold. The latter not being volatile, partly on account of its combination with the less volatile chloride of silver, and partly because both are covered with a layer of fused borax-glass, through which its vapor has not sufficient tension to penetrate in any great quantity.

(TO BE CONTINUED.)

\* For this reason and on account of the large amount of silver bullion in the San Francisco market requiring parting, he states that the Miller process, while technically successful with California's gold, is hardly able to compete commercially with the ordinary silver separation process. He suggests that it might be well adapted for refining the nearly pure gold produced at the chlorination works where chlorine is at hand and the other methods of refining are not convenient.



**Prehistoric Footprints.**—Workmen in the stone quarry of the Nevada state prison at Carson recently uncovered a stone on which were the impressions of immense feet, resembling a man's in shape, some of them measuring fifteen by five inches. Professor Trast, of the California State Mining Bureau, says that the tracks are those of the sloth or some similar quadruped.

**A Venerable Toad.**—Local antiquarians and zoologists are enchanted at present with a live toad-found in the course of railway excavations at Greenock, Scotland. The toad is from 20,000 to 30,000 years old, as the stratum of clay in which it was found certainly dates from the glacial period. Its mouth is sealed up. It breathes slightly through the nostrils, and though the eyes are quite expressive it does not seem to see.

**Improved Military Rifle in England.**—Experimental firing with the new British military rifle at ranges beyond 2000 yards has given startling results. The targets were small field fortifications ten yards long. The firing, volleys by about thirty men, was almost wholly from direction, sighting being impossible, owing to the hazy weather; yet at 2000 yards out of 370 shots there were 159 hits; from 367 shots at 2400 yards there were 96 hits, and from 629 shots at 2800 yards there were 104 hits. Penetration at the extreme ranges had been thought doubtful, but some bullets at 2800 yards struck an iron target and were broken to pieces.

**Opal Industry in Queensland.**—In our issue of June 30th of this year, we mentioned the discovery of fine opals in Queensland, Australia, and we now note the first results of the company's operations, which was formed in London to work the opal-bearing ground. The revenue account showed that opals had been sold to the value of £7576, and that after deducting all expenses there was a net profit of £4664. Though this is not a bad showing for a new industry, the management complains of the great difficulty in finding a market for their product, although the gems are acknowledged to be of superior quality. An attempt is being made, and with some prospect of success, of utilizing the opalized matrix from which the gems are cut, by preparing it for inlay work, in which it is said to give very beautiful effects.

**Russian Petroleum in Japan.**—A correspondent of the *Government Messenger*, St. Petersburg, Russia, in a letter from Yokohama, writes as follows: "There recently arrived here the English steamer 'Monarch,' which brought to this city from Batoum 536,000 gallons of oil in 67,000 cans. It is the first time that Russian oil has appeared in Japan. It was ordered by Jardine, Matheson & Co., one of the largest English firms doing business in East Asia, through the Commercial and Industrial Company of Baku. The 'Monarch' was chartered specially for that purpose. At the very news of the arrival of the Russian oil at Japan the price of American oil fell five cents per can. It is believed here that Russian oil will ultimately drive American oil out of Japan, owing to its superiority and to the great influence here of the firm which has undertaken the business. Both English and Japanese papers welcome Russian oil that it may put an end to America's monopoly in this branch of trade in Japan. Jardine, Matheson & Co. are very confident of a very profitable sale of this oil, and, as it is reported, even before the 'Monarch's' arrival here, they have sent to Batoum another order for still a larger amount of oil." This news, we are informed, has been received in Russia "with great joy." The oil men of Russia "hope to ultimately drive American oil from the Old World, leaving only America for the oil men of America."

**The Deepest Coal Mine in the World.**—The Hasard Colliery was opened in 1842 by M. d'Andrimont. The area of its concession is 4176 acres. The colliery employs 961 workmen underground and 273 at the surface. Its output in 1876 was 332,742 tons. The seams worked vary from 2 feet 0 inch to 4 feet 1 inch in thickness, and the coal is of a semi-bituminous character. A notable feature in the working of the mine is the use of the Plom and d'Andrimont Excavator, an ingenious contrivance for increasing the useful effect of blasting. The shot-hole is drilled in the ordinary manner, and the excavator is introduced, which hollows out a space at the back of the hole much greater than the original diameter of the hole. This enlarged powder chamber is found to greatly increase the useful effect of blasting and also the proportion of round coal. It is used in six seams in the colliery, and has also been adopted at Lens, France. The coals are not brought to the surface of the shafts, but only to the level of 400 feet, whence an endless chain road, two miles long, extends to Bay Bonnet.

The Saint-André du Poirier mine claims to be the deepest coal mine in the world. It has a royalty of 864 acres, and a yearly production of 200,000 to 250,000 tons. There are two coal drawing shafts, the one 2953 feet deep, the other 3083 feet deep. The first shaft is being deepened to 3149 feet. Each of the pits is ventilated by a Guibal fan working in a second shaft. A remarkable feature in the workings at these mines is the comparatively low temperature experienced. The maximum temperature is 75 degrees F., and it is very often considerably lower; the air passing along the "face" is not warm. This tends to show that elevation of temperature is by no means the greatest obstacle in working very deep mines. The four seams worked at Saint André vary from 1 foot 8 inches to 2 feet 7 1/2 inches in thickness; the working faces are 50 feet wide. The daily output per underground workman is 18 cwt. It seems that with an average selling price of 7s. 1 1/2d. per ton, the mine makes a profit varying from 9 1/2d. to 1s. 7d. per ton. This is a striking testimony to the efficiency and economy with which the operations must be conducted. The daily output of the St. André shaft is from 300 to 350 tons. This is an old shaft, only 9 feet 10 inches in diameter; it has been sunk in several stages, as the upper seams became exhausted. It is provided with wooden guides, and six tubs are lifted at once. The winding is done with flat steel ropes, of non-tapering action, weighing 20 pounds per yard. Ropes of the tapering section were formerly used, but were found liable to break at the change of section. The ropes are wound on ordinary drums. The ascending speed is at least 33 feet per second, 120 tubs being lifted per hour. The engine is vertical, with two cylinders and 400 horse-power.

**The Munson Type-Setting Machine.**—James E. Munson, a stenographer, gave an exhibition on the 18th September, in his temporary laboratory at 28 Center street, New York, of his invention of an auto-

matic type-setting machine. Mr. Munson's apparatus is a complete novelty, inasmuch as it runs the type into the galleys fully justified and corrected, something never before accomplished by a type-setting machine. Mr. Munson has perfected a key-board which, made like that of an ordinary type-writer, perforates a strip of paper of about the width used in the Wheatstone telegraph system. The perforations consist of various combinations of letters based upon an alphabetical principle invented by Mr. Munson. Although only about 175 combinations are needed, 1013 can be made on the key-board if necessary. When the paper leaves the perforating machine the letters are so far apart that a strip 13 1/2 inches long represents one line in a column of printed matter. The operator of the machine goes over this strip with a fine rule, and sees that the divisions of words and spaces come to the end of the line correctly. If they do not, he has a perforating hand tool with which he "spaces out" the characters so that they justify on the paper strip.

When he has finished justifying the strip it is run through another machine at a high rate of speed and the perforated characters are brought so close together that four inches of paper represent one line in a printed column. This strip is then put into the type-setting machine proper. This is an electric motor, with a sharp pointed armature connected with magnets representing the characters on the paper. As the armature passes through the perforations in the paper connection is made with rods over the magnets, which in their consequent action drop a type into a groove upon a rapidly revolving platform by which it is carried instantly to pick-ups, which in turn put it upon a supporting rail. It is then carried automatically to the galley and dumped, fully justified and corrected. In this exhibition Mr. Munson used the Thorne typesetter and distributor in connection with his automatic apparatus, which can be applied, he says, to any type-setting machine now in use. It is capable of setting from 8000 to 13,000 ems per hour. The machine is not yet perfect, but Mr. Munson believes it soon will be in practical operation.

An important feature in connection with the invention is that verbatim reports can be made upon any number of perforated slips at a time, and a slip supplied to each newspaper having one of the machines. Furthermore, the slips can be run through an automatic telegraph machine in Washington and fac similes forwarded to any point in the country directly to the newspapers, thus saving delay in handling matter by the ordinary Morse telegraph and in composition. Mr. Munson hopes to be able to use compressed air as a motive power, and to have the machine on the market within a few weeks. He has been assisted by Mr. A. Wisching, an electrician at 28 Center street.

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.]

*Resultats d'Experiences sur L'Elasticite du Caoutchouc Vulcanise.* By A. Stevart, Honorary Engineer in Chief of the Belgian State Railways. Published by G. Mayolez. Brussels. Pages 92.

*Plate-Girder Construction.* By Isami Hiroi, Assistant Professor of Civil Engineering in Sapporo Polytechnic Institute. Published by D. Van Nostrand. New York. Pages 94. Price 50 cents.

*American Street Railways, Their Construction, Equipment and Maintenance.* By Augustine W. Wright, M.A.S.C.E. Published by Rand McNally & Company, Chicago and New York. Pages 200. Price \$5.

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 OCT. 2d, 1888.

- 390,198. Feeding Air to Furnaces. Horatio Barr, Detroit, Mich.
- 390,203. Rolls. Edward L. Clark, Pittsburgh, Pa.
- 390,206. Process of Toughening Steel Rails or Bars. John Coffin, Johnstown, Pa., Assignor to the Cambria Iron Company, same place.
- 390,225. Piston-Rod Packing. Herman Guels, St. Louis, Mo., Assignor to the American Brake Company, same place.
- 390,229. Magnetic Cleaning Apparatus. Alwin Hempel, Dresden, Saxony, Germany.
- 390,235. Steam Boiler. George Kingsley, Lowell, Mass.
- 390,240. Pipe-Coupling. Désiré M. Legat, Paris, France.
- 390,251. Alloy of Copper, Nickel, and Lead. George F. Pottle, Medford, Mass.
- 390,262. Signal-Tube for Mines. Thomas Shaw, Philadelphia, Pa.
- 390,304. Machine for Bending and stamping Metal. George A. Smith, Norristown, Assignor to Jacob S. Thorn, Philadelphia, Pa.
- 390,285. Rolling-Mill Apparatus. Fred. H. Daniels, Worcester, Mass.
- 390,290. Chalk-William Fawcett, Jersey City, N. J.
- 390,312. Sectional Steam-Boiler. Harvey D. Rice, Brooklyn, Assignor to The Abendroth & Rot Manufacturing Company, New York, N. Y.
- 390,332. Pump. William D. Andrew, Brookhaven, N. Y.
- 390,341. Sneeave-Block for Hoisting and Conveying Machines. Alexander E. Brown, Cleveland, Ohio.
- 390,343. Rolling-Mill. Robert A. Carter, Pittsburg, Pa.
- 390,344. Arr. of Rolling Metal. Robert A. Carter, Pittsburg, Pa.
- 390,346. Machine for Bending Sheet Metal. Lemuel Coburn, Holyoke, Mass.
- 390,350. Car-Dumping Device. Daniel T. Denton, Tower Mines, Minn.
- 390,355. Chalk-Molding Apparatus. William Fawcett, Jersey City, N. J.
- 390,357. Machine for Forming Spirals from Flat Metal Bars. Louis Gathmann, Chicago, Ill.
- 390,371. Apparatus for Casting Metal Ingots. Wilhelm Huffelmann, Germaniaütte, Prussia, Germany. Assignor to Gabriel, Bergenhal & Co., same place.
- 390,391. Method of Etching and Producing Inextinguishable Metallic Deposits upon Bright Metal Surfaces. Ernest Nienstaedt, Berlin, Germany.
- 390,394. Glass Furnace. John Pearce and Ernest de La Chapelle, Ottawa, Ill.
- 390,431. Compound Engine. William Berwick, Fall River, Mass., and George Sellers, Batley, England.
- 390,460. Valve for Engines. James des Brisay, Kamloops, British Columbia, Canada.
- 390,461. Steam-Boiler. Daniel A. Dickinson, St. Paul, Minn.
- 390,466. Boiler. George P. Erhard, El Mora, N. J.
- 390,508. Draft Apparatus for Steam-Boiler Furnaces. Charles D. Mosher, Amesbury, and Gilman W. Brown, West Newbury, Mass.
- 390,511. Means for Utilizing Boiler, Furnace, and Exhaust-Steam Heat. William Oliphant, Jersey City, N. J.
- 390,537. Feed-Water Heater. Warren Webster, Philadelphia, Pa.
- 390,538. Water-Heater and Purifier. Warren Webster, Philadelphia, Pa.
- 390,558. Filter-Press. John Brock and Thomas Minton, British Alkali Works, Widnes, England.
- 390,578. Steam Rock-Drill. Thomas F. Farrell, Paterson, N. J.
- 390,583. Shaft and Pulley Coupling. Frederick E. Frey, Bucyrus, Ohio.
- 390,590. Journal Bearing. George L. G. Swold, Belvidere Falls, Vt.
- 390,595. Feed-Water Heater. Edward F. Lutz, Vernon, Mich., Assignor of one-fourth to Frederick J. Rowley, same place.
- 390,638. Means for Transmitting Power to Traction Cables. William H. Woodward, Chicago, Ill.

## THE METALLURGY OF STEEL.\*

By Henry M. Howe.

(Continued from page 265.)

d. *Group 4 Transition from Hardening to Cement Carbon, temperature rising from X toward W.*—If the hardening-carbon granular-crystalline fractures of group 1, F, E, D, are preserved by sudden cooling, they gradually change as, with gradually rising temperature, the carbon changes to cement. At first the change of carbon seems to outrun that of structure, for by the time that a brown tint is reached part of the carbon has changed to cement (24, 32, 40, 47) while no corresponding change of structure has been recognized. With further rise of temperature the dull porcelanic H replaces the fractures of group 1, partially at an incipient glow (25, 33, 41, 48), wholly at V, (26, 34, 42, 49). With still further rise to slightly above V crystallization again sets in, and appears to be the coarser the coarser the pre-existing fracture of group 1 had been, C, fine hackly, replacing F, (43), G, leafy crystalline, succeeding D (35). This suggests that the change of carbon from hardening to cement had not destroyed the pre-existing crystallization of group 1, but had merely masked it by strengthening the inter-crystalline adhesion, so that the fracture obtained at V struck across the crystals themselves, in preference to following their faces: and that the inter-crystalline adhesion again falls on rise of temperature to V +, the effects of the old crystallization are felt again, again fracture tends to follow the faces of the crystals, those which had formerly yielded the coarse D now affording the leafy G, those which had given rise to F now yielding the fine hackly C.

The changes which fracture E undergoes on reheating have yet to be investigated.

§ 245. CERTAIN FEATURES OF THE CHANGE FROM GROUP TO GROUP.—There are three chief changes of carbon-condition, 1, *from cement to hardening* when the temperature rises past W; 2, *from hardening to cement*, in slow cooling from above W to V, and 3 when the temperature of quenched steel rises from X towards V.

The suddenness of the first, corresponding to the suddenness of the accompanying carbon-change, and the slowness of the second and third, harmonize well with if they do not explain the fact that pre-existing crystallization is completely and permanently effaced by the first, but only modified by the second and temporarily masked by the third.

But though in the experiments of Figure 61, and in those of Coffin on steel containing like Brinnell's 0.50% of carbon, by this first change the pre-existing crystallization seems to be effaced, so that it does not influence the results of subsequent manipulation, yet Coffin found that, when only 0.20% of carbon was present, heating to W and quenching only partly broke up the pre-existing coarse structure, some of whose coarse crystals still remained. A second heating to W, however, induced the expected porcelanic fracture. The first sudden change of carbon from cement to hardening seemed to weaken the crystalline structure, the second to efface it.<sup>a</sup> In his view the destruction of crystallization requires energy: this is supplied by the changing condition of carbon. Little carbon present, means little carbon to change, little energy exerted, little effect on crystallization.

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<sup>a</sup> J. Coffin: *Steel Car Axles*, Trans. American Society of Mechanical Engineers, IX., 1888; "Mechanics," 1887, p. 317.

Even in relatively highly carburetted steel it may be necessary to repeat this heating to W if the crystalline structure has been tenaciously fixed, as Metcalf pointed out years ago.<sup>b</sup>

*Position of W.* According to Chernoff, while the changes in the temperature of <sup>d</sup> (W) are not readily recognized by the inexperienced eye, this point rises slightly as the proportion of carbon falls, being at a not-brilliant red for certain steels, while for wrought-iron it lies at a white heat.<sup>c</sup> Metcalf recognizes and employs fifteen different temperatures for refining steel of different percentages of carbon, *i. e.* for rendering them porcelanic by heating to W.<sup>d</sup> Coffin, however, finds that W lies at practically the same temperature for steels whose carbon varies between 0.25 and 1.5%.<sup>e</sup> Exact pyrometric observations are probably needed. It is possible that W represents a range of temperature, not a point: or that, while the critical point is constant, it is expedient to quench soft steels from slightly above it, hard ones from slightly below.

There are two points, nearly constant for most classes of malleable iron and steel, at which the metal evolves an abnormal quantity of heat during falling temperature. The lower one lies between 660° and 705° C., and very probably corresponds to V. The upper lies according to Pionchon between 1,000° and 1,500° C., according to Osmond between 810° and 900°, and may possibly be W. The position of each is nearly independent of the proportion of carbon present. (Cf. § 257.)

§ 246. INFLUENCE OF RATE OF COOLING ON COARSENESS OF GRAIN.—There appears to be a maximum degree of coarseness or size of grain for each temperature, varying with the composition of the metal and rising with its sectional area and with the temperature, at least when this is above W. The development of crystallization of course takes time.<sup>f</sup>

A. *With small bars* the necessarily rather slowly rising temperature appears to afford time for developing approximately the maximum coarseness corresponding to the temperature reached, so that their fracture depends chiefly on the highest temperature to which they have been exposed, and but little on the rate of cooling.<sup>g</sup> Of course, if the metal be forged or fused after the rise of temperature, the crystallization acquired is destroyed again: and so it is if the rise of temperature be to W. In any of these cases the coarseness of fracture must increase with the slowness of cooling. That it does after forging and fusion is well known: and Coffin finds that it does in case of the hackly C, formed during slow cooling from W.<sup>h</sup>

Wedding says unqualifiedly that the size of grain increases with the slowness of cooling, *ceteris paribus*:<sup>i</sup> but qualification is surely needed.

<sup>b</sup> "The Treatment of Steel," p. 25.

<sup>c</sup> Rev. Universelle, 2d ser., I., p. 401, 1877. "Le rouge non brillant."

<sup>d</sup> Trans. Am. Soc. Civil Engineers, XV., p. 385, 1887. *The Treatment of Steel*, p. 35.

<sup>e</sup> Trans. Am. Soc. Civ. Engineers, XV., p. 326, 1887.

<sup>f</sup> Brinnell indeed states that when the carbon has wholly or mainly changed from hardening to cement, whether with rising or falling temperature, crystallization occurs instantaneously, (*ganz plötzlich*). Stahl und Eisen, V., p. 620, 1885. Coffin, however, states that many experiments of his refute Brinnell's proposition which contains this statement, and thinks that Brinnell's experiments do not verify it (Trans. Am. Soc. Civ. Eng., XV., p. 319). I have not succeeded in reconciling it with Brinnell's experiments, *e. g.* with his 9 and 10, figure 61.

<sup>g</sup> This statement applies to the coarseness, not the kind of fracture. We have seen that rapid cooling from above W preserves the granular, while slow cooling yields the hackly fractures.

<sup>h</sup> Op. cit., p. 325. Table 87, § 250, gives absolute measurements of the increase in size of grain on slow cooling from W to V.

<sup>i</sup> Jour. Iron and Steel Inst., 1885, I., p. 190.

Coffin concludes from his experiments that, after the maximum coarseness for given temperature has been reached, further exposure merely changes "the relative cohesion between different (crystal) faces, causing cleavage surfaces." I suppose that he means that it increases the ratio of the intercrystalline adhesion to that of the cohesion of the particles of the individual crystal, so that rupture occasionally penetrates into the individual crystals, and follows their cleavage planes.<sup>a</sup>

B. *Large masses* seem to present rather different conditions. Though Percy reports buttons of iron whose crystals were so large that their cleavage planes extended completely across the fracture,<sup>b</sup> yet it is probably true that crystals tend to a larger size in large masses of iron than in small bars.

Thus the diameter of crystals occurring, not in vugs but in the metal itself, reaches 0.25 inch in slowly cooled, friable ingot-iron reported by Bessemer,<sup>c</sup> and 0.5 inch in Chernoff's forged steel shaft,<sup>d</sup> in Percy's long-heated puddled iron,<sup>e</sup> and in a long-used porter-bar described by Thurston.<sup>f</sup> Ordinary heating does not appear to occupy time enough to satisfy the crystallizing capacity of large masses, which therefore tends to assert itself during cooling; and here the rate and duration of cooling probably affect the size of the grain much more than in case of small bars.<sup>g</sup>

Another possible reason why the rate of cooling should affect the structure of large more than small pieces, lies in the fact that, in quenching, the difference between the rates of cooling of outside and inside is greater in the former than in the latter. Hence severe interstratal movements may be expected in large masses, which like forging might be expected to break up already existing crystallization, while when small bars are quenched the different layers cool and contract at more nearly similar rates. Metcalf admits<sup>h</sup> that, while the influence of the rate of cooling is hardly appreciable in case of bars 0.125 inch thick, it is more readily detected in those 0.25 inch thick, and conspicuous in bars 1.5 inches square. The outside of such a bar quenched from a very high temperature consists of coarse crystals: they become rigid so instantaneously that they preserve the form acquired at the high temperature. The interior is flaky, and might even be called fine-grained: it is indeed much finer than if the bar had been slowly cooled.<sup>h</sup>

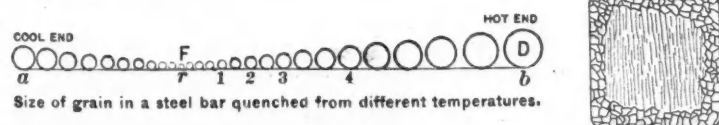


Fig. 62.

§ 247. **FORGING** strongly opposes crystallization, in case of both iron and steel, ingot and weld. Like agitation in the case of salts crystallizing from aqueous solution, it appears to arrest the development of crystalline structure,

<sup>a</sup> Trans. Am. Soc. Mech. Eng., IX., 1888, propositions 7 and 8.

<sup>b</sup> Iron and Steel, p. 10.

<sup>c</sup> Cf. § 54, p. 33. Cf. Iron Age, XLII., p. 57, 1888.

<sup>d</sup> Rev. Univ., 2d Ser., I., p. 402.

<sup>e</sup> Sorby, Jour. Iron and Steel Inst., 1887, I., p. 262.

<sup>f</sup> Thurston, Mat'ls of Engineering, II., p. 580.

<sup>g</sup> Coffin, op. cit. proposition 6th, states that if steel be heated "above W, its crystallization is in the most part determined by the temperature and occurs while heating;" it is probable that he here generalizes from experiments with small bars, and overlooks the very different conditions which accompany larger masses.

<sup>h</sup> Trans. Am. Soc. Civ. Engs., XV., p. 388, 1887.

and to break up more or less completely that which has already been developed. The former action is probably due to its altering the position of the particles with reference to the axes around which they were about to crystallize.

The second (in case of iron) is probably due in part to its increasing the cohesion between adjoining crystals, *i. e.* welding their faces together, so that fracture now follows the shorter path across their bodies: perhaps also in part to its breaking them up into cleavage blocks, like the blocks readily broken from many crystals of galena, or to its destroying the original crystals altogether, new and smaller ones springing up from their ruins: and possibly to its elongating the crystals themselves, and so elongating the path which rupture would have to take were it to follow their faces, and thus the more inclining it to strike across their bodies or to follow the imperfectly developed cleavage planes. But, whatever be the rationale of its action, it is certainly a most powerful means of counteracting the crystallizing tendency, and little crystallization will arise during forging which is sufficiently powerful to make its effect felt to the middle of the mass.

The case of rivets illustrates this forcibly. It is said that when they fail it is always at the head which is not struck during riveting; the riveter's blows against the struck head while it is cooling prevent crystallization and consequent brittleness.<sup>1</sup>

Coffin has observed that, while a bar quenched after its temperature has risen to a light yellow is coarse grained, if it be quenched from this temperature immediately after rolling it is fine grained.<sup>1</sup>

If forging be followed by slow cooling, it is clear that the higher the temperature at which it ceases the coarser will the crystallization become, the worse the steel. Hence the importance of a low finishing-temperature in forging, to which § 250 and § 264 et seq. refer again. Suffice it here to say that the superiority of thin over thick forgings, usually attributed to extra work, is probably due in large part to lower finishing-temperature, especially in case of ingot-metal.

§ 248. **THE VIEWS OF OTHERS ON HEAT-TREATMENT AND FRACTURE.**—A. *Metcalf* believes that the fracture depends first and apparently foremost on the last maximum temperature, secondly and apparently secondarily on the rate of cooling.<sup>k</sup> He sketches in Figure 62 the influence of the last maximum temperature on the size of the grain in different portions of a steel bar which has been quenched after heating its right-hand end to bright whiteness, the left-hand end being below redness, and the intermediate portions, heated by conduction, being at intermediate temperatures. We note the coarse grain (D) of the white-hot part, the finer grain (E) of the portion which had been at a bright yellow, the extremely fine grain (F) of that which had been at W, and the gradually increasing size as we pass to the left from W. I have interpolated these letters.

(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.

<sup>1</sup> Metcalf, Iron Age, XXXIX., May 19th, 1887, p. 17.

<sup>1</sup> Private communication, March 28th, 1888.

<sup>k</sup> Trans. Am. Soc. Civ. Eng., XV., pp. 284, 287, 386, 388, 1887. Cf. "Treatment of Steel," pp. 23, 32.

## PERSONAL.

Capt. H. G. Rothwell, civil and mining engineer, late of the Caribou, has removed to East Saginaw, Mich. Captain Rothwell made a host of friends among the mining men of Algoma, east and west.

Mr. Charles Brent, mining engineer, recently returned from Sitka, Alaska, where he was putting up some improvements for the Lake Mountain Mining Company. He will shortly return to the Badger Silver Mine, Ontario, Canada.

Mr. Jas. Hooper, late of the Non Such mine, and father of Capt. Thos. Hooper, superintendent of the Beaver Mountain silver mine, died at the latter mine on the morning of the 24th September, at the advanced age of 75 years. Deceased was a native of Cornwall.

Mr. Dennison Richmond, division engineer of the middle division of the New York State canals, died on the 4th inst., after a brief illness, of pneumonia. He was the son of the late Van R. Richmond, and was forty-six years old. He had been on the State canals about twenty-five years.

## INDUSTRIAL NOTES.

The striking miners at the Stiewell and Quita mines in Johnson County, Arkansas, have returned to work at the original scale.

The western window glass manufacturers decided to resume work generally on October 1st, instead of October 8th, as generally intended. The resumption will give employment to 6000 men.

The Clinton Rolling Mill, at Pittsburg, which was shut down several months ago by the failure of Graff, Bennett & Co., resumed on the 3d inst. under a syndicate of creditors. It gives employment to about 400 men.

According to the *Johstown Tribune*, it is authoritatively stated that the Cambria Bessemer Steel Works on the 25th ult. made the largest day's work in its history, the product being 953 tons. The average daily output is about 700 tons.

In financial circles in Berlin a rumor has been circulated that the banking firm of M. M. Bleichroder is to be converted into a joint stock company. The Berlin Disconto Gesellschaft, the Austrian Credit Anstalt and the North German Bank at Hamburg are said to be undertaking this great financial operation.

It is believed that the iron and steel manufacturers of Allegheny County have nearly enough orders booked now to keep them running for six months. The output is placed at 5000 net tons of production per day. The output alone from the firm of Carnegie Bros. & Co. is running up toward 2000 tons a day.

At Villalardo, Mexico, last week work was begun on a canal to conduct water to Tlahuilalo. Several thousand men are employed, and 10 steam dredges are now en route from England. The length of the canal will be over 20 leagues, and it will be finished in six months. The canal will open up a rich cotton belt to the company constructing it.

Last night the Amalgamated Association declared the strike in the Spang Steel and Iron Works off. This strike began July 3d last, when non-union men were employed in the Clapp-Griffith department. This is a victory for the masters, as the company makes no concessions, but agrees to take as many of the old men back as places can be found for them.

At the Young Men's Institute, a branch of the Young Men's Christian Association, a class in the theory and practice of team engineering, will be formed Wednesday evening, November 14th. The instructor is Mr. Wm. H. Weightman, M.E., who was at one time with the Novelty Iron Works, and later on the U. S. Revenue and Coast Survey, as designer of engines.

The Amoskeag Mills, Manchester, has what is probably as varied a lighting service as any establishment in the United States. Twenty-one American lamps, 45 Thomas-Houston, 210 Weston, and three 375 Brush arc lights make night brilliant in the large spaces of these mills, while the looms, spindles, and other machinery are minutely illuminated by 236 Edison and 75 Forsythe incandescent bulbs.

The Moss Bay Iron and Steel Company, of America, with offices at Seattle, has been incorporated by Peter Kirk, L. S. J. Hunt, A. A. Denny, W. W. Williams, Jacob Furth and H. A. Noble. The capital stock is \$5,000,000. The corporation will build rolling mills and blast-furnaces, operate collieries and iron mines. The erection of the buildings has already begun, and will be rapidly pushed to completion.

Southern furnaces are said to be refusing further pig-iron orders from the Eastern markets, and they are reported to be doing an excellent business in the Western States, from whence they have obtained numerous contracts at slightly better prices than they could get in the East. The Tennessee Coal and Iron Company's agents are declining any more orders for pig-iron, their furnaces having on hand orders for all the iron they can turn out for some time to come.

The new furnace of the DeBardleben Coal and Iron Company at Bessemer is now turning out 125 tons of pig-iron daily. During the past week the company

shipped over 875 tons of iron to New York, Philadelphia and Ohio River points. Since the furnace first went into blast, about two months ago, the shipments have been something over 7000 tons of iron. Furnace No. 2 will go into blast in a week or two. When this furnace is in operation the total output for both the new furnaces will be 250 tons of pig-iron per day.

James P. Witherow has received the contract for the erection of the buildings for the plant of the Latrobe Steel Company, at Latrobe, Pa. The buildings will be made of wrought-iron and will be fire proof. The dimensions of the open-hearth steel department will be 250 x 80 feet. The hammer shops will be 350 feet long, with an 80-foot span, and will have an L the same length and 40-foot span. The company will manufacture tires for all kinds of wheels. About 300 men will be given employment.

It is reported from Santiago, the capital of the Republic of Chili, that two American engineers are now in that city, representing a powerful American syndicate, and that they have offered to contract for the construction of the railroads which the government intends to build. Their tenders amount in all to \$35,000,000, being \$5,000,000 more than the value which has been fixed by the government engineers. The tenders of the Batignolles Construction Company and of the French Commercial Company for the construction of several of the proposed new lines of railway were not accepted.

The Manchester Ship Canal crosses the path of the old Bridgewater canal where the latter passes over the river Irwell on a viaduct built by Brinley. As ships cannot pass under the Bridgewater canal, and the canal itself cannot be raised, the engineers have decided to pull down the old viaduct and to replace it by an iron trough, over the Manchester canal, which can be emptied and swung out of the way when a clear passage is required. This trough is closed by gates at either end, and hydraulic lifts are also provided by means of which barges can be transferred from one canal to the other. The whole arrangement is a successful solution of a novel problem in canal building.

This year's exhibition is one of the best ever held. The display of machinery of all kinds, dynamos and electrical appliances, gas engines, pumping engines and conveying and hoisting machinery, is a special feature, worthy of inspection. The trustees and managers of the Institute are: James Delamater, J. Trumbull Smith, W. H. G. Doney, Charles F. Allen, James G. Powers, Z. Dederick, William A. Camp, Alexander Knox, Alexander M. Eagleson, George Whitefield, Edgar De Puyster, James A. Crouthers, Vincent C. King, John A. Walker, James W. Fellows, James A. Flack, Charles Andrews, Robert H. Shannon, John W. Handren, Samuel L. Narsden and Alexander Agar.

At Ensley, a suburb of Birmingham, Ala., it is stated that the furnaces are the largest in the world. Sixty-four boilers are required to run the powerful machinery. There are four furnaces eighty feet high and as many cast-houses. A large stock-house 175 feet in length has recently been erected. Two of these furnaces are now in operation, and turn out 300 tons of pig-iron in a day. The other two will blow in before the end of the year. All of them will require, when in full operation, 720 tons of coke, 1300 tons of coal, 1500 tons of iron ore, and 600 tons of limestone per day. The united output of pig-iron will be 600 tons per day. These furnaces will employ nearly 3000 men.

The fifty-seventh annual exhibition of art, science and industry, held under the auspices of the American Institute, opened on Wednesday, the 3d instant. The opening address was delivered by Mayor Hewitt, who spoke of the marvelous achievements of inventors and scientists since the first exhibition held by the Institute, fifty-seven years ago. At that time, said the Mayor, not a railroad entered New York City, photography was unknown, and petroleum and its power was not discovered. In 1776, the steam engine, chemistry and American liberty were born together. The Mayor also spoke of the great saving in the cost of railway transportation attributable to the discovery of Bessemer, who taught the world how to convert pig-iron into steel by the direct process. Such a man, said Mr. Hewitt, deserved the fortune of \$10,000,000 which he secured from his discovery.

## 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. 1097, Construction of Revetment; No. 1098, Dredging; No. 1099, Iron Shears; No. 1100, Dredging; No. 1101, Construction of Lock; No. 1102, Sewerage Pumping Engines; No. 1103, Building Fifty Coke-Ovens; No. 1104, Improvement of Delaware River; No. 1105, Construction of Sewer; No. 1106, Water-Works; No. 1107, Rubble Stone; No. 1108, Rubble Stone; No. 1109, Dredging; No. 1110, Mineral and Lard Oil, for U. S. Light-house Service.

The Westinghouse Electric Company has secured the contract for a 1500 light plant in Chicago.

The date for receiving proposals for the work of improvement of the harbor of Rio Grande de Sul, in Brazil, has been extended by the Brazilian Government to February 6th, 1889.

## GENERAL MINING NEWS.

Shipments of iron ore from the mines of the districts mentioned below for the season up to and including September 26th, as reported by the *Marquette Mining Journal*, were as follows:

	Tons. 1888.	Tons. 1887.
Marquette, Marquette District.....	612,219	645,740
St. Ignace, " ".....	91,311	73,253
Escanaba, " ".....	620,874	694,087
" Menominee District.....	791,744	904,739
" Gogebic District.....	133,096	.....
Ashland, " ".....	822,501	866,203
Two Harbors, Vermillion District.....	279,186	299,083
Total tons.....	3,330,924	3,483,105

## ARIZONA.

## PIMA COUNTY.

[From an Occasional Correspondent.]

The newly discovered Noon district, some 12 miles from Nogales, Arizona, continues to prospect well. The claim San Patrick, lately acquired by H. S. Reed, consideration \$20,000 cash, is shipping rich chloride ore. The last shipment, representing the output of one month, consisting of 16½ tons, produced the owner 7350 ounces. The San Patrick is down 65 feet, and considerable ore in sight.

## CALIFORNIA.

## AMADOR COUNTY.

PLYMOUTH CONSOLIDATED GOLD MINING COMPANY.—We learn from a correspondent that this company is doing just as it has done for the past eight months, viz., simply *nothing* in the way of working the property. They have had quite an amount of supplies in the way of round timbers, lagging and wood put in this season. The public in general hope to see a change in the management when the work does start up in the mine.

HOLLYWOOD MINING COMPANY.—I find there is no such mine as the Hollywood, but the Hollywood Company own the Merrimac and Elephantine claims. There is no work being done on them at present. There is a shaft 75 feet deep on one of the claims. Like many other locations, they may prove valuable when developed, but at present they cannot be called mines.

MIDDLE BAR AND ASTORIA.—These mines have been worked a little more than the last two mentioned, but not enough to develop them properly. I may say the Middle Bar mine is the only one we hear mentioned at all. I have never personally examined these properties, but am satisfied they do not amount to much as mines at present, but maybe they would warrant the expenditure of money upon them.

THE AMADOR GOLD MINE.—This mine is located about one mile south of the Zelle or 1½ miles south of Jackson. They have quite a large force now at work in and about the mine. They have three shafts down to a depth of 250 feet, and are running drifts to connect them. They have already made quite extensive developments underground, and have opened up large bodies of low grade ore, sufficient, in my judgment, to warrant them in the erection of the 60 stamp mill that is now under construction. They probably never could make their ore pay with a small mill, but, with 60 or more stamps in a mill with modern improvements, and the mine economically handled, I am of opinion they can make a little money.

## CALAVERAS COUNTY.

SANTA CRUZ MINES.—This group of quartz mines, situated on Carson Hill, four miles south of Angels' Camp, formerly owned by E. K. Stevenot, mining engineer, have recently been sold to an English syndicate. The company has already commenced operations. A 100-stamp mill will be erected at once, to be run by water taken out of the Stanislaus River by a ditch of 3000 inches capacity, which, with the opening up of the mines, will give employment to a large force of men. All the mines and mills at Angels are running to their full capacity. At the Utica mine, owned by Hayward & Hubbard, they are adding 40 stamps to their 20-stamp mill.

## INYO COUNTY.

DEEP SPRING MINES.—These mines are shipping high grade copper ore to Swansea, England.

## SIERRA COUNTY.

RED CHIEF GOLD MINING COMPANY.—This company was incorporated in August, 1887, with a capital stock of \$1,000,000, divided into 500,000 non-assessable shares of \$2 each. The officers are: Chas. Roblee, President; Wm. H. Barnhart, Vice-President; Jos. I. Barnum, Treasurer; J. D. Good, Secretary. These gentlemen, together with Edward E. Kattell, F. H. Hausman, L. J. Lewis, A. E. Baxter and Chas. Sickels constitute the board of Directors. The property is located on Kanaka Creek, six miles southwest from Forest City, in Sierra County. Reports upon the mine have been made by Messrs. L. J. Lewis, M.E., and J. B. Low, M.E., both of San Francisco, and P. D. Barnhardt, of Elmira, N. Y.

Mr. Charles Roblee, the president of the company, is now in New York. From the data furnished by him we gather the following information concerning the property: "There are three veins of gold-bearing ferruginous quartz, respectively about 80 feet, 23 feet and 42 feet in width. According to the assays of L. J. Lewis, the tests of thirty-four samples of ore taken from the mine average \$6.19 per ton in gold. The ore is free milling, the sulphur and iron being decomposed, and of such a nature that the cost of mining, reducing and treating is estimated by Mr. Lewis at \$1 per ton. Three tunnels have been driven in the mine, and numerous prospecting shafts sunk, and cross-cuts and deep open cuts made. A forty-stamp

mill now being erected will be run by water power, a 28-inch Leffel turbine being in place.  
Mr. Roblee also states that recent working tests of ore taken from various parts of the mine show an average value of \$33 per ton.

**COLORADO.**

**HUERFANO COUNTY.**

[From an Occasional Correspondent.]

**COLORADO FUEL COMPANY.**—At the town of Rouse, seven miles south of Walsenburg, this company has recently opened up new and extensive coal working. The town, which consists simply of the miners' camp, is some five or six miles west of the Denver & Rio Grande Trinidad branch, and is connected with the main line by a spur track. The coal seam outcrops in a gently rising prairie between two mesas north and south of the workings. The seam dips S. 30 W., and runs underground at a 4 per cent slope. It has been attacked by open slopes until sufficient depth has been attained to afford a firm roof, and then by entries until the marketable coal is well opened up, when the usual gangways are run right and left, and the chambers broken out. On account of the flat pitch but one airway and gangway is needed for two sets of chambers, as the coal can be pulled up from one set and down from the other. On reaching the surface the trips are hauled up a long trestle and dumped directly into the cars. At present three slopes and one shaft are working, the hauling power being mules, but the tail-rope system is soon to be introduced. The seam shows a solid, handsome-looking coal, six feet clear from roof to floor, with only one small, insignificant parting, one half inch and less thick, placed about midway. About 250 tons daily are now produced, but with the introduction of the tail rope and further underground developments this can be greatly increased.

The Colorado Fuel Company is also introducing the manufacture of coke at its mines at Sopris, near Trinidad. Some fifty ovens of the bee-hive pattern are now fired. The mines are opened at the head of a gulch, which runs south of the Las Animas River. Three slopes are now on a three per cent grade into three hills, east, south and west, on an eight-foot seam. The trips are then hauled by a tail rope to the tipple, and into the cars, or else diverted to the ovens. The coke is of a very firm, solid character, and ought to command a ready market.

**LAKE COUNTY.**

During the month of August the Small Hopes Company shipped 700 tons of ore and iron, and the September output will be about the same. Last month the production was divided into about 625 tons of silicious ore and 75 tons of argentiferous iron. The latter is of very good grade, assaying about 40 per cent excess in iron and manganese and from 15 to 20 ounces silver.

**COLONEL SELLERS.**—This mine is doing as well as usual, and the September output will be about \$50,000.

**CONTINENTAL CHIEF.**—This mine is making an increased showing of ore, and the management is simply taking out what is inevitable in development work. The net output last month was over \$75,000.

**DUNKIN MINING COMPANY.**—This company produced last month, 2363 tons of argentiferous ore and 181 tons of silver lead ore. Most of this output was made by the company from the No. 4 shaft. The profit on the company's output was a trifle over 40 per cent. The average royalty received from lessees was a little more than 30 per cent of the gross output over smelting charges. The output of the company is divided between the Arkansas Valley, Durango and Kansas City smelters.

**LEADVILLE CONSOLIDATED MINING COMPANY.**—The decline in the price of the stock of this company from 18@25 cents to 7@10 cents during the last few weeks has been the subject of considerable discussion in mining circles in this city. There have been numerous contradictory rumors concerning the company's financial standing, but the true condition of the company is thus stated by Mr. Cameron, the secretary, "On the 1st of September, we had an indebtedness of \$1000, which is increased by the running expenses for the month to \$4000, on October 1st. Our ore has been running in little or no iron for months past, and consequently we have been working at a loss. We have written to our superintendent, asking his advice upon the future working of the property, in order that we may lay the whole matter before our stockholders at a meeting which will be held as soon as his answer is received. Among the questions asked are: Could the mine be worked favorably on a lease? Could the property be sold outright? Could \$10,000 be borrowed in Leadville to continue the explorations that have been undertaken? Could the mine be worked without the pumps? These pumps originally cost about \$11,000, have been used but one year, and are in first-class working order; could they be sold?"

**TIGER MINE.**—This mine, at the head of Fryng Pan Gulch, is shipping from 75 to 100 tons of ore per day. The ore is of very good grade.

**PITKIN COUNTY.**

**ASPEN.**—It is reported, says the *Leadville Herald-Democrat*, that the Aspen mine, the Aspen Mining and Smelting Company and the Enterprise Mining Company are to be consolidated. The Aspen mine is making a big output of rich ore. Shipments are at the rate of 2500 tons per month. There are rumors afloat that the Aspen smelter will be started again.

The Park Regent mine is shipping 70 tons of ore per day.

The Bob Ingersoll has some more rich ore. The new machinery on the Little Percy has been started.

**IDAHO.**

**SHOSHONE COUNTY.**

**BUNKER HILL AND SULLIVAN.**—These mines in the Coeur d'Alene District seem to be steady producers, and during the present month there will be shipped from the concentrating mill 1200 tons of concentrates.

**INDIAN TERRITORY.**

A spur of the Santa Fe Railway is about completed from Ardmore, I. T., to the recently discovered coal mines west of that place, and mining will soon be commenced.

**MICHIGAN.**

**COPPER MINES.**

Calumet output for September is reported at 3084 tons 1305 pounds against 2016 tons last year. Atlantic, 201 tons 575 pounds against 217 tons last year. Quincy product, September, 1888, 343 tons, against 200 tons in 1887.

The September product of Boston & Montana was 1900 tons of matte and ore, equal to about 2,200,000 pounds of refined copper.

**KEARSARGE.**—This company seems to be in a happy position. It is stated that it has made no contract for sale of its product, and is therefore making 10 cents a pound on its copper. The profits are said to be between \$15,000 and \$20,000 net per month.

We append the following tabulated statement of the present market value of the fifteen prominent mines, according to the *Boston Transcript*, the bulk of which stock is held in Boston:

Company.	Shares outstanding.	Present price.	Market value.
Calumet & Hecla.....	100,000	288	\$28,800,000
Tamarack.....	40,000	180	7,200,000
Boston & Montana.....	100,000	52	5,200,000
Quincy.....	40,000	85	3,400,000
Tamarack, Jr.....	40,000	30	1,200,000
Osceola.....	40,000	20½	1,000,000
Atlantic.....	40,000	18	760,000
Franklin.....	40,000	19	760,000
Central.....	40,000	19	760,000
Kearsarge.....	40,000	9¼	370,000
Allouez.....	80,000	3¼	260,000
National.....	40,000	5	200,000
Huron.....	40,000	5½	220,000
Pewabic.....	40,000	4	160,000
Ridge.....	50,000	2	100,000
Copper Falls.....	40,000	*2½	100,000
Total, 16 mines.....	810,000		\$50,310,000

\* Approximate. No quotation for an indefinite period.

We take the following from the *Boston Herald*:

Treasurer Bigelow has received letters from Superintendent Daniell regarding the following mines. Of the Osceola he says: The stopes are looking better. At the Tamarack, the winzes on the lode now down to the 10th level; the ground looks very flattering. The Kearsarge stopes are remarkably good. Last week 24 tons of mineral were received from the mill of the last named mine, and the mill was stamping less than 900 tons of rock. Superintendent Daniell expects to get 90 per cent mineral this month. Reckon that 100 tons will give 180,000 pounds of ingot copper, and the cost price at the mine is about 5 cents, and not more than 7 cents delivered.

**ROPES GOLD MINE.**—The September product of this mine in gold and silver bullion and concentrates exceeds \$6000, the largest product in its history.

**TAMARACK.**—At the annual meeting, held on the 4th inst., nothing but routine business was transacted. The only change in the board of directors was in the election of Edward S. Grew in place of John M. Forbes. The board now consists of Joseph W. Clark, Nathaniel Thayer, Edward S. Grew, George F. Bemis, John N. Denison, Franklin Fairbanks, John Daniell; 28,050 shares were represented.

**MONTANA.**

**SILVER BOW COUNTY.**

**COLORADO MINING AND MILLING COMPANY.**—Annual report of this company states: Capital stock, \$1,000,000, all paid in by property, real and personal. The assets consist of the smelting works and plant and the concentrating works and plant on Silver Bow Creek, the Gagnon, Pleiades, Burlington, Nettie, Independent, Fredonia and Self-Rising lode claims and a number of placer mining claims on Silver Bow Creek, 40 acres of patented lands near the smelting works, interests in the Fashion and Gold Hill No. 2 surface ground and all the Barga lode claim, a majority of the stock of the Original Butte Mining Company, a majority of the capital stock of the Basin Flume Company, together with personal property about the smelter, etc., of the value of about \$250,000. Liabilities, about \$25,000, unsecured. The statement is attested to by N. P. Hill, Richard Pearce, Edward O. Wolcott and Henry R. Wolcott.

**ORIGINAL BUTTE MINING COMPANY.**—The annual report of this Company was filed with the recorder yesterday. The corporation was created under the laws of the State of New York, carrying on business in Montana. Capital stock, \$5,000,000; none paid in cash, paid in mines and mining property. The assets consist of the Original Butte lode, lot 94, and the Jasper lode, lot 128, in Summit Valley Mining District. Indebtedness August 1st, \$67,192.63, unsecured. The report is signed by J. P. Ord, President and J. J. Byrne, Secretary.

**YELLOWSTONE COUNTY.**

**PARK COAL COMPANY.**—This company's mine at Cinnabar, says the *Butte Miner*, has got tunnels of various lengths run on several veins of coal, from one of which it can produce 800 tons a day, and there is coal enough opened for two years' supply. It is in-

tended to build coking ovens this fall. It can be laid down in Butte at \$6.75 a ton. The coal is of superior quality and only makes 8 per cent ash. It has been used with excellent results on the Northern Pacific Railroad.

**NEVADA.**

**EUREKA COUNTY.**

**EUREKA CONSOLIDATED MINING COMPANY.**—A \$28,000 shipment from Eureka was received in San Francisco on the 4th inst. The speiss on the dump is running much richer; whether it will continue to do so or not is an interesting matter for the stockholders. However, if this speiss should continue rich enough to yield dividends, it is probable that the profits would be reserved to provide a fund for pumping the lower levels of the mine, in the event of a satisfactory arrangement being made with the Richmond Company. The Richmond people are playing what may be called a "waiting game." They realize that in the course of a few years the Eureka Company will be obliged either to pump out the Locan shaft and explore the lower levels or to shut down completely. If the Locan shaft is pumped out, the water in the Richmond mine will be drained off, and mining will be resumed by the Richmond Company, who will thus be put to no expense for pumping. Should the Eureka mine be shut down, the stock might depreciate in value and be easily absorbed by the Richmond Company. Therefore, the Richmond people think that they are bound to win. The programme certainly seems feasible, but, says Mr. Fries, of the Eureka Company, "we are just as able to wait as they are."

**LANDER COUNTY.**

**BATTLE MOUNTAIN SILVER MINING COMPANY.**—The difficulties between the Battle Mountain mining men, says the *Salt Lake Tribune*, have been settled by merging the property in a new corporation known as above, with a capital of \$5,000,000, divided into 500,000 shares at a par value of \$10 a share. The corporation owns the Eagle, Highland Chief, Chloride, and Star Grove mines; also the large forty stamp mill and the old Eagle mill, together with all the houses, offices, town-site, and all personal property heretofore belonging to the old companies. St. Louis capital controls the stock, and Mr. Thorpe, the managing director of the company, announces that the company will start its works about the first of the month.

**STOREY COUNTY—COMSTOCK MINES.**

We take the following from the *San Francisco Report*:

**CONSOLIDATED CALIFORNIA & VIRGINIA.**—During the past week there was shipped to the Morgan mill 918 tons of ore, and to the California mill 1440 tons. The average value of all the ore hoisted at these mills during the week was \$34.93 per ton. Bullion was shipped to San Francisco during the past week of the assay value of \$94,517.16. Now on hand in the Virginia City office, about \$14,500.

**HALE & NORCROSS.**—Good headway is making in exploring drifts on the 500 level. On the 600 level the south upraise has connected with the south drift of the 500 level. The north upraise of the 600 level is up 26 feet, and the west drift from the 800 station is out 102 feet. It is in ground of very favorable appearance. The company has on hand \$31,700, with all debts paid.

**NEW MEXICO.**

**SANTA FE COUNTY.**

The case of Charles Gildersleeve against the New Mexico Mining Company, the heirs of Jerome B. Chaffee, Stephen B. Elkins and others for the possession of a half interest in 96,000 acres of land in Santa Fe County, New Mexico, was Saturday decided in the district court in favor of defendants. The property is valued at \$3,000,000. It is said that there are in it 12,000 acres of anthracite and bituminous coal.

**SANTA FE MINING COMPANY.**—We understand that the head office of this company, which succeeds the old San Pedro & Cañon Del Agua, will be established in Boston, and four of the nine directors will be Boston men, three in New Mexico, one in New York and one (Mr. Hubbell) in Michigan.

**OREGON.**

**BAKER COUNTY.**

A suit has been brought in St. Louis, Mo., by S. H. Knowles to recover \$250,000, and attachment has been executed by levying on \$3,000,000 worth of mining stock placed on deposit at the Continental Bank. The suit is against Jonathan Bourne, Jr., and the petition states that the plaintiff in May last sold an undivided one-half interest in property in this county to Bourne for \$250,000. He alleges that Bourne is about to dispose of the property without paying therefor.

**CURRY COUNTY.**

The *San Francisco Chronicle* records an interesting fact in the first shipment of borate of lime from Lomer Ranch:

This borate of lime is superior to quality to any hitherto discovered, according to the analysis of Professor Price. The deposit is volcanic, the borate occurring in boulders varying in size up to 2000 pounds weight, imbedded in volcanic mud. The area of the deposit has been determined to be half a mile in length and 200 yards in width and 30 feet in depth.

The discovery is of importance to the commercial world, for the mine is so close to the coast that an oyster shell can be thrown from it into the water, so that the expensive item of land carriage which has handicapped the borax industry of California and Nevada, as well as of Italy, Asia Minor, Chili and

Thibet no longer stands in the way. Vessels drawing three fathoms of water can lie within 300 yards of low-water mark.

It is stated that by Fleming's new process for manufacturing borax, instituted at the works at Alameda Point, the cost of production can be reduced to one and one half cents per pound.

#### PENNSYLVANIA.

It is stated that the anthracite coal mines in the Lackawanna and Wyoming valleys have almost suspended operations this week on account of scarcity of cars.

#### FAYETTE COUNTY.

**REDSTONE COAL COMPANY.**—The directors of this company have decided to begin the work of developing their large tract of coal on Redstone Creek at once. A coal shaft 265 feet will be sunk. Fifty coke-ovens will be built at once. A number of tenement-houses will be built for the accommodation of the men sinking the shaft, and after the latter is completed, the houses for the occupancy of the cokers will be put up. At present the company will ship their product exclusively to the West. After getting the coke plant in good operation, the company will drill for oil.

#### OIL.

Exports of refined, crude, and naphtha from the following ports, from January 1st to September 29th:

	1888.	1887.
	Gallons.	Gallons.
From Boston.....	3,010,172	3,277,547
Philadelphia.....	100,564,250	122,384,453
Baltimore.....	5,641,387	6,496,152
Perth Amboy.....	16,861,272	12,556,908
New York.....	262,092,785	280,124,231
Total exports .....	388,169,866	427,839,291

#### TEXAS.

##### TARRANT COUNTY.

A St. Louis syndicate, headed by Col. R. J. Hunter, the well known cattle dealer, with a capital of \$200,000, has purchased 5000 acres of coal lands eighty miles from Fort Worth, Tex., near the line of the Texas Pacific road.

#### WYOMING.

##### SWEETWATER COUNTY.

The Union Pacific coal mines at Rock Springs, Wyoming Territory, are averaging 211 tons of lump coal per day.

#### FOREIGN MINING NEWS.

##### CANADA.

##### PROVINCE OF ONTARIO.

**BEAVER SILVER MINE.**—We learn upon good authority that a new strike of rich ore has just been made in this mine.

Our regular correspondent sends the following from the district of Algoma West:

**THE SILVER MINES.**—At the west end of Silver Mountain the Colorado Company have received their hoisting and pumping machinery, and have placed the same in position with most satisfactory results. Three shafts are being sunk on this property, which at proper depth will be connected with adit levels. All openings so far made are looking remarkably well, and a large quantity of milling ore, averaging about 100 ounces per ton, is rapidly increasing the dimensions of the dump. In addition to this, a very considerable amount of high-grade smelting ore is being packed in ore-houses.

Surface improvements are still in active progress, consisting of new shaft and ore-house, together with dwellings for married employes.

**THE SILVER FALLS MINE (R. 110).**—This property, owned by Capt. John C. Haskings, formerly of Truro, Cornwall, is situated on the Silver Mountain range, and so far as tested (a depth of 50 feet), shows a strong mother lode, carrying more or less leaf silver with the usual argentiferous zinc blendes and galena. Capt. Haskings is now re-opening this claim, which, by the way, possesses an unrivaled water-power.

**THE EAST END OR SHUNIAH WEACHEAD COMPANY.**—The work of prospecting the recent discoveries on the eastern extension of this lode, in addition to the ordinary work of drifting and sinking in the mountain, goes on with regularity, and Manager Rlythe, as usual, appears perfectly satisfied.

**THE BEAVER.**—Mining operations in the various shafts, adits and winzes of this property, go on with out ceasing, resulting in a steady output of good mill rock, as well as a marked increase in output of high grade ore, a large quantity of which is now being barreled to complete a car-load for the well-known smelting works of Messrs. Balbach & Sons, of Newark, New Jersey.

**THE BADGER.**—At this mine, visited on the 22d of September, the same average force (60 men) were found at their respective posts. Their new pumping and hoisting engines are now vigorously at work, and as the Badger is almost as conspicuous for its great volume of water as for its rich and steady output of ore, it may be inferred that their new hoisting plant is taxed to its full capacity. A shipment of 41 barrels of ore from this mine, amounting to upwards of 15 tons, was made on 17th September to New Jersey, where it is anticipated it will yield about 2000 ounces to the ton of 2000 pounds.

**THE ELGIN.**—This promising lode is being thoroughly prospected under the direction of one of our most practical mining men, with fair prospects of success. It is the discovery of a noted local explorer and pioneer, Alick Crawford, of Fort William, who as-

sociated with him a well known Ontario government official.

**THE VICTORIA.**—This lode is situated on the government road to the Beaver and Badger, and is within 3 miles of the former mine. It is in the same interesting geological formation as the surrounding mines, and its strongly defined vein is well mineralized.

Nearer the Beaver and immediately upon the sloping banks of Silver Creek is yet another claim, which although so far nameless, nevertheless, may, under present practical direction, steadily develop into at least a "Little Beaver." Depth on this prospect has attained 22 feet.

**THE WOLVERINE,** owned by an English syndicate, is well situated for economical mining and milling. It is but partially developed, and so far will average 40 ounces, while picked pieces go into the hundreds. The directors of the Wolverine Company meet in London, England, this week, to deliberate on future operations.

**CROWN POINT,** owned and operated by Messrs. Cummings & Montgomery, of Duluth, is being slowly developed. This mine has recently shown some fine samples.

**SILVER GLANCE,** one of the strongest true fissure veins in this range—as already reported to the JOURNAL—was disposed of recently, but so far the London company have not completed arrangements for practically testing their promised bonanza.

**SILVER FOX,** owned by the West End Mining Company, is being developed by M. Falco, and already the location presents the appearance of a live mining camp. This lode, like that of the Mink Mountain, is the eastern extension of the Silver Glance.

**MINK MOUNTAIN MINE.**—Arrangements are being perfected by its owner, Thos. H. Hulbert, consulting mining engineer, of Duluth, to operate this fine claim this month.

**REGULAR MEDICAL ATTENDANCE FOR THE MINES.**—Dr. Bathurst, M. D., late of the copper mining region on the south shore of Lake Superior, has relieved Dr. Smellie in attendance upon the mining population in this district, and for the present, owing to its central position, makes the Beaver mine his headquarters. The doctor is a graduate of London, England.

#### CENTRAL AMERICA.

##### HONDURAS.

According to General E. Kraft, who is at present in Chicago, but is a resident of many years standing in Honduras, the mining business in that country is developing rapidly. There was about \$1,000,000 of gold and silver taken out last year and most of it from one mine. This year the product will be \$3,000,000. Fifteen new mines have been opened up. The Americans are doing a great deal in mining. An English paper devoted to mining nearly altogether is published in Honduras. The country politically is now very quiet since President Begran's re-election.

##### GUATEMALA.

We take the following from the United States Consular Report of Mr. I. R. Hosmer, Consul General to Guatemala, just issued by the Department of State:

There are evidences, both statistical and to a limited degree of present experimental knowledge, of gold and silver mines in this Republic. Many of these were worked in the olden time, but since abandoned, as it is said, for the want of capital. They bear names on the record, and I mention them for what they are worth. These are the Sastre, Agua Blanca, Laguna, Rincon, San Antonio, and Contreras, near the capital of Guatemala.

In the department of Huehuetenango there are several unworked gold, silver, iron, lead, and salt mines within its limits, with the exception of the Tojion lead and San Mateo salt mines, which are being developed.

In the department of Quiché, in the Ilon Mountain there is a gold mine; in Chinique, one of silver and several quarries of opal, marble, alabaster, and gypsum.

In the department of Yzabal, not far from the river Montagua, there are deposits or placers of gold that have yielded, by the primitive process of washing, quite an amount of the precious metal in flakes and dust; now, however, I am informed that Messrs. Potts & Knight, citizens of the United States, are making some improvements with the view of opening up some of the placers in which they are interested, in order to work them on a larger scale. The Friedman Mining Company, of New York, have sent to their properties a corps of competent miners with the purpose of renewing suspended operations upon Las Quebradas. The value of the gold-dust exported from Livingston last year was \$12,000.

Coal exists also in the department of Yzabal. Various seams have been discovered, with indications that there are extended deposits of it. These coal mines start from San Felipe del Golfo, near the Yzabal lagoon, then pass beneath the Goelfete to the foot of the San Gil, extinct volcano, near Santo Tomas. It is said to be a rich bituminous coal, containing, when distilled, 50 per cent of volatile matter, one half of which is heavy carbureted hydrogen, or illuminating gas.

##### MEXICO.

[From our Special Correspondent.]

**LOWER CALIFORNIA.**—A company was incorporated in San Diego, Cal., on the 15th, to explore and work mines and to hold real estate in Mexico. It is called the Consolidated St. Nicholas & San Francisco Gold Mining Company of Lower California. Capital stock \$1,000,000.

**SONORA.**—A wagon road will soon be built from

Nogales, Arizona, to some mines owned by an American mining company, about 80 miles southeast of Nogales, in the Arizpe district of Sonora. The company is preparing to take in a large amount of machinery and supplies to work the property on a large scale.

The Carrizal mine, near Batuc, Ures district, is owned by King & Meyer. They have been developing the property for several years, and it is now yielding a large output.

The San Francisco and Las Cruces gold mines are situated in the Arizpe district, on the trail leading from Ures to Oposura. They were recently sold to a London company after an examination by W. Milford, a mining expert of that city. There is said to be abundance of wood and water, with veins seven and eight feet wide. The English company is called the "Arizpe Gold Mines of Mexico, Limited," and is stocked at £50,000.

**SINALOA.**—Having heard that a Sinaloa mining Syndicate has been formed in London with a capital of £50,000 to buy mines in Mexico, a newspaper that has come to my hands comments unfavorably on the amount of capital and says that it would take that much to buy some of the dumps of the mines here. But, notwithstanding, there is much money to be made here with a capital of the above amount if judiciously employed.

**CHIHUAHUA.**—In the Sabinal district the miners are suffering from a period of depression resulting from the sudden petering out of the famous ore shoot in the Plancha de Plata mine. As the vein is continuous there is, however, reason to believe that the continuation of the ore body may be found by judicious exploration and the company has let a contract for sinking a new shaft to below the 150 foot level. Mr. Adolf Munzenberger is working the San Domingo, the Cinco de Mayo and the Porvenir mines steadily and ships the product to the El Paso smelter. A smelter is projected to use up the low grade ore of the camp.

A railroad is projected from Deming, N. M., via Las Palomas and Corralitos to the Pacific coast. It will run through a rich mineral country in Mexico.

The Homestake mine, in a new mineral district that lies between the Santa Maria and Carmen rivers, has been purchased by Wythe Walker, Alex. Davis and Thos. Thourghman, of St. Louis, Mo. The mineral is lead carbonates with iron and manganese. It averages 35 to 50 per cent lead, from 35 to 150 ounces silver, and up to  $\frac{1}{3}$  of an ounce of gold per ton.

The great new gold mine, the San Gabriel, at Batopilas is said to be a deposit to all appearances inexhaustible. Ten arrastras are turning out from \$10,000 to \$14,000 worth of gold monthly, 93 per cent fine.

Mr. W. McKamy has obtained a concession from the government to work mines and placers in the Municipality of Guadalupe y Calvo.

The concession to work mines in the District of Parral, which was granted to Gaspar Salas on the 23d of November of last year, has been declared forfeited for non-observance of the conditions to which the same was subject.

**DURANGO.**—The Guaneveci district, in which Haggin and Hearst, of San Francisco, have recently bought the Cachemole mine, is distant 140 miles to the west of Jimenez station, on the Mexican Central Railroad. An English syndicate, operating in Guadalupe y Calvo, had a lease on some mines here and extracted large amounts of silver forty years ago. The mines have been in a state of comparative abandonment for many years, yet the yearly shipments to the Durango mint have averaged nearly \$100,000 all that time.

Three years ago the Cachemole, then abandoned, was cleaned out, and an ore-body was met with that is from forty to fifty feet wide. Shipments have been made during the past year of ore averaging over 100 ounces per ton, and a large amount of lower grade ore has been worked at the mine.

The Sirena, near the Cachemole, was also recently cleaned out, and has shipped in the past year over \$200,000 worth of ore to the United States, and also made a considerable quantity of bullion on the ground. There are said to be many old mines in the district that, it is thought, will do as well as those just mentioned if cleaned out. The great drawback to the district is the present system of transportation by pack mules, but this will soon be done away with, as a wagon road is in construction.

**NUEVO LEON.**—A company of Fort Scott, Kan., capitalists is working the Iguana mines to the eastward of Lampazos station, on the Mexican National Railroad. The ores are to be concentrated and then shipped to the United States.

James F. Matthews & Co., of Denver, are reported to have leased the Rosario mine, at Salinas.

**SAN LUIS POTOSI.**—In Catorce, the Concepcion mine is improving every day. A cross-cut in one of the lower stopes has developed a vein more than 12 meters wide, and has not yet reached the foot-wall. The pumps recently put in have quite cleared the mine of water. A dividend will be declared this month.

The San Augustin mine is in a bad state again, as the ore is scarce and of low grade. The Padre Flores mine is yielding some rich specimens, but has not yet shown an ore body.

In Matehuala, the La Paz mine is doing well, and expects to pay dividends at the end of this month. The ores are abundant and average 50 ounces per ton.

In Pozos, the Angustias mine has paid its seventh dividend, and the mine is reported in a fine state. A new shaft is projected, so that the output can be increased. The Dorado mine of the Providencia Company has a vein one meter thick uncovered for a length of 60 meters at the depth of 22 meters with about 400 ounces per ton.

**ZACATECAS.**—The La Sonambula mine, adjoining

the San Rafael, is being developed by the Palmer Brothers.

The price of the Asturiana shares went down on account of the omission of the usual dividend expected on July 31st; but two dividends have been paid since, so that the shares are on the rise. The last two dividends amounted to \$48,000 on the whole number of shares.

The Prodigio mine has also paid two dividends this month of the same amount.

**HIDALGO.**—In Pachuca the recent floods played havoc with the railroads and also with the mines; several haciendas were overflowed, and the Maravillas mine is reported as being under water. The Espiritu Santo mine also suffered through the same cause. The La Luz Pachuquilla mine reports only "indications" as yet.

In the Real del Monte district, a Chicago company, Mr. L. D. Pollard, vice-president and resident manager, is working the Jesus Maria mine. The company is cleaning out an old shaft and cross-cutting to reach an east and west lode which is supposed to be the best on the property.

**MORELOS.**—Some quicksilver mines near Cuernavaca have been bought by J. W. C. Maxwell of San Francisco.

A writer in a late number of the *Mining and Industrial Review* of this city says that there are 2819 mines and 300 metallurgical works in operation in this country. He assumes that there are six men employed in each mine daily, which makes a total of 16,914 miners at work, who, at an average of \$1 per day, would earn \$16,914 daily. The production of each mine he estimates at 3000 pounds daily, or a total of 4228 tons, which he values at 27 ounces of silver per ton, a total of 114,156 ounces per day. The writer of the above, evidently not being much of a statistician and still less acquainted with his own country, has very much underestimated the magnitude of the mining industry here. The average number of men in the mines now being worked in Mexico is, according to my own observations and including some that are practically idle, not less than twenty, which in the above number of mines will amount to 56,380, or, in round numbers 60,000 men. There are, in addition, some 20,000 men not usually counted as miners but engaged in managerial, clerical and other occupations in connection with the mining companies, making a grand total of 80,000 men directly employed about the mines. Assuming the average daily wage to be that paid in Pachuca, where about 4000 men, including miners and employés, are constantly at work, we find this to be \$1.50, making a total in a year of 300 working days of \$36,000,000 for the whole Republic.

The average daily production of the mines is about five tons of cleaned ore per day, or a total daily production for the whole number of mines of 14,100 tons. In one year the production is about 4,230,000 tons. The average net yield of the above in gold, silver, copper, lead and mercury, which are about all the metals that are mined here, is possibly \$20 per ton, a total of \$84,600,000. From this amount we must deduct the cost of labor, \$36,000,000, and of materials, say \$15,000,000 more, which leaves a net profit on the extraction of \$33,600,000.

The average capital invested in each mine is approximately \$10,000, a total of \$28,200,000 for all, so that the yearly profit on the money invested in the active mines of Mexico is nearly 120 per cent.

The three hundred metallurgical works employ on the average twenty-five men each, making a total of 7500 men in this business, who, at an average wage of \$1 per day (the men that work in metallurgical works are paid much less than the miners), earn \$2,250,000 annually. The average capital invested in metallurgical works is about the same as for a mine, namely, \$10,000 each, so that the total value of this species of property in the Republic is about \$3,000,000. This estimate may appear to be low, but it must be remembered that at least 75 per cent of these works are built to work ore by the patio process or by the Mexican smelting system, and that neither of these demands a large expenditure for plant, the largest item being the running expenses, or, rather, repairs.

I am informed on good authority that more than six hundred new mining companies have been organized in Mexico since the new mining laws came into effect, and that during the last six months 682 mines and 33 metallurgical works have entered into active exploitation.

In the future of Mexican mining silver will not occupy the almost exclusive position that it has hitherto maintained. The low price of that metal has forced prospectors to seek for gold with more energy than before, and owing to the fact that the advance of the settlements has opened up large districts formerly occupied by hostile Indians or inaccessible on account of the scarcity of water, they have been successful in finding in Lower California, in Sonora and in Chihuahua, placers and quartz veins that will become of great importance as soon as capital and intelligence are attracted to their exploitation.

**CHIHUAHUA.**

[From an occasional Correspondent.]

Having recently visited a number of the mines in this State and knowing that many of your readers are interested in the mining industry hereabouts, I propose to give them the results of my observations through the medium of your valuable JOURNAL. So much has been written by a class of boomers, whose sole business seems to be to make Mexico appear a veritable El Dorado, that plain statements of facts may be too tame for some, but believing that what you and your readers want is fact and not fiction I shall confine my-

self to such statements as can be substantiated. One of the districts visited was that of Parral, a town of about 10,000 inhabitants situated in the southwestern part of the State, and sixty-five miles from Jimenez on the Mexican Central Railroad. At Parral there are a number of small smelters owned by Mexicans, and also two or three small stamp mills which are not now in active operation. There are two modern stamp mills, both running. One is owned by the widow Botello & Sons, residents of Parral, and is run exclusively upon their own ores produced mainly by the Verde and Veta Grande mines. This mill is run steadily, and is producing about forty to fifty thousand ounces silver bullion per month. The other stamp mill is owned by the Mexican Santa Barbara Mining Company, of London, England. They are now erecting additional stamps, and when the improvements are completed will have a capacity of about 60 tons per day. This company recently shipped 10,000 pounds of sulphides to Newark, N. J., for refining, as they were considered too low grade to be refined at the works economically. This is the old Bosque mill, formerly owned by N. A. Cowdry, of New York. The Hidalgo Mining Company have a leaching plant with a capacity of about thirty tons. They use rolls for crushing, and report them as doing very satisfactory work. This mill is the first of its kind in this vicinity, and if it proves a success will be followed by others of the same class. It was started up about two months ago, and has been running on low-grade merchant ore, producing about forty thousand dollars in bullion.

The mines in the immediate neighborhood of Parral are the Prieta, leased by Botello & Sons, not now producing any ore, but having a first-class pumping and hoisting plant.\*

Close by this and northeast of it is the Tajo mine, which has not been worked since 1865, having caved in badly in that year. During the two years preceding that, the records of the company operating it show an output of over 500,000 ounces silver. There is no machinery of any kind upon it, and it is offered for sale at \$100,000.

The Ronquilla adjoins the Tajo, and is in like condition. The Jesus Maria, owned by the estate of the late N. A. Cowdry, of New York, is north of the Prieta about one hundred meters, and has not produced any ore since Mr. Cowdry's death.

Immediately adjoining the Jesus Maria and north of it is the Aquileraña, or Philadelphia mine, owned by the Hidalgo Mining Company, of Pittsburgh, Pa. This mine, like all others in the Parral Mountain, is under water to a depth of about one hundred feet, and so great is the flow of water that additional pumps must be erected before the mine can be worked to its full capacity. No work, except possession work, has been done in any of these mines for about two years, on account of the difficulty in controlling the water. The Hidalgo Company are now preparing to pump their mine out and work it extensively. At Minas Nuevas, seven miles north of Parral, is an important group of mines. Of these, the Verde and Veta Grande, owned by Botello & Sons and F. Stallforth & Brother, of Parral, are the most active. They are well equipped with modern pumping and hoisting machinery; have reached a depth of 1000 and 1300 feet respectively, and are producing jointly about seventy-five tons of ore daily, averaging 60 ounces per ton.

Adjoining the Veta Grande in the south is the Alfereña, owned by Mr. J. F. Sieberling, of Akron, O., having a first-class hoist. This mine has a present depth of 650 feet, and is not making more water than is needed for the boilers. It is producing about 30 tons of ore daily, averaging 35 to 40 ounces.

There are several other mines on this ledge, among which only two others are producing any ore at present. These are the Presena and Quebrillos, which are being worked in a small way. The Presena ore carries about 45 ounces silver at present, and is 600 feet deep.

**VERITAS.**

**THE CUSI MINE.**—The financial position of the Don Enrique Mining Company now owning the Cusibuirachic mine is as follows:

Cash on hand in N. Y. ....	\$63,758.75	
Ore shipments on way .....	23,000.00	
American currency .....	\$86,758.75	
Add exchange 30 per cent .....	26,027.72	
Overdrawn at Mexican Bank ...	\$97,534.45	\$112,786.39
Less bullion at mint .....	20,000.00	77,534.45
		\$35,251.92
Balance in American currency ..		27,115.78

**LOWER CALIFORNIA.**

**LA BOLEO COPPER MINES**—These mines have now stacked up, says the San Francisco *News Letter*, over 2000 tons of copper bullion running 95 per cent, besides a large quantity of matte, which will average 65 per cent.

**SONORA.**

(From an Occasional Correspondent.)

The La Dura and La Prieta mines, owned by Graf & Co., have been in bonanza for some time past. The company is putting up additional concentration works on the Yaqui River, near the California mine.

English parties are negotiating for the Guadalupe gold mine, located near Saric Arispe District. The Creston Gold Mining Company (extension of Las Prietas) are expecting to put up a 30-stamp mill.

\* Reason: Badly in debt, and creditors made it a condition that they must confine themselves to their milling business for the present.

The ore reserve developed for the last two years by E. H. Price, the manager, in the Creston and the Colorado mine will keep the new mill running for a long time and assure the success of the company.

A portion of San Geronimo mine, situated in the Alameda District, Ures, Sonora, caved in on the 20th ult., killing Harry Melle, the temporary superintendent in charge of the mine during the absence of its owner, J. H. McKim. Melle at the time of the accident was in a house built over the old works of the mine. His body was found buried some 25 feet from the surface. The debris filled up the lower new workings of the mine, and will cause considerable expense in reopening it properly. The mine had been known to be unsafe for more than a year past.

The Trinidad mine, Sabuaripa District, is at last producing bullion at the rate of \$15,000 per month. J. Smith, the superintendent, has gone to San Francisco in quest of skilled labor to mine economically the large ore reserves, principally in soft ground.

A rich strike in the St. Louis mine, near the San Augu-tin-Arispe District, is reported. The owners claim \$200,000 of ore in sight.

**RUSSIA.**

An important report from the British consul at Taganrog on the coal industry of Southern Russia has just been published. The five coal basins of Russia are the Donetz, sub-Moscow, Dombrova (Poland), Ural and Caucasus; of these the first is the one described in the present report. It stretches over a considerable portion of New Russia, between the Don and the Dnieper, and includes many extensive seams of bituminous and anthracite coal, but it contains all kinds of coal suitable for manufactures and household purposes. Thereport goes seriatim through six groups of collieries producing different kinds of coal, and describes the mode of working and the results of the more important collieries in each group. There are in all 200 collieries in the Donetz basin, many being thoroughly equipped, but others being wholly unprovided with modern appliances. The recent rapid development of the coal industry in this region is said to owe much to the annual conferences of the representatives of the mining industries. The annual output at present exceeds 1,600,000 tons, of which about 1,300,000 tons are carried by railway; but it is calculated that nearly 3,000,000 tons will be available for transport during the present year, besides the quantity consumed in the neighborhood.

**SOUTH AMERICA.**

**UNITED STATES OF COLOMBIA.**

**SANTIAGO GOLD MINING COMPANY.**—According to the weekly reports from the mine received at the office of Messrs. George William Ballou & Co. in this city, work is progressing at the mine satisfactorily and rapidly, although but a very small force is employed. During the week ending September 6th 10 tons were mined from the Harper mine and 32 tons from the La Guaca. During the preceding week the total production amounted to 70 tons. On a vertical vein, recently discovered, the ore is reported to run \$8 per ton in free gold, carrying no sulphurets. This vein is now 6 feet wide, and in one week has been opened up a distance of 10 feet by one miner. The first shipment of gold was made recently to Wells, Fargo & Co., in this city. It amounted to \$4600.

**CHILI.**

In the district of Vallenar rich gold deposits have been discovered, and at the Balmaceda mine, at Ovalle, a silver vein of marvelous richness has been struck.

**WALES.**

**MORGAN GOLD MINE.**—From our English exchanges we learn that this mine is looking better and that free gold is showing in the stopes. The mill is crushing from 25 to 30 tons a day, which it is stated will average over two ounces gold to the ton. [We understand that the pay chute, though 8 to 12 feet thick, is very short, less than 100 feet, and there is very little ore or reserves in sight.—ED. ENGINEERING AND MINING JOURNAL.]

**COAL TRADE REVIEW.**

NEW YORK, Friday Evening, Oct. 5.

**Statistics.**

**Production Anthracite Coal for week ended September 9th and year from January 1st:**

Tons of 2240 Lbs.	1888.		1887.
	Week.	Year.	Year.
P. & Read RR. Co. ....	201,104	4,951,108	5,393,020
Cent. R. E. of N. J. ....	162,015	4,122,657	3,606,979
L. V. RR. Co. ....	181,931	4,902,892	4,717,796
D., L. & W. RR. Co. ....	155,032	4,847,855	4,103,973
D. & H. Canal Co. ....	124,011	3,501,742	2,810,393
Penna. RR. ....	62,972	3,315,792	2,756,137
Penna. Coal Co. ....	38,945	1,243,394	1,103,040
N. Y., L. E. & W. ....	14,000	640,087	567,514
<b>Total</b> .....	<b>940,090</b>	<b>27,445,497</b>	<b>25,118,852</b>
Increase .....		2,326,645	.....

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.....22,997,226 | 1885.....22,042,884  
 1884.....24,434,228 | 1886.....22,683,348

**Production of Coke on line of Pennsylvania RR. for week ending September 29th, and year from January 1st, in tons of 2000 pounds: Week, 93,371 tons; year, 2,919,554 tons; to corresponding date in 1887, 2,608,294 tons.**

**Production of Bituminous Coal for week ended September 29th, and year from January 1st:**

	1888.		1887.
	Week.	Year.	Year.
Tons of 2240 lbs.			
Phila. & Erie RR.....	1,878	47,053	13,067
Cumberland, Md.....	76,409	2,653,116	2,343,072
Barclay, Pa.....	800	118,480	137,704
Broad Top, Pa.....	7,969	258,522	242,292
Clearfield, Pa.....	68,763	2,465,427	2,346,268
Alleghany, Pa.....	17,825	577,531	639,119
Pocahontas Flat Top	27,952	1,029,693	748,729
Kanawha, W. Va.....	27,743	1,178,858	999,409
<b>Total.....</b>	<b>229,139</b>	<b>8,358,680</b>	<b>7,476,230</b>
<b>WESTERN SHIPMENTS.</b>			
Pittsburg, Pa.....	13,833	527,847	417,399
Westmoreland, Pa.....	30,028	1,135,474	1,028,593
Monongahela, Pa.....	8,444	301,445	278,341
<b>Total.....</b>	<b>52,315</b>	<b>1,964,766</b>	<b>1,724,333</b>
<b>Grand total.....</b>	<b>281,454</b>	<b>10,323,446</b>	<b>9,199,563</b>

**Anthracite.**

The anthracite trade continues very fair. Every one seems to be busy, and in many instances the circular rates are firmly adhered to. There is an active demand for egg, chestnut, and stove, especially the latter for the winter trade. Stocks of Lehigh broken are rapidly accumulating, and prices are consequently slightly weaker for this size. Pea is not wanted at all, and stocks at the mines are increasing.

Advices from Chicago report that orders are coming in very plentifully, and cars are very scarce. The *Black Diamond* estimates that the amount of anthracite required for the Western trade this year will be between 1,900,000 and 2,000,000 tons.

It has been agreed that prices, as per circular, will be no higher for the month of October than during September.

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@2.25
Stove.....	4.65		

**Bituminous.**

The trade appears to be in excellent condition. During the week orders have been large and plentiful, the only drawback being the lack of cars.

Prices are firm throughout the trade, and from every part of the country come reports of increasing activity.

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

**Boston. Oct. 4.**

[From our Special Correspondent.]

The market for coal at this port is quiet in all its branches. There would be a good fall movement in anthracite now if there were a better stock at shipping ports; but as is, trade is light. As before noted, cargoes afloat meet with good demand, and this is the best branch of the business at present. The retailers have got it into their heads that everything is to be gained and nothing lost by waiting until they need to buy coal more than they do now. Prices remain nominally unchanged, but there is less trouble in obtaining prompt shipment than there was in case of most of the companies, and this is taken as an indication of an easier state of affairs.

In bituminous coal the movement is small as far as new business is concerned. F. o. b. and delivered quotations are unchanged, save as freights fluctuate. The low prices of the earlier part of the season still prevail.

Everything is in favor of the vessel owner in the freight situation.

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 has shown more activity of late, and dealers are well occupied. The combination seems to be working like a charm. Delivered prices 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.

**Buffalo. Oct. 4.**

[From our Own Correspondent.]

No change in prices of anthracite, and a firm feeling, with steady quotations for bituminous coal. The opinion prevails that anthracite will not be advanced again for this season's consumption, as the dear public would revolt most emphatically, and producers and dealers probably think that "discretion is the better part of valor." The demand for cars is largely in excess of the supply, but the railroad people are evidently doing the best they can. Car shops are running full, and many of them overtime, to fill orders for new cars and execute repairs.

Trade may be quoted as good and healthy. The stock of anthracite coal for shipping by lake meager, and is a source of considerable annoyance to vessel owners, whose craft are delayed in loading.

Prominent among the entertainers of the members of the American Institute of Mining Engineers, now in session in this city, are Messrs. T. Guilford Smith, Thomas Hodgson, C. D. R. Stowitz, E. L. Hedstrom, Thomas Loomis and F. H. Snell, the well-known coal merchants.

This week opened with several gales on all the lakes; several coal laden vessels went ashore or sank. The

demand for freight room here for coal was fair, and vessel owners secured loads at unchanged quotations. The market closed to-day steady and moderately active. The rates for the week were as follows: 80c. to Chicago; 75c. to Milwaukee, Escanaba, Green Bay, Portage, Marquette, and Sault Ste. Marie; 90c. to Racine; 60c. to Duluth, Superior, Ashland and Washburn; 25c. to Toledo and Detroit; 50c. to Saginaw; 70c. to Gladstone; 75c. to St. Ignace, and 40c. to Bay City.

The shipments by lake westward from this port from September 27th to October 3d, both days inclusive, were 80,423 net tons, namely, 36,240 to Chicago, 11,480 to Milwaukee, 11,480 to Duluth, 2600 to Toledo, 6800 to Superior, 1820 to Detroit, 1050 to Marquette, 1580 to Racine, 2300 to Gladstone, 2100 to Washburn, 650 to Escanaba, 250 to Saginaw, 500 to St. Ignace, 760 to Ashland, 620 to Green Bay and 90 to Bay City. Total shipments thus far this season about 1,868,000 net tons, including cargoes on vessels from Tonawanda not reported at Buffalo Custom House.

The receipts of coal here by canal for fourth week of September, 4853 net tons; the shipments, 190 net tons.

**Statistical.**—Receipts of coal by lake at this port this year none. Shipments westward by lake for the month of September, 326,010 net tons, as compared with 298,560 tons in 1887, and 227,800 tons in 1886; for the season to October 1st, 1,833,200 net tons, 1,842,080 tons in 1887, and 1,128,870 tons in 1886. The receipts of coal by canal for September 30,543 net tons, as compared with 20,706 tons in 1887; the shipments, 115 net tons as compared with 1394 tons in 1887; the season's receipts to October 1st, 106,276 net tons, as compared with 46,930 tons in 1887, and 61,847 tons in 1886; the season's shipments to October 1st, 6112 net tons, as compared with 6702 tons in 1887, and 13,768 tons in 1886. The railroad receipts and shipments not reported, the companies declining to give the information.

This year the closing rate of lake freights on coal hence to Chicago, 80c.; in 1887, \$1.25, and in 1886, \$1.

The distribution of coal from this port by lake since opening of navigation to October 1st was as follows to points named:

To	Net tons.	To	Net tons.
Chicago.....	654,599	Manistee.....	600
Milwaukee.....	417,327	Marquette.....	17,800
Duluth.....	205,130	Romney.....	317
Sandusky.....	6,930	Manitowoc.....	8,230
Racine.....	21,080	Escanaba.....	1,040
Toledo.....	60,912	Alpena.....	1,550
Bay City.....	8,530	Marine City.....	1,700
Port Colborne.....	950	Hancock.....	1,570
Windsor.....	2,320	Michigan City.....	600
Cleveland.....	1,050	Bay Mills.....	300
Detroit.....	25,140	Pat-in-Bay.....	350
Ludington.....	1,580	Kenosha.....	620
Gladstone.....	20,090	Muskegon.....	1,470
Washburn.....	25,420	Sault Ste. Marie.....	2,350
Houghton.....	630	Sheboygan.....	10,540
Lake Linden.....	5,110	Kenosha.....	4,170
Ashland.....	27,600	Port Arthur.....	1,280
Green Bay.....	22,350	Wallaceburg.....	280
Saginaw.....	13,965	St. Clair.....	1,000
Superior.....	89,600	Portage.....	550
Marquette.....	3,730	Port Clinton.....	970
Tawas.....	250	Kinkardine.....	3,290
Cheboygan.....	1,040	Port Huron.....	3,490
Kelly Island.....	870	Miscellaneous ports	
Ft. William.....	1,100	per Tonawanda	
Menominee.....	2,640	vessels.....	175,000

**Pittsburg. Oct. 4.**

[From our Special Correspondent.]

**Coal.**—The prospect at this moment is that before the *ENGINEERING AND MINING JOURNAL* goes to press a large number of miners will be at work in most of the pools. When the next rise comes there will be from 10,000,000 to 13,000,000 bushels of coal sent to the lower markets. At all events it is a pleasant sight to see the miners once more employed. The Allegheny River is rising, and may make barge water sufficient to send out a few tows.

**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.**—The production and shipment of coke continues to increase. There has been a temporary relief from the car famine, and the increased daily shipments are a reminder of the palmy days of \$2 coke. Week's increase, 4103 tons. The number of active ovens increased 156, leaving only 2045 ovens idle in the entire region, the situation being as follows: 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 Mahanoy 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:**—Bangor, 90@91; Bath, 90; Beverly, 90; Boston, 80@85; Bridgeport, Conn., 70; Cambridge, Mass., 85; Cambridgeport, 85; Charleston, 80@85; Chelsea, 80@85; Com. Pt., Mass., 80@85; E. Boston, 80; E. Cambridge, 85; E. Greenwich, R. I., 80@85; Fall River, 80@85; New Bedford, 80; Newburyport, 1.10; New Haven, 70; Newport, 80@85; New London, 80@85; Norwich, Conn., 70; Norwich, 85@90; Portland, 80@85; Portsmouth, N. H., 1.00; Providence, 80@85; Quincy Point, 90; Salem, 90.

**From Philadelphia to:**—Annapolis, 70; Bangor, 1.05@1.15; 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; Georgetown, D. C., 85; Gloucester, 1.05@1.17; 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, 1.23; Saco, Me., 1.20; Salem, Mass., 90; Savannah, 1.00@1.10; Washington, 85; Weymouth, 1.15; Wilmington, N. C., 60.

**From Baltimore to:**—Bangor, Me., 1.30; Bath, 1.25@1.30; Boston, 1.15; Bridgeport, Conn., 1.00@1.05; Brooklyn, 95; Charleston, 1.10@1.15; Fall River, 1.05; Galveston, 3.00; Gardner, Me., 1.00@1.10; New Bedford, 1.00; Newburyport, 1.30; New Haven, 1.00; 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@1.20; Savannah, 1.25; Somerset, 90; Williamsburgh, N. Y., 1.00; Wilmington, 1.10@1.20.

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

**METAL MARKETS.**

**NEW YORK, Friday Evening, Oct. 5.**  
**Prices of Silver per ounce troy.**

Sept	Sterling exchange	London Pence.	N. Y. Cents.	Oct.	Sterling exchange	London Pence.	N. Y. Cts.
29	4.87½	43¼	94¼	3	4.87	43¼	94¼
1	4.87½	43¾	94½	4	4.87	43¾	94½
2	4.87½	43¾	94½	5	4.87	43¾	94

[Oct 9-16.]

**Treasury Statement.**—A statement prepared at the Treasury Department shows that during the month of September there was a net increase of \$23,477,123 in the circulation and a net decrease of \$1,793,707 in the money and bullion in the Treasury. The circulation of gold certificates increased \$10,087,796; of silver certificates, \$8,902,968, and of subsidiary silver, \$1,185,499. These constituted the principal items of increase in circulation. The only decrease was in national bank notes amounting to \$970,165. The principal decrease in the Treasury was \$1,856,850 in national bank notes, \$1,008,068 in subsidiary silver and \$951,430 in United States notes. There was an increase in the Treasury cash of \$954,821 in gold coin and \$932,132 in standard silver dollars, and also an increase of \$463,054 in gold bullion. The total money and bullion in the Treasury is stated at \$579,780,796, and the total circulation at \$1,354,340,280.

**Foreign Bank Statements.**—The governors of the Bank of England, at their weekly meeting, advanced its rate for discount from 4 to 5 per cent. During the week the bank lost £804,000 bullion, and the proportion of its reserves to its liabilities was reduced from 41.58 to 33.78 per cent, against a reduction from 43.76 to 38.64 per cent in the same week of last year, when its rate for discount was 4 per cent. Thursday the bank gained £65,000 bullion on balance. The weekly statement of the Bank of France shows losses of 11,500,000 francs gold, 2,450,000 silver. The Bank of France advanced its rate for discount to 4½ per cent.

**Copper.**—The market has presented no feature of interest during the past week. It would seem that the short sales alluded to in our previous reports have now been all covered, and while nothing in the shape of Lake copper is offered at any tempting price, there are no buyers at the ruling quotations, and in consequence of this state of affairs little or no interest is now taken in the "call" on the Metal Exchange. The quotations of Lake copper have been nominally marked down somewhat to 17½c. for Spot and delivery up to the end of the year; but as before stated, there are practically neither buyers nor sellers at that price. For casting kinds the demand has increased again, and the smelters have now put up their prices to 16c., below which figure nothing is now obtainable.

Reports from Europe are to the effect that a similar condition of affairs exists there. In London, Chili Bars (which at the beginning of the week stood at £98) have dropped to £91 for spot, while three months prompt are still quoted £78 10s. This decline in the price of spot Chili bars signifies nothing more than that there are evidently no more shorts to squeeze, and it is expected that before long quotations will approach nearer to real values in comparison with other kinds of copper, say about £78. In G. M. B. the transactions have only been small at prices ranging between £78 10s. and £79 5s., with buyers at the latter figure for 3 months prompt. Best Selected is quoted £81 to £82, and Tough Copper, £79 to £79 10s. Furnace material has been in good demand, and mail advices report about 5000 tons having changed hands at fair prices.

**Tin.**—The statistics published at the beginning of this month, although fairly satisfactory, influenced the market unfavorably, and the tendency became very flat, prices dropping ¼ to ½, but closing rather better at the finish. We quote spot 23½; October, 23@23½; November, 23; December, 23. In London the market declined during the week from £103 17s. 6d. to £100 for spot, and about the same figure for 3 months' prompt, but to-day the tone is decidedly firmer at £101 5s.



**Lead.**—The past week has again been one of rapid fluctuation and surprises. After the publication of the last report prices took a strong move upwards. Spot lead being bid up to 5·07½ and October to 5½, at which prices only a few hundred tons changed hands with buyers over. Early in the week, however, the bidding slackened, and as the bull party seemed indisposed to check the downward tendency prices gradually gave way from day to day. On Thursday some large parcels were pressed for sale. In consequence of this prices went down to 4·85 for spot and October, and 4·80 for November, whilst December was offered at 4·65 without attracting any attention. To-day, however, another change took place, and with no sellers prices were again bid up to 5·05 for spot and October and 4·85 for November. In face of these large fluctuations consumers are doing very little, and thus the struggle between the bull speculators and the consumers continues with the final result simply a matter of conjecture. In London prices have given way, and whilst at the end of last week everything found ready buyers at £14 15s., as soon as the speculative buying ceased prices fell down and the latest cable advices report Spanish lead Spot, £14 7s. 6d.; November, £14 2s. 6d., with a weakening tendency.

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

Our market is quiet, but strong. Spot opened at 5·05c. bid; futures, 4·90c. bid. Sales amounted to 500 tons. Later, the market declined to 5c., asked for spot, but there were no transactions at that price. The situation is an entirely speculative one.

**Spelter** has been in very good demand, with very little offered. Domestic is quoted at 5½ to 5¾, and foreign 6 to 6¼. The London quotation for good ordinary brands has been raised to £19@£19 2s. 6d.

**Antimony** is very strong, and prices are again quoted higher. Hallett's antimony is held in London for £42, and cannot now be bought here on spot under 10¼.

**CHEMICALS AND MINERALS.**

NEW YORK, Friday Evening, Oct. 5.

**Heavy Chemicals.**—The market is unsteady on account of the rapid advance in prices within the last few weeks and the uncertainty as to the future action of the caustic soda makers abroad. It is generally believed, however, that the present advance is based upon substantial trade conditions that will at least sustain prices for some time to come, and will probably force them even higher than at present. During the past week, transactions have not been large, as many consumers, believing the present condition of the market only temporary, have held off. A few, however, have purchased a considerable supply. Advices from abroad report no important change. Supplies are scarce, and prices are very firm. The chloride of potash makers are reported to have formed a combination, and the market for the article is rising excitedly.

Caustic soda is firm at the advanced prices. Sales during the week are estimated at 600 drums. Supplies are very scarce. Trade is principally in the higher tests, 70@74 per cent, for which the current market quotations are 2·37½@2·42½c. according to quantity. 60 per cent remains at 2·50@2·62½c. for large lots. In Boston, trade is very active.

Carbonated soda ash, 48 per cent., is unchanged in price. The volume of business is not large, but the market is decidedly firm and prices show an upward tendency. Supplies to arrive are quoted at 1·25@1·27½c. Very little spot stock is to be had, and prices are firmly maintained at 1·27½@1·35c. according to quantity.

Caustic soda ash is quiet, although the market for the article is firm, in sympathy with the feeling of strength apparent in the whole list of heavy chemicals. There is no special demand for this article, however. Prices remain at 1·25@1·27½c., to arrive, according to quantity. On the spot, stock is held nominally at 1·32½@1·35c.

Sal soda is dull in the absence of any great demand. Following the general course of the market, however, prices are firm at a slight advance over last week's quotations. We quote for stock on the spot about 1c., while supplies to arrive are held at 95c.

Bleaching powder is very firm. There is no stock on the spot, scarcely any to arrive, and advices from abroad report a very firm market. These conditions naturally give prices an upward tendency. This week prices have been advanced in New York to 2·10@2·12½c. for stock on the spot. Supplies to arrive are held at 2@2·06½c. Boston dealers are asking 1·95@2c., but, having little stock to offer, do not prevent New York dealers from selling everything obtainable at advanced prices.

**Acids.**—The market this week is duller than at our last writing. The large consumers have withdrawn, and inquiries are for small lots only. As the stocks held by consumers are not large, it is probable that this week's dullness is only temporary. On the whole, the market shows an undertone of strength, and among dealers generally there is a hopeful feeling for better business during the coming year. This week prices are unchanged.

Acetic acid rules at 2@2½c., according to quantity and quality. For large orders it is probable that 2c. would be eagerly accepted.

Nitric and muriatic are in fair demand at unchanged figures. Ruling prices are about as follows: Muriatic, 18°, 1·10@1·15c.; 20°, 1·25@1·30c.; 22°, 1·50c. Nitric acid is held as follows: 36°, 3¾c.; 38°, 4c.; 40°, 4¼c.

Oxalic acid shows no important change. There has been fair trading at last week's figures. In reference to the recent advance in this article, Messrs. Roessler & Hasslach, of this city, in a circular recently issued give the following explanation: "The market had been so demoralized and the raise came so suddenly that nobody could prepare for the advance, and very little, therefore, is in second hand. There existed a great overproduction, and while for some time nobody wanted to yield to this unsound condition, the ruinous prices resulting at last induced some of the manufacturers to reduce their output, and one of them gave up its manufacture altogether. Particularly in view of the diminished output, even the present raised price will not make up for the loss the makers have suffered; at least, it would require a long time to effect this."

Tartaric acid is without feature of 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 powdered.

Sulphuric acid is in very good demand, stocks are not large, and prices are firm, with an upward tendency in some quarters. Among the smaller manufacturers this feeling is especially apparent. Prices this week are about 1@1½c., according to seller and quantity.

**Fertilizers, Potashes, etc.**—"Business is very good," is about the usual reply to the first question asked the dealer in fertilizing chemicals. Buying for the Southern trade has now commenced, and will be soon succeeded by the regular demand for next season. Dealers are busy and prices are firm, owing to the limited supply held in some quarters. The revised price list is about as follows: Azotine, \$2.40 as to quality; dried blood (city), low grade, \$2.40@2.45 per unit; Western high grade, \$2.40@2.50 per unit for ground material; tankage, high grade, \$23@25 per ton; low grade, \$21@22 per ton. Fish scrap, \$25 @26 per ton f.o.b. factory. Sulphate of ammonia, \$15.25 per cwt.

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.

Steamed bones, unground, \$19; ground, \$25.

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.

Muriate of potash is in very good demand at the old figures, \$1.80@1.85 for both spot and arrivals.

Double Manure Salts.—The supply is limited, and prices are consequently firm. This week's quotations show a little advance at 1·15@1·20c. on a basis of 48 per cent potash.

Cainit is unchanged. There has been no large arrivals to ease the market, although prices for shipment are a little lower at \$9.50 per ton. The nominal quotations for stock ex store are \$10.50@11.

Brimstone is quiet. Transactions are very limited. Freight rates continue very high. Ruling prices are unchanged from last week.

Nitrate of soda is absolutely without change. No sales, no arrivals, no news, and no change in prices are the only features of the market. Stock on the spot is estimated at 70,000 bags. The current quotations are 2·17½@2·20c., according to quantity, and 2·10@2·12½c. to arrive.

Acetate of lime is selling moderately. Brown is held at 1·15@1·20c., and gray at 2·25@2·30c.

Arsenic is very firm. Freight rates are high, and in the opinion of leading dealers prices will be forced still higher by the combination abroad.

Cream of Tartar.—There is nothing new to report. Sales are of a jobbing character.

**Minerals.**—There are few complaints among dealers. Business is of fair proportions at satisfactory prices.

Sulphate of Barytes.—The market quiet with limited transactions.

Chalk is in plentiful supply, which, however, is not in excess of the demand.

China Clay.—Only a moderate demand is reported. Prices are unchanged.

Talc.—The best quality French is very scarce. American is also in good demand.

**BUILDING MATERIAL MARKET.**

NEW YORK, Friday Evening, Oct. 5.

There is little change in the building material market. In the city there is little improvement. Throughout the country there is no abatement in the active demand for all lines of building materials that has characterized the year 1888. Engineering and public works of many kinds are being projected on a hitherto unapproached scale, thus producing a brisk demand for cement, building stones, and slates at very satisfactory prices.

**Bricks.**—During the past week, there has been little change. Dealers seem to be convinced that no improvement either in prices or in the demand is to be expected before the close of the year. Up rivers and the inferior grades are in very plentiful supply. The finer fronts are nominally unchanged, although the supply seems to be rather restricted.

**Lime.**—The market has been eased considerably by recent arrivals, but little change in price is noted.

**Cement.**—The demand continues exceptionally good for both foreign and domestic grades. Of the former, the large importations are very readily taken, and prices are decidedly firm.

**Roofing Slate.**—Prices are very firm. Vermont slate is moving very fairly, but the Pennsylvania article can hardly be supplied to meet current requirements.

**IRON MARKET REVIEW.**

NEW YORK, Friday Evening, Oct. 5.

**American Pig-Iron.**—The market has been quiet, with few new features of interest. Prices are well maintained at current quotations. During the past week there has, perhaps, not been quite so strong a demand as during the preceding week, still the condition of the market is healthy. It is, however, not to be denied that foundries which draw their supply from the New York market are by no means as busy as at this time last year. No new transactions of moment are reported.

**Scotch Pig** has also been very quiet. Glasgow quotations are lower than for two or three weeks past, but this has no effect on the New York market, as dealers here have for some time been selling their stocks here and in transit at prices below the cost of importation, in consequence of the decreasing demand for Scotch brands in this country, those brands being gradually replaced by the "American Scotch" irons, which can be bought at lower prices. Freights remain at about 10s.

**Bessemer Pig** is in a little better demand, and domestic brands are a trifle firmer.

**Spiegelisen.**—There have been some recent purchases on private terms. English is still quoted \$27.25@27.75 for early delivery, and a little less for later delivery.

**Steel Rails.**—Recent sales reported by Eastern mills amount to about 10,000 tons. For early delivery the price is about \$28 at Eastern mills. For winter and spring delivery quotations are higher, and several mills are not anxious to take deferred orders. There is no doubt that the mills have taken large orders in the past few weeks which have not been reported. The total allotments to the rail mills up to September 1st amounted to 1,259,000 tons, and now the mills have so nearly sold up to their allotments that a new allotment of 200,000 tons has just been made. The total product for the year will, therefore, probably amount to 1,500,000 tons, which is an excellent figure for an "off" year, being about 75 per cent of last year's product in this country, and 50 per cent greater than the British product of 1887.

Recent private advices indicate that the reports concerning the European international rail combination have perhaps been exaggerated, although there is no doubt that such a combination has been proposed, and would be welcomed by the continental and most of the English makers.

**Structural Iron and Steel** continue in excellent demand, and the mills are very busy filling orders. Prices are firm and unchanged.

**Steel Plates** are likewise in good demand, and considerable new business is reported.

**Old Rails.**—No new business is reported. Tees are offered at \$24, with \$23 bid. Strong holders insist on \$25 for Tees and \$26 for Doubles.

Louisville, Oct. 2.

(Specially reported by Messrs. HALL BROTHERS & Co.)

The same general feeling prevails. The furnaces, as a rule, are well sold up for some time to come, and while they are disposed to accept some business, they are holding firm at full prices. There is a fair run of orders offered, the majority being for early deliveries, which few furnaces are able to make. Buyers though are able to get what they want for their requirements at reasonable rates. The East is absorbing the larger portion of the output from the South, that market being a shade higher than the West at the present time.

Philadelphia, Oct. 5.

[From our Special Correspondent.]

The Eastern Pennsylvania pig-iron market presents a quieter condition this week, the chief reason being the oversold condition, especially of all good brands of iron. With a little more crowding a further hardening of prices will result. Several furnace representatives have been in the city this week looking and talking over the situation, and in some few instances orders have been given to brokers and agents to accept only such business as is offered at full prices. Choice brands are very hard to get. Some few lots have been picked up. Western iron for mixing is worth \$2 per ton more than two months ago. The market is very strong, owing not only to the oversold condition of eastern furnaces but to the inability of western iron makers to accept orders for prompt delivery or to crowd iron into this market at any prices they could get for it. The eastern makers are slow to take advantage of what seems to be a good opportunity to put up prices. The Thomas Iron Company could render the iron trade a great service if it would. Several inquiries were made within a few days for pipe iron and for other purposes. But nothing in particular was done. There is not much change in quotations excepting that business if done would be done at top prices rather than at bottom ones. Muck bars were marked up fifty cents per ton to-day. Two or three options were withdrawn. The makers are very well sold up, and a general advance is likely within thirty days. Foreign material is under some little inquiry, but no sales are probable at present. The bar mill demand is quite active this week for small lots. Prices are firm, and there is a probability of an advance should the present strength be maintained a week or two longer. Stores realize 2c. without difficulty. Refined bar is selling from mills at 1·90c. Considerable iron for car purposes has been contracted for. Nails are weak,

and very little driving is done. The sheet mills are working very regularly, but in most cases an accumulation of stock is going on. It will be checked unless demand should set in soon. All kinds of merchant steel are in good request this week. Plate and tank iron is firm in price. Makers are expecting a large amount of business before the close of the year. They are reporting the present requirements rather light. Structural iron orders are coming along in a quiet, steady way, but mills are not at all over run with orders. Full prices are ruling on all the business done. Agents report favorable opportunities for large business during the winter. A good deal of steel rail capacity is off. Some business has been done at the lowest quotations ruling. Rumors of large transactions at an early day are repeated this week. It is said that considerable business has been done in the West. The old rail market is rather quiet. The small amount of business done is but a fraction of what could be done if buyers and sellers could agree on terms. The scrap dealers are short of No. 1 and selected scrap. Other kinds are plenty.

Pittsburg. Oct. 4.

[From our Special Correspondent.]

**Raw Iron.**—Leading dealers report a steady trade demand, with a good deal of iron changing hands, while many brokers report an active market. Others say they could sell more iron if the same was obtainable. Many of the city furnaces are well sold up, and are not doing any traveling in order to find purchasers. The same applies with equal force to furnaces from which a large amount of iron is sold in this market.

The Shenango and Mahoning Valley furnaces are busy filling orders that were entered last month, which will employ them for some time to come. Consumers are absorbing a large amount of raw material. Many of them will soon be in the market for more iron. All things taken into consideration, the market shows a healthy tone, and prospects for its continuance are considered pretty well assured. There is nothing of special importance to note, nor is it likely that there will be until after the election, although a change of administration is now regarded as almost certain. When the result is definitely assured a further quickening in the business pulse is confidently anticipated. Meanwhile there are no signs of retrogression from the very decided improvement we have kept our readers advised of for some weeks past. A sale of 1000 tons of neutral Muck Bar was made during the week on the following conditions: If Harrison and Morton are elected the price was \$31.50 per ton; if Cleveland and Thurman, \$29.50, being a difference of \$2. This is only a straw, but a valuable one. The prices of desirable brands of forge descriptions are well maintained. Holders show no signs of weakening. Old rails are not so active. Muck bar, steady. Skelp iron firm, with a good inquiry. Bessemer steady at previous quotations. Steel slabs and billets find purchasers at previous prices. Scrap material sells freely.

The following sales tell the story.

Coal and Coke Smelted Lake Ore.	
4000 Tons Bessemer	18.00 cash.
1000 Tons Bessemer	18.15 cash.
1200 Tons Gray Forge	16.50 cash.
1200 Tons Gray Forge	16.50 cash.
600 Tons Bessemer	18.00 cash.
500 Tons Bessemer	18.00 cash.
500 Tons Gray Forge	16.50 cash.
300 Tons Gray Forge	16.50 cash.
Coke Native Ore.	
500 Tons Gray Forge	16.50 4 mo.
300 Tons Gray Forge	15.85 cash.
100 Tons Gray Forge	16.00 4 mo.
75 Tons No. 2 Foundry	17.00 cash.
50 Tons Mottlet	16.00 cash.
175 Tons Gray Forge	16.25 cash.
100 Tons No. 1 Foundry	17.50 cash.
Ferro-Manganese.	
200 Tons 80 per cent	56.00 cash.
100 Tons 80 per cent	56.50 cash.
Steel Slabs and Billets.	
500 Tons Nail Slabs	29.00 cash.
500 Tons Billets	29.50 cash.
500 Tons Blooms	29.50 cash.
500 Tons Sheet Billets	29.75 cash.
Muck Bar.	
1000 Tons Neutral, October	29.50 cash.
500 Tons Neutral, Spot	29.00 cash.
500 Tons Neutral	29.00 cash.
500 Tons Neutral	29.25 cash.
Steel Wire Rods.	
300 Tons American Fines	43.00 cash.
Skelp Iron.	
500 Tons Narrow Grooved, per 100 pounds	1.85 cash.
500 Tons Wide Grooved, per 100 pounds	1.97 1/2 cash.
200 Tons Sheared, per 100 pounds	2.15 cash.
Steel Rail and Blown Ends.	
500 Tons Rail Ends	19.75 cash.
200 Tons Bloom Ends	19.75 cash.
200 Tons Billet Ends	19.75 cash.
Old Iron Rails.	
500 Tons American Ts	25.00 cash.
100 Tons American Ts	24.50 cash.
100 Tons Old Steel Rails	20.00 cash.
Scrap Material.	
200 Tons No. 1 Wrought Scrap	20.00 cash.
200 Tons Wrought Borings	14.50 cash.
200 Tons Cast Turnings	12.50 cash.
200 Tons Cast Scrap	16.50 cash.
200 Tons Scrap Steel	17.00 cash.

FINANCIAL.

New York, Friday Evening, Oct. 5.

The mining market this week opened quiet and dull, but toward the close evinced signs of strength. Today, prices were active and volume of trading was larger.

There has been little encouragement from San Francisco. Assessments seem to be plentiful, but whether they presage a depreciation in prices, heavy buying

IMPORTS AND EXPORTS OF METALS AT NEW YORK SEPTEMBER 26 TO OCTOBER 2, AND FROM JAN. 1.

IMPORTS.		EXPORTS.	
Year.	Week.	Year.	Week.
Tons.	Tons.	Tons.	Tons.
<b>Spelter.</b>		<b>Old Balls.</b>	
American Metal Co. L.A.	303	Baldwin Bros.	100
Friedensville Zinc Co.	23	Bowening & Archibald.	100
Hendricks & Bros.	56	Brown Bros. & Co.	668
H. Lamarche & Sons.	6	Crossman & Bro., W. H.	1,005
Lewisohn Bros.	33	D., L. & W. R. E.	409
J. Macy's Sons	28	Frankfort, M.	100
Naylor & Co.	131	Geisenheimer & Co.	100
Osgood, F.	131	Henderson Bros.	537
Perkins, C. L.	83	Neumark & Gross	1,912
Pope's Sons & Co.	28	Stetson & Co., Geo. W.	230
		Waltam & Co.	300
		Winter & Smillie	80
Total	1,416	Total	5,541
Corres. date 1887	2,746	Corres. date 1887	814
<b>Zinc Sheets.</b>		<b>Sheet Iron.</b>	
G. A. & E. Meyer	594	Bruce & Cook	53
H. Lamarche's Sons	594	Coddington & Co.	70
Milne & Co.	81	Crooks, R. & Co.	10
Naylor & Co.	81	Newton & S.	4
Total	677	Thomson & Co., A. A.	2
		Wagner, W. F.	40
<b>Pig Lead.</b>		Whitney & Co.	
Caswell, E. A.	46	Total	70
N. Corwith & Co.	111	Corres. date 1887	35
Hendricks Bros.	122	<b>Scrap-Iron.</b>	
Total	279	Poothery, J. H.	80
Corres. date 1887	3,283	Bowring & Archibald.	200
<b>Tin.</b>		Brown Bros. & Co.	
Abbott & Co., Jere.	3,448	Burgess & Co.	172
American Metal Co.	389	Crossman, W. H. & Co.	47
Birdwell & French	89	Geisenheimer & Co.	565
Crooke S. & R. Co.	28	Gerhardt, F. T.	8
Davol & Sons	8	Johnson, L. & Co.	85
Dickerson, Van Dusen	10	Muller, Schall & Co.	15
Funch, Edye & Co.	10	Neumark & Gross	321
Hendricks Bros.	22	Purdon & W.	75
Knauth, W. & K.	21	Salter & L.	390
Lehnaier Sons & Co.	18	Trowbridge & Co., D.	75
Lewisohn Bros.	15	Ward & Co., J. E.	150
Muller, Schall & Co.	56	Total	80
Nathan, Trotter & Co.	8	Corres. date 1887	75
Naumann, F.	8	<b>Charcoal Iron.</b>	
Naylor & Co.	28	Abbott & Co., Jere.	3
Phelps, Dodge & Co.	849	Bacon & Co.	102
Pope, Jas. E., Jr.	50	Downing & Co.	25
Pope's Sons & Co.	124	Littenberg, N.	15
Schwager Bros.	28	Lundberg, G.	16
Thomson & Co., A. A.	28	Mersick & Co.	7
Thomson & Co., D.	11	Milne & Co.	18
Total	163	Muller, Schall & Co.	124
Corres. date 1887	45	Naylor & Co.	587
<b>Tin Plates.</b>		Page, Newell & Co.	
American Metal Co.	509	Sanderson & Son	307
Bridge & Beach Mfg. Co.	339	Total	1,268
Bruce & Cook	80,171	<b>Spiegel Eisen.</b>	
Byrne, James	20,746	Abbott & Co., Jere.	205
Central Stamping Co.	1,667	Arkell, Jas.	78
Coddington & Co., T. B.	3,233	Crocker Bros.	492
Corbierre, Fellows & S.	2,249	Dana & Co.	500
Cort & Co., N. L.	3,043	Geisenheimer & Co.	278
Cons. Fruit Jar Co.	849	Jansen, J. A.	10,493
Crocker Bros.	548	Naylor & Co.	553
Crooks & Co., Robert.	2,113	Perkins, C. L.	2,443
De Mill & Co., H. R.	450	Pierson & Co.	1,050
Dickerson, Van Dusen	5,148	Post, Martin & Co.	320
Dolly, T. G. F.	112	Total	1,545
Fairbanks, N. H.	264	Corres. date 1887	790
Hamilton & M.	362	<b>Iron Ore.</b>	
Henly & Earle	38	Cornack & Co.	1,022
Iron Clad Mfg. Co.	119	Danaugh & G.	25
Lalaine & Grosjean	3,096	De Flores, R.	7,478
Lombard, Ayres & Co.	500	Earnshaw, A.	6,013
Merchant & Co.	122	Earns & Co.	1,721
Mersick & Co., C. S.	50	Johnston & Co.	300
Morewood & Co., G.	2,756	Naylor & Co.	3,700
Naylor & Co.	8,978	Outerbridge & Co., A. E.	340
Newall Bros.	208	Wright, Chas. L. & Co.	1,640
Phelps, Dodge & Co.	9,124	Total	22,235
Potts, W. A., Son & Co.	573	Corres. date 1887	363
Pratt Mfg. Co.	1,530	<b>Steel &amp; Iron Rods.</b>	
Saunders Bros.	330	Abbott & Co., Jere.	6,522
Shepard & Co., Sidney	924	American Screw Co.	10
Somers Bros.	328	Bacon & Co.	223
Stroud & Co.	686	Baldwin Bros. & Co.	53
Taylor, N. & G.	540	Bowker, C. F.	689
Thomson & Co., A. A.	115,817	Carey & Moen.	814
Warren & Co.	1,665	Cobb, M.	69
Wheeler & Co.	275	Dana & Co.	4,672
Whittemore & Co., H.	43,327	Downing & Co., B. F.	247
Wolf & Reasing	22,850	Galpin, S. A.	250
Wright & Sons, Peter	105	Heyn, A.	1,735
A. M. Underhill.	21	Hugill, Chas.	41
Total	52,556	Jacobus, E. Y.	12
Corres. date 1887	1,664,117	Lazard Freres	695
<b>Pig-Iron.</b>		Lundberg, Gustaf.	700
Abbott & Co., Jere.	600	Mersick & Co.	29
Austin, B. & Co.	100	Milne & Co., A.	150
Baldwin Bros. & Co.	103	Naylor & Co.	19
Bartlett & Co., N. S.	100	Ogden & Wallace	4
Crocker Bros.	989	Page, Newell & Co.	122
Crooks & Co., R.	750	Philip, C. M.	20
Dana & Co.	600	Stroud & Co.	8
Downing & Co.	51	Wallace & Co., W. H.	19
Drum'nd, McCall & Co.	200	Wilson, J. G.	11
Erie Dispatch	250	Totals	4,114
Foley, E.	20	Corres. date 1887	137
Henderson Bros.	1,865	<b>Steel and Iron Rods.</b>	
Holt, H. N.	50	Abbott & Co., Jere.	6,522
Irvin & Co., Richard.	50	American Screw Co.	10
Knauth, N. & K.	15	Bacon & Co.	223
Lee & Co., James.	50	Baldwin Bros. & Co.	53
Milne & Co., A.	375	Bowker, C. F.	689
Naylor & Co., A.	2,467	Carey & Moen.	814
Naylor	5,717	Cobb, M.	69
Perkins, C. L.	5	Dana & Co.	4,672
Pierson & Co.	13	Downing & Co., B. F.	247
Page, Newell & Co.	15	Galpin, S. A.	250
Pope, Jas. E., Jr.	150	Heyn, A.	1,735
Pratt Mfg. Co.	10	Hugill, Chas.	41
Sanderson & Sons	2	Jacobus, E. Y.	12
Stetson & Co., G. W.	315	Lazard Freres	695
Tonsila, M. R.	120	Lundberg, Gustaf.	700
Walbaum, W. H.	200	Mersick & Co.	29
Williamann & Co., Jas.	300	Milne & Co., A.	150
Wright & Son, P.	20	Naylor & Co.	19
Total	1,954	Ogden & Wallace	4
Corres. date 1887	43,769	Page, Newell & Co.	122
<b>Steel Sheets, Billets, Forgings, etc.</b>		Philip, C. M.	20
Abbott & Co., Jere.	14	Stroud & Co.	8
Arkell, Jas.	17	Wallace & Co., W. H.	19
		Wilson, J. G.	11
		Totals	4,114
		Corres. date 1887	137

CURRENT PRICES.

Table of current prices for various commodities including chemicals, pig iron, and building materials.

Table of current prices for metals and building materials, including iron, steel, and various alloys.

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

Table of Philadelphia prices for various goods and services.

Table of Baltimore, Md. stock market quotations.

Table of Birmingham, Ala. stock market quotations.

Table of Pittsburgh, Pa. stock market quotations.

Table of foreign quotations for various commodities.

Table of Pittsburgh prices for coke, pig iron, and steel.

Table of foreign quotations for various goods and services.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Main table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES, ASSESSMENTS, DIVIDENDS, and NON-DIVIDEND-PAYING MINES. Includes entries for Adams, Alouez, Alpha, Amador, American Flag, etc.

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 \$31,820,000 in dividends, and the Con. Virginia, \$24,800,000. \*\* Previous to the consolidation of the Copper Queen with the Atlanta, Aug., 1885, the Copper Queen had paid \$1,350,000 in dividends. †† 1,000,000.

NEW YORK MINING STOCKS QUOTATIONS.

Table with columns for 'DIVIDEND-PAYING MINES' and 'NON-DIVIDEND-PAYING MINES'. Each section lists company names and their stock prices for various dates from Sept. 29 to Oct. 6, along with sales figures.

\*Ex. dividend. †Dealt in at the New York Stock Ex. Unlisted Securities ‡Assessment unpaid. Dividend shares sold, 24,390. Non-dividend shares sold, 68,820. Total New York, 93,180.

BOSTON MINING STOCK QUOTATIONS.

Table listing Boston mining stock quotations with columns for company names and prices for dates from Sept. 28 to Oct. 4, including sales data.

\*Ex dividend. †Assessment paid. Boston: Dividend shares sold, 12,027. Non-dividend shares sold, 26,630. Total Boston, 38,657.

COAL STOCKS.

Table of coal stock quotations with columns for company names, par value, and prices for dates from Sept. 29 to Oct. 5, including sales figures.

\*\*Bld. †Asked. \*\*Of the sales of this stock, 63,504 were in Philadelphia, and 277,870 in New York. Total sales, 497,083.

San Francisco Mining Stock Quotations.

Table of San Francisco mining stock quotations with columns for company names and closing quotations for dates from Sept. 28 to Oct. 4.

by insiders, dividends, and then a glorious "boom" is, of course, merely a matter of conjecture.

The Comstocks showed considerable animation this week. Consolidated California & Virginia sold at \$9 @ \$9.75, closing at the latter figure. Belle Isle shows one sale of 400 shares at 45 cents. Ophir, 100 shares at \$5.13. Union Consolidated, 100 shares at \$3.05. Savage, 150 shares at \$2.85. Sierra Nevada, 200 shares at \$3. Crown Point, 100 shares at \$4.70. Sutro Tunnel was very active at 10@12c., with aggregate sales of 13,600 shares.

A decree for foreclosure against the Sutro Tunnel Company has just been entered in the United States Circuit Court of Nevada. The Reorganization Committee gives notice that stockholders will be allowed a final opportunity to protect their unassented stock by subscribing to their new bonds, and depositing their stock at Union Trust Company, New York, to wit: 55 cents per share assenting from October 5th to November 5th, and thereafter 60c. per share assenting until January 2d. Subscribers will receive trust company certificates, entitling them to the same number of shares as those deposited, and \$1 in bonds for each 55 cents and 60 cents respectively paid by them. Interest at the rate of 4 per cent will be allowed on subscriptions from date of payment. Any shareholder who does not subscribe for these bonds within this period of ninety days, from October 1st, must necessarily lose his interest in the property of the company.

The Amador County properties were active as usual. Amador was dealt in at 2.20@2.25, with sales of 2200 shares. Astoria, 21 @ 23 cents, with sales of 6700 shares. Hollywood, 500 shares at 39@40 cents. Middle Bar, 4500 shares at one price all through the week, 39 cents. Sutter Creek, 2700 shares at \$1.15 @ 1.20.

Plymouth Consolidated also was dealt in largely. The price of the stock ranged from \$7.50 @ \$8.25. Quicksilver Preferred is evidently being boomed. Sales amounted to 1115 shares at \$38.85 @ \$40.50, closing at \$39.00. Quicksilver is on the list at \$10.25. Bodie Consolidated, 800 shares, opening at \$1.50 and closing at \$1.15 @ \$1.20, owing probably to the recent assessment. Brunswick was rather dull at 15@18 cents, with only 1600 shares sold. Mono was sold to the extent of 400 shares at 78 cents. Standard Cons. was not dealt in.

Among the Colorado mines Leadville Consolidated was unsteady at 10@12c., with sales of 2400 shares. In our mining news on another page we give the secretary's statement of the company's condition. Iron Silver was sold \$3.50. Robinson Cons. at 88@90c. Adams, 100 shares, at \$2.10. Dunkin, 300 shares at 90c. Alice, 1400 shares, at 55@60c., closing rather strong at the latter figure. Plutus was active at 95c. @ \$1.05, with sales of 2300 shares. Cashier also displayed life at 11@10c., the aggregate sales being 5100 shares.

The Deadwood shares participated in the general improvement. Deadwood appears on the list at \$1.50 @ \$1.70, closing at the latter figure. Caledonia, 225 shares at \$3 @ \$2.75. Iron Hill, after a prolonged absence, appears at 15c., with 500 shares sold. Homestake was quite active at \$10.63 @ \$11.50. Ontario was neglected. Horn-Silver closed very strong at \$1.05 @ \$1.20, after opening on Monday at 90@93c.

There is good news for the Horn-Silver stockholders. On Wednesday, Messrs. Whitlock & Simonds of this city received the following laconic, yet satisfactory, dispatch from Mr. A. C. Washington, who went to Utah to represent the stockholders who favored the retirement of the Francklyn-Brown management: "I have been victorious." This was supplemented by the following despatch dated Salt Lake City, October 4th: "The annual meeting of the Horn-Silver Mining Company was held yesterday at Frisco, and resulted in the defeat of the Francklyn-Brown management and the triumph of the Washington-Whitlock party. Enough of the Utah men were elected directors to control the local management. In regard to the \$648,000 debts to the company of the old management, \$75,000 is allowed the Francklyn party on railroad construction account, with interest; \$25,000 is paid the company in cash, \$30,000 paid down on an Idaho mine sale and \$45,000 more to come; and the company accepted a Nevada mine for the balance due."

Calumet & Hecla shows a sale to-day of 10 shares at \$298. This high priced stock must be a strange sensation to the mining brokers, who are accustomed to deal in stocks valued at "cents," and not "dollars." The stock of the United Copper Mining Company of Maine was dealt in to-day for the first time on the New York exchanges. This company owns three copper mines—the Douglass, the Bluehill, and Stewart, located at Bluehill, Me., near Bar Harbor. Sales were made at \$1 @ \$1.10. Colchis Mining Company, of New Mexico, was called for the first time yesterday. The opening prices were \$2.25 @ \$2. Silver Mining, of Lake Valley, closed at 24 cents with total sales of 3200 shares.

Silver King was one of the most active stocks on the list. Transactions amounted to 3055 shares at prices ranging from \$1.95 @ \$3.25. Barcelona fluctuated at 89@95c., with transactions amounting to 4700 shares. San Sebastian was sold at \$1. Santiago at \$3.85. Rappahannock, 1500 shares at 11c. El Cristo closed at 59c. bid, 60 asked. It opened at 90c. The reason for this decline has not yet been officially announced. Eleven hundred shares were sold.

The Deer Creek Gold Mining Company, to the "listing" of which we referred in our last issue, announces a dividend of five cents per share, or \$10,000. Mr. J. C. Hall is one of the most prominent projectors of the enterprise. Mr. Hall, we believe, has been connected

with several mines listed on our exchange. We shall be pleased to give the Deer Creek Gold Mining Company our careful attention in an early issue. The stock was quite active at \$1.10 @ \$1.20, with total sales of 1100 shares.

The following announcement appeared this week. It refers to the meeting which was fully reported in our issue of September 23d: At a meeting of the stockholders of the Hector Gold Mining Company, held September 20th, it was unanimously agreed to prosecute the action in San Francisco, Cal., against Messrs. Valentine and others who are apparently attempting to "freeze" out the stockholders in the East. In order to carry on the litigation, a voluntary contribution is asked of two cents per share, for which the undersigned will give his receipt. As only those contributing will be allowed to participate in case of success, your prompt attention is requested. Hermann Cohen, 61 Broadway, N. Y.

This week's transactions amounted to 98,150 shares, of which about 25,000 were dividend-paying stocks and 68,000 non-dividend. At the Real Estate Exchange, on the 3d inst., twenty shares of the Pennsylvania Coal Company were sold at auction for \$297 1/2.

**Meetings.**

Humboldt Copper Company, No. 19 Exchange Place, Boston, Mass., October 15th, at eleven o'clock, A. M.

**Dividends.**

Deer Creek Gold Mining Company, of Idaho, has declared a dividend, No. 1, of 5 cents per share, or \$10,000, payable October 15th at No. 62 Broadway, city.

Hubert Mining Company, of Colorado, has declared a dividend, No. 40, of eleven cents per share, or \$5500.

Parrott Silver and Copper Company, of Montana, has paid dividend of twenty cents per share, or \$36,000, payable October 1st.

**Assessments.**

COMPANY.	No.	When levied.	D't'nt' in office.	Day of sale.	Am't per share.
Amer. Eagle, Cal. . . . .	1	Sept. 20	Oct. 25	Nov. 15	.10
Atlas, Dak. . . . .	1	July 11	Aug. 15	Oct. 10	.001 1/4
Baker Divide, Cal. . . . .	16	Aug. 13	Sept. 17	Oct. 8	.25
Belcher, Nev. . . . .	36	Sept. 18	Oct. 23	Nov. 12	.50
Bodie, Cal. . . . .	9	Sept. 24	Oct. 29	Nov. 30	.50
Cedar Rapids, Dak. . . . .	5	Aug. 25	Sept. 30	Oct. 17	.05
Desire, Dak. . . . .	3	Sept. 7	Oct. 9	Oct. 26	.002 1/2
Dickert & Myers, Utah . . . . .	1	Sept. 4	Oct. 9	Oct. 30	.50
El Dorado, Dak. . . . .	4	Aug. 17	Sept. 19	Oct. 9	.001
Empire, Cal. . . . .	1	Sept. 19	Oct. 22	Nov. 8	.25
Eschequer, Nev. . . . .	26	Sept. 6	Oct. 10	Oct. 31	.20
Golden Pledge, Cal. . . . .	13	July 31	Sept. 8	Oct. 1	4.00
Justice, Nev. . . . .	47	Sept. 25	Oct. 31	Nov. 19	.25
Lady Wash., Nev. . . . .	7	Aug. 21	Sept. 26	Oct. 16	.25
Loam, Cal. . . . .	1	July 30	Sept. 15	Oct. 1	.01
Locomotive, Nev. . . . .	3	Aug. 21	Sept. 26	Oct. 16	.25
Live Oak Drift. . . . .	1	Aug. 20	Sept. 27	Oct. 19	.05
Montreal, Utah. . . . .	1	Aug. 17	Oct. 1	Oct. 20	.01
Mono, Cal. . . . .	26	Sept. 20	Oct. 23	Nov. 28	.50
Ophir, Nev. . . . .	54	Sept. 1	Oct. 4	Oct. 24	.50
Pondera, Cal. . . . .	1	Aug. 10	Sept. 18	Oct. 10	.05
Potosi. . . . .	31	Oct. 1	.....	.....	.50
Virginia Creek, Cal. . . . .	6	Aug. 29	Oct. 9	Oct. 29	.06
West Salem, Dak. . . . .	1	Sept. 5	Oct. 8	Oct. 26	.001 1/4

**Pipe Line Certificates.**

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

The oil market has fluctuated this week between 93 1/2c. and 96 1/2c., closing about the bottom price to-day. The speculation in it is so limited that it is hard to predict its immediate course, but we believe that the decreasing stock of oil will insure higher prices some time this fall. Money is getting dearer and this will temporarily injure bull interests.

**CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.**

	Opening.	Highest.	Lowest.	Closing.	Sales.
Sept. 29 . . . . .	94 1/4c.	95 1/4c.	94c.	95 1/4c.	556,000
Oct. 1 . . . . .	95	96 1/2	95	95 1/2	1,025,000
2 . . . . .	95 1/2	95 1/2	94 1/4	94 1/2	932,000
3 . . . . .	94 1/2	96	94 1/4	95 1/2	1,075,000
4 . . . . .	95 1/2	95 1/2	95	95 1/2	1,382,000
5 . . . . .	95 1/2	95 1/2	93 1/2	93 1/2	1,247,000
Total sales in barrels . . . . .					8,217,000

**NEW YORK STOCK EXCHANGE.**

	Opening.	Highest.	Lowest.	Closing.	Sales.
Sept. 29 . . . . .	94 1/4c.	95 1/4c.	94c.	95 1/4c.	695,000
Oct. 1 . . . . .	95 1/2	95 1/2	95	95 1/2	634,000
2 . . . . .	95 1/2	95 1/2	94 1/4	94 1/2	627,000
3 . . . . .	94 1/2	95 1/2	94 1/4	95 1/2	571,000
4 . . . . .	95 1/2	95 1/2	95	95 1/2	493,000
5 . . . . .	95 1/2	95 1/2	93 1/2	93 1/2	831,000
Total sales in barrels . . . . .					3,851,000

**Boston Mining Stocks.** Oct. 4.

[From our Special Correspondent.]

We have had a more active market for copper stocks the past week, the principal features of which have been the advance in Calumet & Hecla and Kearsarge Mining Company. The former, on the continued good outlook at the mine, has been in good demand, and so eager were buyers to get stock that it advanced from \$288 to \$299 in one day, subsequently declining to \$293; recovering again to \$298.50, and selling to-day at \$297; thus scoring a net advance of \$9 per share for the week. The rise in Kearsarge from \$9 to \$12 was due to the excellent reports regarding the mine and its prospects for the future as a dividend payer. The stock opened at \$9.12 1/2 and advanced rapidly, on large sales, without a break, until \$12 was reached, which seemed to be the top price, and a

natural reaction followed, leaving last sale at \$11. Sales about 8500 shares.

Boston & Montana also felt the good effects of the rise in the above stocks and shows an advance of 1 1/2 for the week, selling at \$50 1/2 @ \$51 1/2 and closed quite strong at \$51 1/2.

Allouez has been also quite active, with sales of over 3000 shares at \$3 1/2 @ \$3 3/4, closing at \$3 3/4, and looks as if it would go much higher.

There was also a little spurt in Huron, which carried it up from \$4 1/2 to \$5 1/4 one day; since, however, it has lapsed into dullness again.

Pewabic advanced in moderate sales to \$4 1/2, a rise of 1/2 for the week.

The balance of the list was a little heavy. Franklin being the weakest spot, and showing a decline from \$18 to \$16 1/2 and with very little disposition to buy it. Osceola also dropped from 20 1/2 to 19 1/2. Quincy from \$85 to \$83. Tamarack sold down to \$177, but rallied later to \$178.

Atlantic was fairly steady at \$18 @ \$18 1/2, and National held its own at \$5. Ridge sold at \$1 1/2 @ \$1 1/4, and Bonanza dull at \$1 1/2, only 200 shares changing hands for the week.

Silver stocks have ruled as dull as ever, the only ones showing life being Dunkin, with sales at 95 @ 97 1/2c., dividend on, and Brecca at 38c.

3 P. M.—There was not much change this afternoon. Closing prices: C. & H., 298 @ 297 asked; Kearsarge, 11 1/2 @ 11 1/4 asked; B. & Mont., 51 @ 52 asked; Franklin, 16 1/2 @ 17 1/4 asked; Osceola, 19 @ 19 1/2; Quincy, 82 1/2 @ 83; Tamarack, 175 @ 177; Allouez, 3 1/4 bid.

**LATER PRICES.**

(By Telegraph.)—October 5th.—Boston and Mont., \$51 bid; Allouez, \$3 3/4; National, \$5 1/2; Pewabic, \$4 1/2; Osceola, \$20; Kearsarge advanced to \$12 1/2.

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**TO STOCKHOLDERS**

**OF THE**

**SUTRO TUNNEL COMPANY.**

A decree for foreclosure against the SUTRO TUNNEL COMPANY has just been entered in the United States Circuit Court, Ninth Circuit, District of Nevada, and the property of that company will be sold thereunder at an early date. The Reorganization Committee hereby gives notice that stockholders of that company will be allowed a FINAL opportunity to protect their hitherto unassented stock, by subscribing to the new bonds and depositing their stock as heretofore advertised. Subscriptions to said bonds will be received at the Union Trust Company, No. 73 Broadway, New York, at the following terms, to wit:

**55 CENTS PER SHARE, ASSENTING FROM THE DATE HEREOF TO NOVEMBER 3d, 1888, AT 12 M., and thereafter 60 CENTS PER SHARE, ASSENTING UNTIL JANUARY 2d, 1889, AT 3 P. M.**

Subscribers to the bonds will receive Trust Company certificates, entitling them to the same number of shares as those deposited by them, and \$1 in bonds for each 55 cents and 60 cents respectively paid by them. Interest at the rate of 4 per cent. will be allowed on subscriptions from date of payment.

Payment should be made by check on New York to the Union Trust Company, and should be accompanied by the stock duly indorsed in blank, and an authorization to the Union Trust Company. Blank forms for this authorization and copies of circulars can be obtained upon application at the Union Trust Company's office, or at Room 19, seventh floor, Mills Building, New York.

Dated New York, October 3d, 1888.

**H. B. BALZTER, Chairman,  
GORDON MACDONALD,  
P. C. A. M. VAN WEEL,  
OTTO LOWENGARD,  
THEODORE SELIGMAN,  
REORGANIZATION COMMITTEE.**

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