

# THE ENGINEERING AND MINING JOURNAL



Entered at the Post-Office of New York, N. Y., as Second-Class Mail Matter.

VOL. LI. MAY 30. No. 22.

RICHARD P. ROTHWELL, C.E., M.E., Editor.

ROSSITER W. RAYMOND Ph.D., M.E. Special Contributor.

Cable Address: "Rothwell, New York." Use A. B. C. Code, Fourth Edition, Mexico; Mr. R. E. Chism, M. E., Callejon Espiritu Santo No. 4, City of Mexico. Australasia Messrs. Moffat, Judd & Co., 11 Bridge street, Sydney, N. S. W.; Mr. W. Forster, 56 Elizabeth street, Melbourne, Victoria; Messrs. J. T. Partridge & Co., 134 Manchester street, Christchurch, New Zealand.

SUBSCRIPTION PRICE, including postage: Weekly Edition (which includes the Export Edition), for the United States, Mexico and Canada, \$4 per annum; \$2.25 for six months; all other countries in the Postal Union, \$5.

Monthly Export Edition, all countries, \$2.50 gold value per annum. REMITTANCES should always be made by Bank Drafts, Post-Office Orders or Express Money Orders on New York, payable to THE SCIENTIFIC PUBLISHING CO. All payments must be made in advance.

THE SCIENTIFIC PUBLISHING CO., Publishers, SOPHIA BRAEUNLICH, Sec'y & Treas. R. P. ROTHWELL, Pres. and Gen'l Manager. P.O. Box 1833. 27 Park Place, New York.

### CONTENTS.

Howe's Metallurgy of Steel.....	625	Chemical Investigations of the Blast Furnace Process.—II.....	631
Mint Statistics.....	625	*Prominent Men in the Mining Industry.....	633
The Report of the Rapid Transit Commissioners.....	625	A New Use for Tubes Made by the Mannesmann Process.....	633
The Importation of Mexican Lead and the Balance of Trade.....	625	Production of Iron and Zinc Ores in New Jersey.....	634
The Coke Strike and the Iron Situation.....	626	Zinc-Ore Mining in Sweden.....	634
New Publications.....	626	*Rapid Transit for New York.....	634
Books Received.....	626	The Topographical Society of Connecticut.....	635
Interesting Occurrences of Gold.....	627	Value of Minerals and Gems Produced in India in 1889.....	635
Notes on Alaska Mines.....	627	Improved Apparatus for the Evaporation of Brine.....	635
The Che-Wa-Lah Mining District, Washington.....	627	The Corinth Ship Canal.....	635
Erratum.....	627	Patents Granted.....	635
Ecrasite, a New Explosive.....	627	Personals.....	636
Suggestions as to the Origin and Deposition of Florida Phosphates.....	629	Obituary.....	636
*Notes on Arizona Mines.....	629	Societies.....	636
Magnetite in the Ural Mountains.....	629	Industrial Notes.....	636
New Tunnel Under the Detroit River.....	629	Machinery and Supplies Wanted.....	636
*Official Reports.....	630		
The Action of Oils on Metals.....	632		

<b>MINING NEWS:</b>	<b>FOREIGN:</b>	<b>MINING STOCK</b>	<b>METALS.....</b> 643
Alabama..... 637	Canada..... 640	<b>TABLES:</b>	
Arizona..... 637	Germany..... 640	Boston..... 647	<b>IRON:</b>
California..... 637		Coal Stocks..... 647	New York... 643
Colorado..... 637	<b>DIVIDENDS.....</b> 640	New York..... 647	Chicago..... 644
Idaho..... 637	<b>MEETINGS.....</b> 640	San Francisco... 647	Louisville... 644
Illinois..... 638	<b>ASSESSMENTS.....</b> 640	Baltimore..... 648	Philadelphia.. 644
Indiana..... 638		Birmingham... 648	Pittsburg..... 644
Iowa..... 638	<b>MINING STOCK</b>	London..... 648	
Kansas..... 638	<b>MARKETS:</b>	Paris..... 648	<b>CHEMICALS AND MINERALS.....</b> 645
Michigan..... 638	New York..... 640	Pittsburg..... 648	<b>BUILDING MATERIAL MARKET.....</b> 645
Minnesota..... 638	Boston..... 641	St. Louis..... 648	
Missouri..... 638	San Francisco... 641	Trust Stocks... 648	<b>CURRENT PRICES</b>
Montana..... 638	St. Louis..... 641		Chemicals..... 648
Nevada..... 639	Denver..... 641	<b>COAL:</b>	Minerals..... 648
New Mexico..... 639	Lake Superior... 641	New York..... 642	Rarer Metals... 648
Oregon..... 639	Deadwood..... 641	Boston..... 642	Building Mat'ls 648
Pennsylvania... 639	Helena..... 641	Chicago..... 643	<b>ADV. INDEX.....</b> xxiii
South Dakota... 639	Salt Lake..... 641	Pittsburg..... 643	
Texas..... 639	Pipe Line..... 641		
Utah..... 639			

The Société d'Encouragement pour l'Industrie Nationale, of Paris, has awarded Mr. Henry M. Howe a prize of 2,500 francs for his "Metallurgy of Steel." This is a high testimonial to the value of Mr. Howe's great work, and shows the appreciation with which it is regarded abroad.

It is pleasing to note the high compliment which Dr. ADOLPH SOETBEER, the eminent German statistician on monetary subjects, has paid recent directors of the United States Mint in an article on the production and employment of the precious metals during the period 1881-1890, recently published in Conrad's *Jahrbuch für Nationalökonomie*. Speaking of the service rendered by this bureau in the publication of its annual mint reports and its reports on the production of gold and silver in the United States, he says: "The several directors of the mint, but especially the present director, Mr. E. O. LEECH, have devoted themselves with lively and unflinching interest, and with the circumspection of experts, to this task."

This is high praise coming from such a source, and by those who are familiar with the immense amount of labor involved in the collection of these statistics, and the numerous obstacles which have to be contended against, this tribute will be appreciated. No other nation of the world undertakes this task in the same comprehensive manner as the United States and its reports are consequently the more valuable, while the commendable promptness with which they are issued increases their importance.

### THE REPORT OF THE RAPID TRANSIT COMMISSIONERS.

The report of the Board of Rapid Transit Commissioners upon a route for the western member of a rapid transit system for the city of New York will be received with satisfaction by all urban and suburban residents, who have had to put up so long with the present totally inadequate means of transportation, not only as making another step toward a much-needed end, but also for the excellence of the recommendations which it embodies. The contour of Manhattan Island, long and narrow, requires two lines of railway running parallel with its longitudinal axis similar to the present elevated railway systems, and it has always been recognized that any rapid transit system should conform to this general plan.

In the selection of the western route the Rapid Transit Commissioners have certainly adopted the best possible line. Running through Broadway, from a point at or near the South Ferry to Fifty-ninth street, it turns thence into the Boulevard, running through that to One Hundred and Sixty-ninth street, and from there through Eleventh avenue, or just west of it, and over Spuyten Duyvil Creek, and so on to the city limits. This is the route best adapted to the needs of travel. Running under Broadway, the main artery of travel, in the lower portion of the city, it will best meet the requirements of transportation there, while its extension into the upper end of the city follows the line in which there promises to be the greatest growth.

The plans of the new rapid transit system are not yet completed, but it is to consist of a four-track road built mainly in tunnels under the streets but partly on viaducts where it is necessary to cross depressions in the upper portion of the city. In Broadway, between the South Ferry and Forty-second street, the tunnel is either to have four tracks on a level, or is to be double-decked, with two tracks upon each deck, but in any case it is to be so far below the surface as not to endanger the foundations of buildings, or to interfere with sewers, pipe lines and other subways. It will thus escape the objections which killed the Arcade railway scheme which was proposed several years ago. Above Forty-second street the line is to consist of four tracks upon a level as near the surface as possible, when in tunnel, but not in open cut at any point.

The Commissioners have been compelled by the enormous expense involved in securing right of way to abandon the idea of any system of viaducts or open cuts. Running this tunnel line under the streets, such will be avoided. The tunnel system is clearly the best under the circumstances. As finally designed it will undoubtedly be somewhat similar to the new South London underground railway, which is now in such successful operation. As in that case, it is provided that electricity shall be the motive power in the new system planned for New York. The Rapid Transit Commissioners are to be commended for the honest and thorough manner in which they have performed their work, and the people of New York to be congratulated that there is, at last, the promise of real rapid transit in the near future.

### THE IMPORTATION OF MEXICAN LEAD AND THE BALANCE OF TRADE.

Our esteemed contemporary, the Salt Lake *Tribune*, in referring to a recent editorial in the *ENGINEERING AND MINING JOURNAL* on "How the Lead Tariff has benefited Mexico," says that we should explain just how extensive has been the building of smelters in Mexico. A glance through our columns of mining news would have furnished the answer to this question, but for convenience we will summarize. Since the McKinley bill, with its clause affecting the importation of Mexican lead ore, went into effect, October 1st, 1890, new smelting works have been erected at both San Luis Potosi and Monterey, the latter place having become the center of the new industry and now being known as the "American metropolis of Mexico." On the 1st of May there were three large lead smelting establishments in operation or in course of construction at that city. The Nuevo Leon smelter had two furnaces in operation and two others which were expected to be blown in within a short time; the Monterey Smelting Company expected to begin operations in May; and the Great National Smelting Company was beginning the erection of a large plant to be completed about September 1st. The combined capacity of these works, all of which were constructed by American capital, when completed, will be 1,000 tons a day, or far more than enough to reduce all of the Sierra Mojada ore, which has been the main stand-by of American smelters in making up the deficiency in the supply of domestic silver-lead ore.

The Salt Lake *Tribune* considers our idea of the influence of credit balances in the trade between nations as a myth, and is of the opinion that we shall continue to export picks, shovels, wheat, cotton and woolen goods and other forms of merchandise to Mexico, even if we do import nothing in return. This is certainly a primitive idea of trade for an intelligent newspaper to hold at this late day; it means that all of our exports must be paid for in gold and silver. Now, the part that bullion plays in the commerce of the world is comparatively small. It serves simply as the small weight which is used to maintain the equilibrium of the wavering balance. We export wheat, cotton, sugar and

beef to Europe, and we import many commodities, paying for these with drafts on our exports, or, in other words, on our credit balance abroad. If we export more than we import, the balance of trade is restored by imports of gold. If we imported nothing, we should export but little, for nations, like neighbors, buy from those who take in return what they have to sell. Yet, the advocates of the lead tariff expect this well-established law of political economy to be reversed in our trade with Mexico. To show how closely the equilibrium of trade is preserved, it is only necessary to refer to the statistics of our imports and exports. In 1890 we imported from other countries goods to the value of \$823,397,726; we exported \$857,502,548; we imported \$42,602,983 in gold and silver and exported \$50,362,349. During the first quarter of the present year the balance of trade was against us, and we exported gold, the amount of which has been increased within the past two months by the financial situation in Europe, which has been such that the bankers there have been willing to pay a premium for it. Yet, it has needed only the export of this small amount of bullion, small in comparison with the value of our other exports, to excite alarm in financial circles here.

As to our charge that the tariff excluding Mexican lead increased smelting charges in Colorado, the center of the silver-lead smelting industry in the United States, the Salt Lake *Tribune* has only to refer to the columns of its Colorado contemporaries, especially those published in dry-ore producing districts, Clear Creek county and the San Juan region, for instance, in December, January and February last. A single issue, picked at random, of any of those journals published during that time, would answer that question. It is not, however, possible to argue with those who are ignorant of, or willfully ignore, facts so well known to every one in the industry.

#### THE COKE STRIKE AND THE IRON SITUATION.

The coke strike in the Connellsville region, which has been in effect for nearly four months and which, since the 1st of April, has disturbed the peace of that portion of Pennsylvania, is now at an end. Thus is concluded one of the most remarkable and most desperate struggles between capital and organized labor of recent years. The strike was inaugurated in the early part of last February on the refusal of the men to accept a reduction of 10 per cent. in their wages, which was called for by their employers in a new schedule submitted on February 9, the old agreement expiring upon that date. The men, on the other hand, presented a demand for an increase of 12½ per cent. Neither side would yield, and thus the memorable strike commenced, work being suspended at almost every oven in the district.

On March 26, the H. C. Frick Coke Company and the McClure Coke Company, the principal operators of the region, published notice of a sliding scale under which they proposed to reopen their works, some of the coke-workers having expressed their willingness to accept the terms which it offered and return to work if assured protection. This was promised; for the purpose of giving it, the companies had a number of deputy sheriffs placed on guard at their works, and the attempt to resume operations was made. Up to this time matters had been very quiet throughout the region, but the strikers who held out becoming excited at this turn in affairs, there commenced a series of outbreaks, which culminated on the night of April 1st in a riot at the Morewood works, at which seven men were killed and several more wounded by the deputy sheriffs in defense of the works. The State militia was then called out, and for several weeks the district was under military guard.

From this time on, the operators gained gradually starting up the idle ovens, so that the issue of the strike was no longer a matter of doubt, although the men held on with grim persistence. Attempts were made by the latter to induce those who had returned to work to leave, but these were of no avail, and finally, last week, the labor leaders realizing that they were making a hopeless fight, asked Thomas Lynch, the general manager of the H. C. Frick Coke Company, for a conference, which he refused. Disheartened at this and on the verge of starvation, the men decided to return to work, and the great strike was concluded.

The sliding scale which, with the victory of the companies, will govern the rate of wages in the Connellsville region, is based upon the selling price of coke, of which the minimum is to be \$1.75. It provides for a reduction of wages of about 5 per cent., and stipulates that the companies shall at all times have the right to say how and when their plants are to be operated, and the right to employ any men that they desire and no others.

The scale is to remain in force until February, 1894, and by its terms there can be no such thing as a strike within that time, the men agreeing not to suspend work for any cause without the consent of the management. At present the price of furnace coke has been established at \$1.90 per ton of 2,000 pounds f. o. b. Connellsville.

Whatever were the grievances of the men, they forfeited all sympathy by the lawless acts of which they were guilty during the last two months of the strike. The hardships which their wives and families, and those dependent upon them, have suffered, and will continue to suffer for a

long time yet, are to be regretted, but the men themselves richly deserve this punishment for the bloodshed and the loss of property which have resulted from their attempts to prevent their fellow workmen from exercising their rights as American citizens and returning to work when they desired. The results of the disorder and lawlessness following the Morewood riot will be a lesson to the people of this class that we have no place for anarchistic principles in this country. The chief matter for regret, however, is perhaps that the workmen are not more wise in the selection of their leaders, for the latter were doubtless the most to blame in this case, as they have been in others.

The effect which the settlement of the strike will have upon the iron market will probably be to lessen somewhat the cost of making iron, by bringing about a reduction in the price of coke. From its inception the strike has not been felt seriously in the iron market. It commenced early in February, when the consumption of pig iron had already experienced an enormous decrease, and while production was still disproportionately large, and immense stocks were hanging as an incubus over the market. The price of pig iron had fallen to such a point, that with the prices of coke, ore and labor, and with the high freights ruling, there was little or no profit in the operation of a large number of the furnaces that were in blast. As their supply of coke was exhausted, these furnaces blew out, making no attempt to secure fuel, which explains the remarkably even price of coke throughout the strike, although the production of the Connellsville region was practically nothing.

With the settlement of the strike the price of coke remains the same as it was before the commencement. The production of pig iron has been reduced so that it is now probably going on at very nearly the same rate as consumption; prices continue low, and it must be confessed that there does not seem to be any indication of an early or important improvement in the demand for iron.

Under these circumstances it does not appear that the ample supply of coke which is now assured will lead to any general blowing in of the iron furnaces as long as its price is maintained at \$1.90 per ton, which is the determination expressed by the manufacturers, since the same reasons which caused the blowing out of the furnaces in the Mahoning and Shenango valleys several months ago still hold good. The competition of Southern furnaces is as strong now as ever, and cheaper supplies—among others, cheaper coke—are a matter of necessity with less favored Northern furnaces.

#### NEW PUBLICATIONS.

**PRELIMINARY SURVEY AND ESTIMATES.** By Theodore Graham Gribble, Civil Engineer. 420 pages. Published by Longmans, Green & Co., London and New York. Price, \$2.25.

This little volume, as its author states in the introduction, is designed to instruct an inexperienced surveyor so that he will be able to carry out a survey in a new country rapidly, correctly, and according to the ideas and requirements of the people, and, at the same time, is intended to be of some assistance to the experienced professional man in roughly estimating the cost of proposed works and in guiding his decision in the case of alternative routes and situations.

While these rather ambitious expectations would seem to make the author liable to the charge of claiming too much, such does not appear to be the case, and his long experience as a practical man has enabled him to write a book which is eminently adapted to the needs of a professional man in the field. Besides an opening chapter, which is a discussion of the general considerations bearing on the subject, there are eight others devoted respectively to route surveying or reconnaissance, hydrography and hydraulics, geodetic astronomy, tacheometry, chain surveying, curve ranging with transit and chain, graphic calculation for preliminary estimates, and instruments. An appendix, consisting mainly of tabulated functions of different triangles and a glossary replete with information and in which definitions of all terms used in civil engineering work have been incorporated, completes the book. A good deal of attention has been given to the different methods of tacheometry or telemetry, as it was formerly called, and all the conditions having a bearing on the various methods are quite fully discussed. Not of less interest and value, however, is the chapter on graphic calculations for preliminary estimates. He has here combined a great deal of information, parts of which cannot be easily obtained elsewhere, while other portions are scattered through periodicals and the publications of scientific societies.

There are included in this chapter six diagrams, the use of which will prove a most material saving of time in, for instance, calculations pertaining to earthwork, iron bridge construction or quantities of masonry in stone arches. A number of diagrams in other portions of the book are added in support of the author's views on the rapidity of graphic methods as compared to numerical calculations. We feel no hesitation in recommending this volume as a valuable guide both in the field and office.

#### BOOKS RECEIVED.

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

**Geological Observations on the Volcanic Islands and Parts of South America Visited during the Voyage of H. M. S. "Beagle."** By Charles Darwin, author of "The Origin of Species," etc. Third edition, illustrated, 648 pages. Published by D. Appleton & Co., New York, 1891.

**The Geotectonic and Physiographic Geology of Western Arkansas.** By Arthur Winslow. Illustrated. Published by the Geological Society of America. Rochester, 1891.



## 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.

## Interesting Occurrences of Gold.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In his article on "Interesting Occurrences of Gold" in the ENGINEERING AND MINING JOURNAL of May 2d, 1891, Mr. Hausmann either neglected to mention a fact concerning the Cedros Island mines which is more interesting than any to which he refers, or it is possible he was not aware of it. A party, in which was Mr. Philip Deidesheimer, formerly of the Comstock, recently visited the mines. On his return from the island Mr. Deidesheimer brought with him several specimens of native sulphur, which were taken from a portion of one of the ore bodies which was heavily mineralized. The sulphur is very friable and burns readily on touching it to a flame. It assays \$100 in gold to the ton, which is the remarkable feature of the mineral.

Ore deposits similar in character to those of Cedros Island are not at all uncommon in this southwestern country. A number of such deposits occur in the Mojave desert and also in Yavapai county, Arizona.

The country rock in the vicinity of the mines at Cedros Island is a rather dark grayish rock, sometimes porphyritic. The rock is a basic lava, quite dense, and is often laminated. It resembles some of the andesite found in the Comstock. All stages of metamorphism, from the normal lava through silicious, porphyritic and kaolinized rocks, are found. Some of the sulphide ore is heavily charged with arsenical pyrites, the decomposition of which has produced the great oxidized ore bodies of the upper portions of the deposits.

An ore which resembles it in a remarkable degree physically, is found in the Halberg silver mine in the Lava Beds district in San Bernardino county, Cal. The notable difference is that the country rock at the latter place is a diorite, more or less porphyritic, and the value of the ore is chiefly in its silver content, whereas at Cedros Island it is chiefly gold.

At the Lava Beds small dikes of a dark, basic trappean rock cut through the diorite, though these were not observed in connection with the ore deposits. The silicious rock at Cedros Island is sometimes rich in gold, being frequently seen with the unaided eye, while at the Lava Beds the silicious rock is of low grade and is thrown over the dump.

Perhaps an even more interesting occurrence of gold is that at the Carbonate mine, in the Oro Grande district, San Bernardino County, Cal., in which a wonderful strike was made about three months ago at a depth of 180 feet. The main ore body is quartzose, carrying carbonate of lead, galena, and iron oxides, with gold and silver. This deposit occurs at a contact of lime and porphyry and is about three feet in thickness. The big strike was made in the shaft 180 feet below the surface. It entered as a thin wedge of quartz and calcite, showing free gold. The lens widened to 6 or 8 inches and seemed to become richer. Three sacks of this rock sold for \$7,000. A single shipment of a few tons netted \$25,000, and a few days since 45 pounds were crushed and amalgamated, netting \$6,000. An occurrence of gold like this is very interesting indeed.

SAN DIEGO, CAL., May 15, 1891.

W. H. STORMS.

## Notes on Alaska Mines.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Business in Alaska is beginning to improve a little now, as the moneyed men are commencing to return from the States, and are accompanied by others looking for investments. There is one sale of a legitimate mining property about consummated and another is being negotiated. Word has just been received from Lituya Bay, whither the Wheelock party went a few weeks ago to work on the black-sand beach deposits which they worked last season with fair results. On arriving there this spring, they found that the hole which they worked out last season had been entirely filled again, and they were quite discouraged, as they expected to be obliged to wash it all out again before striking pay sand. However, they concluded to try the gravel newly filled-in to determine if it were auriferous. After working a few hours a clean-up was made, when, to their surprise, they found that they had several ounces of amalgam, the yield being greater than it was last season in the same place.

Considerable time and money were spent last season in opening this claim, as the water had to be brought several miles; for quite a distance across low, wet ground it was conducted through a large canvas pipe elevated on trestle-work. The sluice boxes have to be set below high-water mark, and the weather must be very carefully watched, and whenever a storm comes up the boxes must be taken up and removed to a place of safety and work suspended. Two similar claims have been located near this one, but the greater part of the coast in this vicinity is very rough and dangerous, with no place for deposits of sand to accumulate, and consequently offers little chance for prospecting.

The old Treadwell mine is still the stand-by of Alaska. A working shaft has now been sunk, and levels run on the vein in both directions and good ore found; it is claimed to be fully as good as the surface ore which is now being worked. There is a rumor here that the immense mill of this company may be still further increased.

The Silver Bow Basin Mining Company has raised to the surface from the end of the tunnel where the gravel was struck as recounted in my letter of the 27th ult., and is now ready to begin washing as soon as it can get water onto its claim; as yet there is considerable snow in the Basin. I surmised some time since, and my suspicions have been corroborated by pretty authentic information from Boston, that this company or its promoter has found it slow work to raise more money in Boston and is now going to try London. A prospectus has been prepared and sent to England and an agent along with it. Mr. Nowell intended to go himself, but I fancy he feared the publicity which would be given the matter, so he sends a party very little known in connection with his schemes, thinking to push the matter through quietly. Disinterested observers are again led to ask why this desperate anxiety to sell stock when everything is in readiness to begin washing gravel as soon as it is warm enough to obtain the water; if the Basin is one-fiftieth part as rich as the promoter has claimed, he can realize much more from the mine than he

can by selling the stock. This very action clearly shows how little confidence the promoter and his backers have in the final result of their immense placer scheme.

The Taku Consolidated Company has begun operations and the Eastern Alaska Company is only waiting for a little more of the snow to go. At the Shuck placer claims the tunnel has tapped the basin and the sluice boxes are now being put in place, and they will soon be washing gravel. The Silver Queen Company is completing its mill; one of the directors of the company was here recently and spent two weeks looking about, but he did not appear to be very enthusiastic over the prospects of paying dividends on a capital of one and a third millions of dollars. W.

ALASKA, May 31, 1891.

## The Che-we-lah Mining District Washington.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Spokane Falls, or Spokane, as it is now called, has at last awakened to the fact that its future welfare depends entirely upon the development of the surrounding mining regions, real-estate operations alone having heretofore engrossed the entire attention of its citizens, who are composed of a class such as real-estate advertising brings together, and who, being totally ignorant of all matters in connection with mining, were ready to bite at any mining scheme which was represented as yielding immediate and fabulous returns. This fact was most industriously operated upon, and the natural result is to-day shown in Spokane's depressed financial condition, and in the entire unwillingness of its people to foster or maintain any reasonable undertaking in the mining line. A feeble attempt was made toward establishing a mining exchange, but owing to the shortness of both funds and enthusiasm the scheme fell through, and has resolved itself into a one-room display of mineral specimens, in the Hotel Spokane, from the eastern counties of Washington and the Cœur d'Alene region, Idaho. In connection with this so-called exchange is maintained a secretary, or attendant, whose duty it is to dispense information relative to the ores displayed, with a view to interesting outside investors.

Near the city is built a lead smelter of fair capacity, owned by the North Pacific Smelting Company, at the head of which is Col. R. G. Ingersoll, whom the local papers familiarly dub "Our Bob." For reasons unknown the smelter is yet inactive, and in the mean time the product of all tributary regions is passing through Spokane *en route* to other points. All, or nearly all, of the lead-silver output of the Cœur d'Alene is controlled by the Omaha & Grant Smelting and Refining Company, of Omaha, Neb., and Denver, Colo., and the silver-lead and iron-silver output of this and the Colville region is being secured by the smelting companies of Tacoma and Portland, Ore.

One of the most damaging things to Spokane's interests is the fact that its local newspapers are ever ready to publish all sorts of indiscriminate information relative to the surrounding regions, regardless of its source, and thus deter from taking hold many who are so inclined.

In spite of the foregoing ugly facts, it is evident from the feeling recently manifested by the more conservative class that Spokane will soon quit its misguided endeavors and take some substantial steps in the right direction to recover its lost prestige and make itself the point of importance in connection with the surrounding mining regions to which its geographical position entitles it.

In the Che-we-lah district, 65 miles north of Spokane, much prospecting has been done, but with only a partially successful outcome, due to the fact that the work has been mainly in the hands of men who are not miners, but "tenderfeet," talked into enterprises entirely foreign to them. High-grade croppings of uncertain existence have had the benefit of expenditures that would have yielded otherwise than disastrously had they been placed upon any of the many low-grade, well-defined ledges which exist throughout the district. The Capital iron mine has been demonstrated a permanent property and recently purchased by parties in Portland, Ore. The ore is an iron-silver, and is to be used mainly as a flux by the Portland smelter. The mine will be worked on a liberal scale this summer.

The Eagle Mining Company is now down 225 feet on the Eagle vein, and is in hopes of cutting a ledge at that depth. To date, its endeavors have been rewarded only by a series of pockets such as are characteristic of distorted lime formations. The ore is a lead-silver.

The Copper King is prospecting with good results, showing at a depth of 300 feet (by tunnel) a well-defined ledge of low-grade copper-silver ore.

The Finley is being opened by Spokane parties, and as a prospect it is of good promise. The ore is a silver-lead, and in places of high grade in silver.

The Brown's Lake copper belt, which presents well-defined, low-grade ledges of argentiferous copper ore, will receive no development this year other than assessment work, owing to the present condition of the copper market and excessive railroad rates via the Spokane Falls & Northern Railroad from this point to Spokane.

R. C. TEMPLEMAN,

CHE-WE-LAH, Wash., April 29, 1891.

**Erratum.**—In the article, "Performance of Seventy-five-Ton Refrigerating Machine of the Ammonia Compression Type," published in the ENGINEERING AND MINING JOURNAL of May 16th and 23d, the first paragraph of Part I. should have read: "The machine was of the compressive type, having two single acting compressive cylinders 12 inches diameter × 30 inches stroke, and one Corliss steam cylinder 18 inches diameter × 36 inches stroke, double acting."

**Ecrasite, a New Explosive.**—Ecrasite, a new explosive, is the invention of two Austrian engineers, named Siersch and Kubin. Its power is stated to be in relation to dynamite as 100 to 70, and the new explosive is said to be capable of being carried from place to place with perfect safety. It emits a thick black smoke, and the detonating noise is louder than that of gunpowder, but shorter, sharper and clearer. A bombshell loaded with it explodes with such terrible results that experiments against palisades, representing 100, 250 and 500 men at ranges of 300, 750 and 1,200 meters, are said to have recorded marks on every division of the palisade standing for a soldier. No details of the composition of this new explosive are known, as the secret of the invention is being closely guarded by the Austro-Hungarian war office.



## SUGGESTIONS AS TO THE ORIGIN AND DEPOSITION OF FLORIDA PHOSPHATES.

Written for the Engineering and Mining Journal by Walter B. M. Davidson, A. R. S. M., London, England.

There are as many theories of the origin and final deposition of the phosphate deposits in Florida as there are writers on this subject, and no question, geologically speaking, has aroused keener controversy among rival experts. The question is essentially an economic question, and when it has been decided, it may be possible for mining engineers to decide questions in their office they now must decide in the field, and to assist materially in the development of what, without question, is the most important phosphate field yet discovered.

How important to the world at large a permanent source of phosphate of lime is, may be estimated by educated, if not practical farmers when they realize a few proved and accepted figures, which I take from a thesis by Dr. R. A. F. Penrose, Jr., presented for the degree of doctor of philosophy at Harvard University, and published by the United States Geological Survey, in Bulletin No. 46, 1888, p. 21:

"Phosphoric acid composes over 40% of the ashes of bones, and in the vegetable kingdom it is especially abundant in the seeds of plants. Thus the ash of wheat contains over 49% of phosphoric acid. It has been estimated that for each cow kept on a pasture through the summer there are carried off, in veal, butter and cheese, not less than 50 pounds of phosphate of lime."

I would that the school "marms" of the agricultural districts would teach the youthful farmer of either sex to embroider the above on his or her sampler, and have it hung up in the farm homestead instead of the "God Bless Our Home," "Welcome Papa," etc., which, while moral, do not seem to me to teach any agricultural lesson to the young farmer or farmer's wife. "Use the Proper Fertilizer," or "Analyze Your Soil," or "God Helps Him who Knows what His Soil Wants," seem appropriate mottoes.

While thousands of acres every year are going out of tith, discarded as "worked out," and the new land to be broken is becoming less and less, while the population is increasing, it behooves producer or farmer and consumer, or every one who eats in the United States, to learn the lesson, that while consumption is increasing the power of production is decreasing.

The Department of Agriculture is teaching this, but the farmer is the most conservative of his kind—what was good enough for his grandfather is good enough for him—*Carpe diem*.

This being the case, the question of the world's future supply of phosphate is interesting to every one, be he farmer or millionaire. The farmer's and the millionaire's children's food equally depends on this question, for without phosphate we cannot have seed, and without seed we cannot have wheat, and what does our modern science substitute for bread?

The phosphate field in Florida, so far as accepted, includes nearly the entire western half of the peninsula as far south as the Caloosahatchee River, the western boundary being, so far as known, the line drawn from Thomasville, Ga., directly south to the Gulf. Finds of phosphate are, however, reported as far west as Bristol on the Apalachicola River, and a few bone-drift deposits have been determined in Franklin and Waukulla counties, but none, so far, of economic value. I divide Florida phosphates into: (a) Hard rock or boulder phosphate; (b) soft rock; (c) nodular phosphate; (d) river-pebble phosphate; (e) land-pebble phosphate.

Before entering into the vexed question of the origin and deposition of each it is well to review briefly the geological history of the section.

Until a very few years ago—until, in fact, Mr. Albertus Vogt and Col. John Dunn blundered onto the fact that there was phosphate in Florida—the whole peninsula was looked upon as a coral reef covered with a blanket of sand. Now the interest has been so universal, and so much capital is at stake, that the United States Geological Survey has ordered a geological reconnaissance, and its surveyors and geologists are even now in the field, and no doubt their results when published will prove of the utmost value in solving the now moot point of the origin of the phosphate and its economic distribution. Geologists working in this field have a hard task, for there are no outcrops save in very rare instances, no sections to be studied, no synclinals or anticlinals to measure, and nearly the whole peninsula is covered with a mantle of sand varying in thickness, the rivers ever building up their banks of sand, or finding new and shallow channels instead of cutting through and exposing the underlying strata. Many artesian wells have been sunk, but unfortunately few records of any value have been kept, the most valuable, geologically speaking, being that sunk at Lake Worth, and on which Mr. N. H. Darton, of the United States Geological Survey, has published a monograph this year.

As far as I am aware, the deepest artesian boring in Florida in the phosphate field is that of the city water-works at Ocala, Citrus county, Fla.; jealousy, it is deeply to be deplored, and the ignorance and bigotry of the contractor prevented a full geological record from being taken, which would have been most instructive. I visited this boring and examined the samples, but the contractor had forcibly prevented a resident doctor from gaining the much required information, and had made a hopeless mélange of all the boring debris. The engineer told me that he had struck "coal," and hunted out some specimens to prove it. They were evidently lignite, and were probably of the Laramie or lignitic period (see Dana, pp. 490 to 492), and occurred, according to my informant, between 600 and 800 feet in depth; but no accurate data could be obtained.

The phosphate field in Florida is underlaid at an uncertain depth by the Vicksburg limestone (Dana)—a cenozoic deposit. This limestone outcrops at certain well-defined localities, those that I have visited, being outcrops in Wakulla and Franklin counties, west of Tallahassee, the limestone quarries of Ocala and Rock Springs, in Orange county, the limestone of Tampa Bay and the banks of the Manatee and Caloosahatchee rivers.

These are some of the most prominent exhibits, but all my personal observations, and the information I could obtain from the men who contract to sink artesian and drive wells, lead me to assert positively that an eocene or miocene limestone underlies, in various thicknesses, and at varying depths, the greater part of Florida, and, broadly speaking, the entire phosphate field. It is hard to determine exactly the geological age

of the limestones, as, owing to denudation and redistribution, the fossils are, in places, mixed, eocene fossils being found in miocene beds.

Without referring in detail to the various fancy theories already advanced, which I may call the "Guano," "Noahic" or "Diluvian," or "Act of Grace" theories, the only serious scientific and geological explanation of the hard rock phosphate is that advanced by Francis Wyatt, Esq., Ph.D., in his paper in the ENGINEERING AND MINING JOURNAL of August 23, 1890. This I possibly may be allowed to call the *wave or beach theory*, and in my opinion, while very ingenious and distinctly scientific, and while, no doubt, wave action came into play, it does not explain satisfactorily the rock phosphate deposit in all its vagaries.

I hope that my suggestions may possibly lead to the truth, though I feel that I am only on the threshold of a great geologic question, and possibly am trying to enter by the wrong door.

To me it seems that during the close of the cenozoic period the shores of the Gulf of Mexico as then defined were, as the rest of the eastern coast of the North American continent, elevated by gradual upheaval until they formed shallow lagoons, estuaries and bays. The waters of the ocean at that time were very likely more phosphatic than at present, there being an excess of carbonic dioxide in the atmosphere and lime in the water; both of which, however, were largely eliminated during the carboniferous and cretaceous periods.

In these shallow warm seas lived myriads of shell fish, many secreting phosphate as well as carbonate of lime, as is shown by the analysis of a shell of *lingula ovalis* quoted by Dana as containing 85.79% of phosphate of lime. Although no doubt much of this phosphate was acquired by accretion at a subsequent period, the shells of the shell fish, during these geological epochs were undoubtedly more phosphatic than those of the present era. Fishes of all kinds teemed in these waters, died, and their bones, while mostly disappearing, served to increase the amount of phosphate of lime in the limestone.

Gradually the shores emerged from the seas, and even while they rose came the great geologic era of semi-recent geology—the glacial epoch.

The cold of this epoch, as we know, drove all and every living creature which could travel, southward, always southward. The strongest survived the longest—some seeking the swamps and warm estuaries of the Carolinas, but numbers going still further south, even as the consumptive Yankee travels to-day in the Florida vestibule train seeking warmth and food (I do not for an instant intend to imply that the northern consumptive Yankee goes south to seek food—no, only climate; *vide* southern hotels). But pushed to the southern limit and seeking life and warmth, the great mammal horde of the tertiary epoch flocked to the swamps and estuaries of Florida. There they died—some from want of food, some killed by the strongest, some drowned, some by natural death, but most by the terrible cold wave ever moving southward. The bones of these animals lay there in myriads; some were preserved, some rotted.

At this time also the shallow sea was swarming with sharks, manatee, whales and other denizens of tropic waters, many of them also driven south by the change in the temperature in the northern latitudes; and their bones and teeth added to the "Valley of Bones" which we now find along this southern shore.

Then came the swing of the thermometric pendulum, and the Champlain period was an era of melting of glaciers and of ice, when most American rivers were fifty times the size they are to-day, and after that man first left records of his sojourn here.

The Champlain floods were not so severe in their action in the south as north, but no doubt it was during this period that the Peace River pebble formation and the soft rock phosphates were largely deposited.

While these quaternary changes were taking place, Florida was still rising, slowly but surely rising, and denudation began. Then once more the slightly elevated peninsula gradually sank under sea level, and it was covered by successive deposits of sand, varied by clays, the beach being the red clays of north Florida and southern Georgia.

Before this took place, however, an economic change bearing on this subject had taken place. In many places the limestone, then the dry land, had been leached by the rain water, even as chalk to-day can be leached, and is leached by soda water, or rain water, which is dilute soda water. The highly phosphatic limestone was denuded and dissolved, the bicarbonate of lime carried away in solution, and the more insoluble phosphate in suspension and solution. In the stiller waters of the estuaries, and in the wider river beds (the rivers had the same course as now, broadly speaking), the phosphate of lime in suspension was deposited as an alluvial secondary deposit. This was mixed, of course, in many places with lime, sand and clay being brought down by the same waters.

As I accept the problem, while all this was in action, above the limestone were the bones of the various beasts and fishes killed by the awful cold and by overcrowding. Some of these bones helped by their decomposition to add to the phosphate of lime present in the underlying strata, and some were pseudomorphed into fossils of phosphate of lime, just as we find them to-day in vast quantities; some were washed down and were deposited with the phosphatic mud, and some still are *in situ* in the clay overlying the limestone or mixed with the shell reefs and beaches.

As I see it, the streams percolating and leaching out the carbonate of lime in the phosphatic upper strata of the Vicksburg limestone were supercharged with bases. At certain places, not to be determined by any law, the water in the streams and rivers gave up the phosphate in solution, the phosphoric acid being replaced by carbonic acid. The exact conditions under which this took place have yet to be determined, but the irregular deposits of "rock," "boulder," or "high-grade" phosphate of lime I believe to be the result. Sometimes these rivers or streams issued from an underground river or spring, and when the underground pressure was relieved and when an excess of base was present in nascent form and the carbonic acid could escape readily, the deposit was made even as the silicious sinter round the hot springs of many countries in modern times.

The phosphate of lime, pure or impure, took the place of the lime rock, sometimes in its original form, and even pseudomorphic fossil shells *in situ*; but usually it was deposited according to no known law, and in the irregular deposits in which it is found. While this action was at work, or afterward, when the second sinking took place, the sand covering was deposited, and it was then that some of the detached boulders helped to form a beach, as described by Dr. Wyatt.

The great similarity between the appearance of the hematites of Vir-



ginia and the hard rock phosphates of Florida was first pointed out by Mr. N. H. Darton of the United States Geological Survey, and the identity is very striking. These hematites seem to have been deposited in the Oriskany sandstone, from water supercharged with hydrated ferric oxide, and the water either carried away the silica in suspension or solution, or filled by precipitation the cavities and crevices already present in the sandstone.

It is interesting to place side by side two specimens—the one of iron ore from Alleghany or Bath county, Va., from the Oriskany sandstone, and one of high grade phosphate from the Dunnellan Mines, in Marion county, Fla. The identical structure must strike even the most uneducated eye.

To resume—the phosphate carried in suspension, etc., was deposited in the back waters of the rivers forming the soft rock or phosphate, and in the shallow streams. With this were the bones of the dead beasts mentioned above. Then in some not understood way, segregation and accretion took place, the richer phosphatic nodules attracting to themselves the phosphate within the radius of their attraction, and thus was formed the "nodular" phosphate rock, which consists of rich concretionary nodules in a poorer calcareous matrix, mixed with bones and teeth.

There is no dispute as to the immediate origin of the pebble phosphate, river and land. The nodules and the bones, mostly rounded by attrition,

awaiting the completion of a 7-mile pipe line, to start its 50-ton smelter. Immediately south of this camp is the Harqua Hala gold district, which is now being quite extensively developed, one 20-stamp mill being nearly finished. The Stanton mill, 12 miles east of Congress, is running on good ore, while the Weaver placer mines just beyond are only limited in their gold production by the amount of water. The Yarnell mine, 7 miles northeast, has been extensively developed recently, and shows an enormous body of free-milling ore of good quality. This mine is soon to be equipped with a reduction plant.

Other mines in Yavapai county which are doing splendidly are the Crowned King, in the Bradshaw Mountains, which has large bodies of high-grade sulphurets developed; the Hillside, west of Prescott; the United Verde, at Jerome, which is the third largest copper producer of the Territory; all the mines of Phelps, Dodge & Co.; the Senator, Copper Basin, Boggs, Hackberry, and the old Tiger mine, recently reopened and now showing fine bodies of high-grade silver ore.

The mining industry seems to be prospering in all parts of Arizona, and within the next few years there is likely to develop a period of activity, such as the Territory has not experienced for a long time. Most of the mining properties mentioned would be tributary to a railroad connecting Phoenix with Prescott, thereby connecting the famous Salt River Valley with the Atchison, Topeka & Santa Fe railway system. The importance of this connection will be readily appreci-



CONGRESS, ARIZONA.

were washed down by the rivers and distributed in their ever-changing beds with sand and mud. The nodules and the bones form the gravel in the banks in the river beds, the "river pebble" being merely the present result of river action.

#### NOTES ON ARIZONA MINES.

Congress, Ariz., is situated 55 miles south of Prescott, and receives its name from the Congress gold mine, which is the cause of this town of several hundred inhabitants being built here at the foot of the Slate Creek Mountain. The camp was founded by the late J. Reynolds, commonly known as "Diamond Jo," and the property is now operated by his estate.

The Congress Gold Mining Company has one of the most complete mining plants in the Territory of Arizona. In addition to the large stamp mill it has two hoisting works, a complete pumping plant to supply the mill, an assay office, machine shop, store, boarding-house, large company-house, three houses for the officers and some twenty houses containing from twelve rooms down, for the men. The mine has been a steady gold-producing and dividend-paying mine for over two years, and at the present time it is thought that the ore reserves, moderately estimated, are sufficient to run the mill for several years, and it is expected to crush 100 tons of ore per day. The mine is worked by two main shafts some 700 feet apart; the eastern one is 730 feet deep and the western one 850. There are three other ventilating and development shafts, which are 500 feet, 250 feet, and 200 feet deep. In all, eleven levels have been opened in the mines, the longest of them being 1,050 feet at present.

The ore of the Congress mine is crushed in a 40-stamp mill, which is equipped in the most perfect manner. The crushed ore is concentrated on 20 Frue vanners, and the sulphuret product, which contains from \$140 to \$250 in gold and a few ounces of silver per ton, is dried and sacked, and shipped by freight teams to Prescott or Phoenix; there is, however, strong probability that a railroad will connect these two places, passing the mine, in the near future.

The mining outlook in this part of Arizona is very favorable at the present time. The Yuma Copper and Silver Company, operating about 80 miles south of Congress, which is developing a copper property, is now

ated when it is understood that along the Atlantic & Pacific Railroad are unlimited forests of pine that at present find but a local market, while the inhabitants of the southern part of the Territory are obliged to procure their lumber from far-off Puget Sound. Moreover, the coal from the extensive fields in the northern part of the Territory will find a ready market in supplying the numerous mines along the proposed road, as well as meeting the large demand in the southern part of the Territory. In turn, also, the mining interests of the north require the agricultural products of the Salt River Valley, which, if obtained, would be followed by the opening of many mines at present undeveloped, owing to excessive cost of supplies and of marketing products. S. R. B.

**Magnesite in the Ural Mountains.**—It is reported that a German engineer has discovered on the Asiatic side of the Ural Mountains, in the Werchnival district, magnesite, with but bare traces of carbonate of lime, oxide of iron and silicic acid. This is the first discovery of any importance in the Ural district of this valuable mineral.

**A New Tunnel Under the Detroit River.**—The Michigan & Canada Tunnel Company has been organized, presumably in the interest of the Michigan Central Railroad Company, to build a double-track railway tunnel under the Detroit river, connecting Detroit, Mich., and Windsor, Ont. The tunnel will cross the river a short distance below the Michigan Central transfer ferry, and will open on the main line on the Detroit side of the river, about one mile back from the shore. The total length will be 12,033 feet, of which 2,100 feet will be an open cut on the Canada side and 1,500 feet an open cut on the Detroit side. The inclosed portion or tunnel proper will be 8,433 feet long. The tunnel will be lined with steel plates, inside of which will be five rings of brick and concrete. The outside diameter of the lining will be 31 feet  $\frac{1}{4}$ -inch, and the inside diameter 27 feet. Preliminary work will begin at once. The material penetrated will be clay similar to that penetrated by the Port Huron tunnel. As to the method of excavation, shields similar to those employed in excavating the Port Huron tunnel, will probably be used.

## OFFICIAL REPORTS.

## Osceola Gravel Mining Company.

The following is an abstract of the report of the officers of the Osceola Gravel Mining Company, of Osceola, Nevada, for the period of 16 months from August 1st, 1889, to November 30th, 1890, which we give at length, as it contains much valuable information upon the cost of placer-mine working. We have frequently commended the excellent manner in which this enterprise has been conducted, and it is pleasant, therefore, to note that the result of its operations is exceeding the estimates made.

The work of construction on the east ditch was commenced early in September, 1889, and continued, until the severe snowstorms of December following practically stopped it. The flume construction, however, continued at intervals throughout the winter.

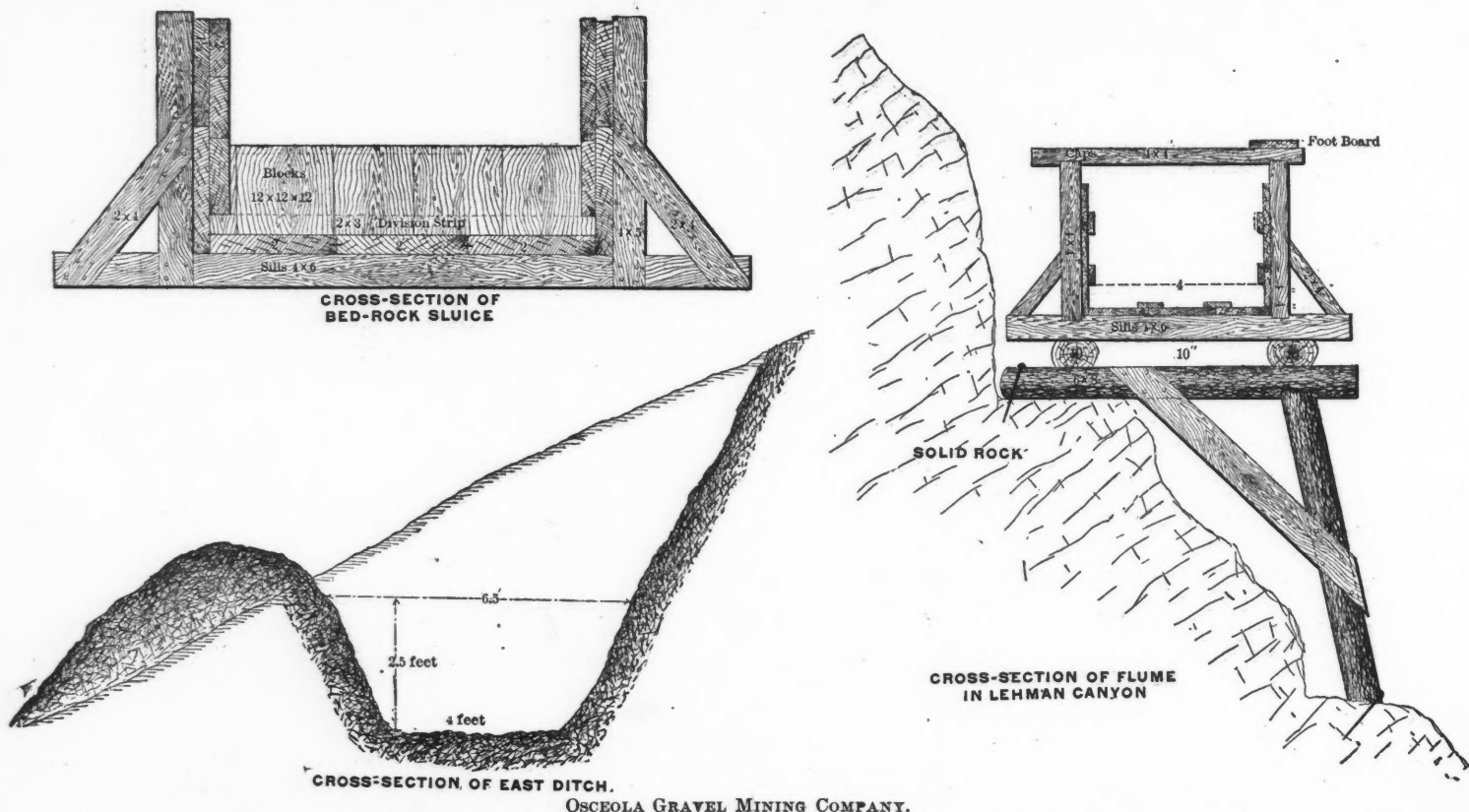
The total length of the ditch line, which includes flumes and tunnel, from Lehman's Creek to the distributing reservoir at the company's mines, near Osceola, is 95,133 ft., or 18 miles and 93 ft. The whole was completed and the water from Lehman's Creek passed through to the reservoir July 4th, 1890, and cost \$108,222.65.

The ditch portion is 82,891 ft. in length; its dimensions 4 ft. wide in the bottom, 2½ ft. deep in solid ground, with sloping sides ¼ to 1, or an angle of 22½°, and has a uniform grade of 14 ft. per mile, and a carrying capacity of over 2,500 miner's inches of water = 40,000,000 gallons per 24 hours: the excavated material being placed on the lower side increases its capacity. Its cost, as per the several contracts, was \$58,307.86. The material excavated comprised 17,204 cu. yds. of gravel, including

putting in culvert and gate, constructing cabin, etc., which cost \$949.28. At the mines the distributing reservoir was enlarged during March, 1890, by the excavation of nearly 4,000 cu. yds. of cemented gravel and rock from the interior and placing it upon the bank, thereby increasing its capacity over 50%, the cost of which, together with the new gate tower and waste gate, was \$2,875. Two large-sized giants or monitors of the Hoskin-Marysville-California patent, size No. 5, having 15-in. inlet and 8-in. nozzle butt, were added to the plant. These, with two 18-in. water gates and deflectors, cost delivered \$900.00.

Eleven hundred feet of large bedrock sluice was also constructed, 60 in. wide and 35 in. deep. It is through this sluice that all the gravel from the present workings passes, consequently it was necessary that it should not only be strongly built and supported, but be absolutely tight in the bottom to prevent loss of quicksilver and gold. The bottoms are selected lumber 1½ in. thick, planed, tongued, and grooved. The sides are doubled, the inner lining is 2-in. plank. Upon the bottom is placed the riffle blocks; these are square timbers 12 in. × 12 in. × 12 in. placed in rows across the bottom, and divided by a 2-in. strip, which leaves an aperture for the gold to settle in. The quantity of lumber used per linear foot, including riffle blocks, was approximately 80 ft., and cost over \$3 per foot for labor and material. The total cost was \$3,300.

In connection with the building of the new bedrock sluice, and chargeable to that account, there was a tunnel driven through the north of the bedrock into the deep channel, 135 ft. This tunnel greatly facilitates the working of that channel and cost \$1,225. It is 8 ft. wide and 7 ft. high and is in solid quartzite.



OSCEOLA GRAVEL MINING COMPANY.

boulders and loose rock; 40,843 cu. yds. of cement, requiring blasting or gadding; and 23,151 cu. yds. of solid rock, all requiring blasting.

Of the main flumes there are 14 sections. These are located at such places as were impracticable for ditch to be made, being on the side of the rocky and precipitous mountains, especially in the Lehman Cañon, where 3,768 ft. had to be built. The longest single section is 2,808 ft., and the shortest 96 ft. The whole length, however, aggregates 5,352 ft. The size is four ft. wide and four ft. deep, with a uniform grade of 32 ft. per mile, much of which had to be supported upon trestlework.

The drop flumes or chutes, of which there are six, vary in their dimensions according to the vertical fall at their respective localities, the total length of these being 6,258 ft., with a vertical fall of 1,352 ft. The whole length of the main flumes and drop chutes is 11,610 ft., the total cost of which, including the four houses for ditch tenders, each 14 ft. × 20 ft., fitted with bunks, tables, etc., 16 waste gates, timbers for trestle, stringers, and ties, was \$21,494.05. The total amount of lumber, which was yellow pine of first-class quality, used in the flumes was 316,800 ft. (board measure), in addition to 28,240 linear ft. of hewn timbers used for stringers, trestle posts, and ties, size varying from 8 to 12 inches in diameter.

The route of the ditch was shortened at least two miles by the excavation of a tunnel through a projecting spur of the main mountain range. This is 632½ ft. long, 5 ft. wide, 6½ ft. high, and has a grade of 4 ft. in its length. It is in fairly solid granite except at the approaches, where the rock was somewhat decomposed, requiring a few sets of timbers and lagging. The total cost of excavating and timbering was \$5,060.00.

The total cost of the east ditch was \$108,222.65. Of this amount the purchase of Lehman's Creek, with ranch and improvements, absorbed \$10,000; engineering expenses, \$6,221.99; excavating ditch, \$58,307.86; flume construction, \$21,494.05; tunnel, \$5,060.00; and general expense account, which includes teamsters, cooks, superintendent, etc. In addition to this, and properly chargeable to the east-ditch account, was the work of cutting and draining a small lake at the head of Lehman's Cañon,

One set of under-currents was built, being placed in connection with the sluice at a point 1,000 ft. below the head; it is 24 by 48 ft., divided into four compartments, and has a grade of 1 in 12 ft. and cost \$385.00.

In addition, several minor improvements were made, such as the construction of a small pipe line to furnish the water to a Pelton wheel for power purposes, new buildings, and an electric lighting plant. Two arc lights of 2,000 candle power were used, placed on the placer, enabling much more work to be done in hydraulicking on the night shift than was previously done with other kinds of lighting and at much less cost.

From measurements taken every 12 hours, morning and evening, it appears that the volume of water passing the ditches during this period of 16 months was 147,725 miner's inches, of which 120,670 were from the west and 27,055 from the east ditches. In repairing breaks, 8,400 inches were wasted, leaving total water used in the mine 139,325 inches, the miner's inch being equivalent to approximately 16,000 gallons every 24 hours.

A cross-section made of the ground washed up to November 30th, 1890, showed that 223,876 cu. yds. had been broken from the high banks and passed through the sluices during the season. Less than half of the superficial area of the bedrock, upon which this gravel rested, had been cleaned, however. The cleaned or creviced bedrock, therefore, represents, as per engineer's estimate, that the gold from but 118,187 cu. yds. had been secured, the remainder being in the crevices of the uncleaned bedrock. This will be better understood by explaining that the bottom of the gravel banks, which average 105 ft. in height, is from 100 to 250 ft. distant from the bedrock cuts, which conduct the gravel to the sluices. These cuts vary in length, the present cut reaching 225 ft. above the entrance to the main sluice at the head of the tunnel. All the gold taken out during the past season came from the main sluice and the creviced portions of the bedrock, lying in close proximity to it. The gold lying in the upper portions of the cuts and along



the foot of the high banks (100 ft.) still remains covered with a few feet of gravel. The early frosts in November stopped all bedrock cleaning.

There is difficulty in getting skilled gravel miners in Nevada, no mining of this kind being done nearer than California. Consequently the company fell behind with bedrock cleaning, which requires experienced men to facilitate it. No larger nuggets than 7½ ounces were found during the past season, but quite a quantity weighing from ¼ to 3 ounces. The total amount of the gold extracted was \$28,175; this was from 118,187 cu. yds. The estimated quantity from which the gold was washed shows an average of nearly 24 cents per cu. yd., confirming the three former seasons' averages in the same channel. Owing to the increased volume of water, the enlargement of the pipe line, hydraulic giants, and the main sluice during the past season, the duty of the miner's inch has been brought up nearer to its maximum, as is seen by comparison with former seasons' work.

With the old sluice 32 in. × 30 in., using 1,000 to 1,100 miner's inches, the average washing was 1.1 cu. yds. to the inch of water, while during the last season through the new sluice 60 in. × 35 in., using 2,000 to 2,300 miner's inches, the average was 1.62 cu. yds. to the inch of water. It is expected to increase this to 2 cu. yds. next

CHEMICAL INVESTIGATIONS OF THE BLAST FURNACE PROCESS.\*—II.

By A. Ledebur.

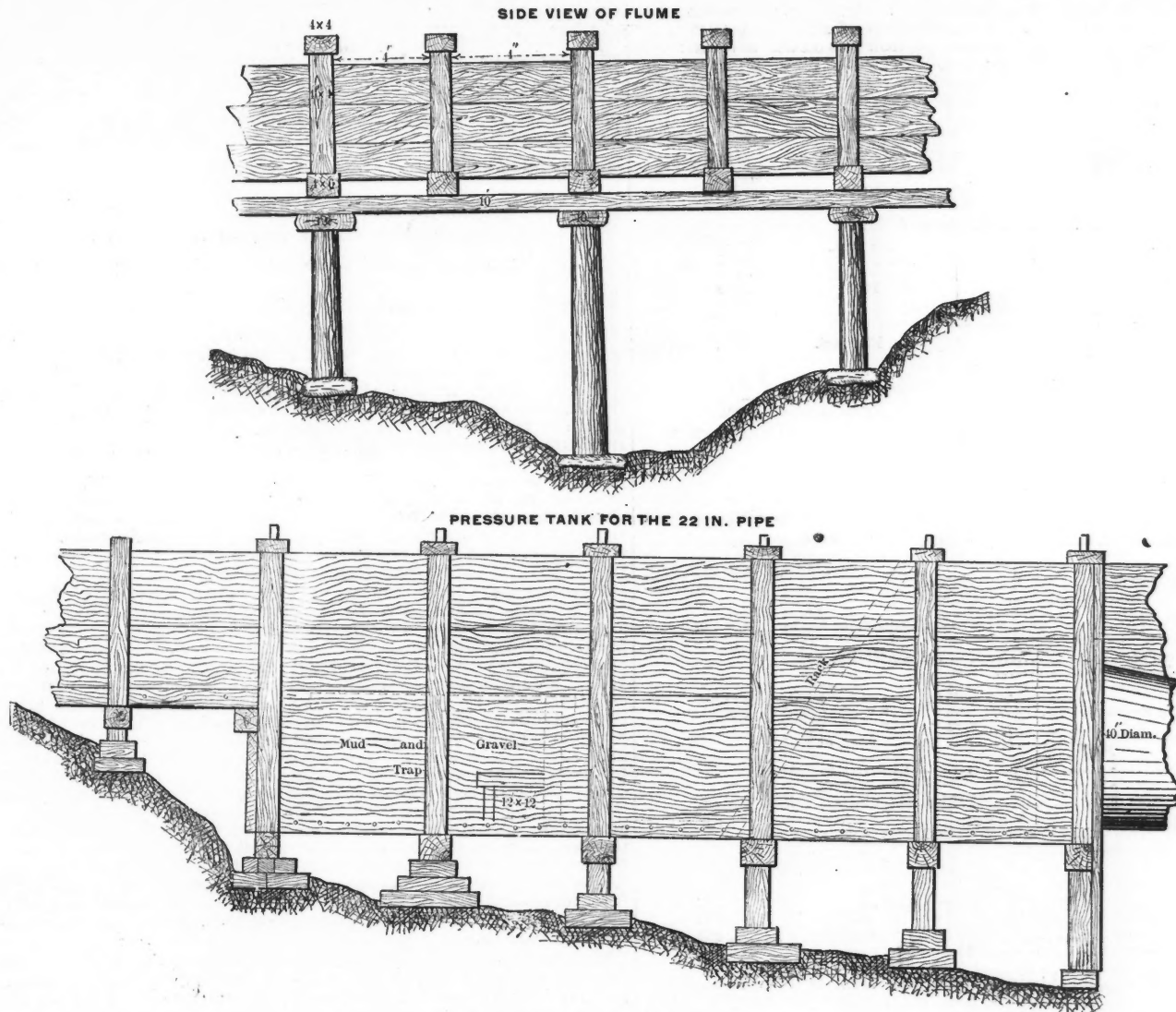
Translated for the Engineering and Mining Journal by H. B. C. Nitze, E. M.

(Concluded from page 608.)

INVESTIGATIONS OF THE SMELTING MATERIALS AND FINAL PRODUCTS.

Inasmuch as it is not intended to follow the details of the blast furnace process, but simply to obtain a view of the changes which the smelting materials undergo on the whole, and to gain further information regarding the disposition of the fuel in the furnace, we can dispense with the laborious and—as before mentioned—somewhat doubtful analyses of the gases, as well as of the ores, from different parts of the furnace. It will suffice to institute a comparison of the composition of the smelting materials—ores, fluxes, fuel, and air of the blast—on the one hand, with the final products—pig iron, slag, and waste gases—on the other, taking into consideration the relative weights of the materials entering and those leaving the furnace.

All of the constituents of the materials charged must of course reappear



OSCEOLA GRAVEL MINING COMPANY.

season, as the advantage of a larger volume of water will then be had and less stoppages on account of waiting for sufficient head in the reservoir to accumulate. It is the recurrence of these stoppages that draw so heavily upon the power, for when the water slacks in the cuts and sluices many hundred tons of gravel are left on the bottom, and it is this inert mass that must first be started before fresh gravel can be brought from the banks. The Osceola gravel, being quartz and quartzite, and very coarse, weighs approximately 3,600 pounds per cu. yd. The actual mine-labor payroll for the whole season, which includes sluice construction, was \$11,450.66.

The report of the treasurer of the Osceola Gravel Mining Company from August 1st, 1889, to November 1st, 1890, included the following statements of its financial condition:

EXPENDITURES.		RECEIPTS.	
Requisitions from manager.....	\$144,500.00	Preferred stock subscriptions.....	\$150,000.00
Lehman's Creek and Ranch.....	10,000.00	Interest on balances.....	1,984.28
Gold nuggets purchased from old company.....	3,200.00	Returns for gold from mine*.....	11,284.52
Salaries, general expenses, etc.....	7,153.28	Returns from nuggets purchased from old company.....	2,901.29
Cash balance in treasury.....	1,316.81		
	\$166,170.03		\$166,170.09

\* Since the completion of the treasurer's report additional gold shipments amounting to \$16,890.48 have been reported.

in the final products;† but the form of their reappearance, especially as regards the ratio  $\frac{CO}{CO_2}$  in the waste gases, is different, according as the reduction of the ores has taken place mainly by means of solid carbon or by CO, or else—in reference to the utilization of the fuel—according as greater or less amounts of CO<sub>2</sub>, resulting from the indirect reduction, are again reduced to CO by volatilization of solid carbon. The carbon in the waste gases resulting from this source, as also the carbon formed by the

\* *Handbuch der Eisenhüttenkunde*. Part II, p. 487 et seq.  
 † Jaumain, for instance, found at several furnaces of this description the percentage of CO<sub>2</sub> and CO of the waste gases to be:

Blast furnace.	% by weight in the center.		CO <sub>2</sub> CO.	% by weight at circumference.		CO <sub>2</sub> CO.
	CO <sub>2</sub> .	CO.		CO <sub>2</sub> .	CO.	
Marchiennes.....	17'91	19'15	0'93	14'33	24'10	0'60
Haumont.....	14'20	22'63	0'63	11'57	27'89	0'41
Monceau.....	14'30	21'79	0'66	20'32	19'52	1'04

(Compare *Annales des mines*, series 7, vol. 20, p. 323.)

blast before the tuyères, may be calculated when the above factors are known.

In this connection we must also take into consideration that the gases escaping from the throat of the furnace have not always the same composition at different parts of the cross-section of the same; they are usually higher in oxygen in the center and higher in carbon at the circumference, as is easily explained. If the throat of the furnace be closed, and the gases be led off by means of a separate pipe (for instance, by a gas-catcher, such as von Parry's, von Hoff's, or Langen's), an approximately correct average composition may be obtained if the sample be properly taken from this pipe.\*

If, however, a part of the gases escapes from the throat, while another part is led off below the same, or should perhaps a part be led off by means of a suspended Darby pipe, while another escapes by a Pfort's gas-catcher, the danger becomes imminent that the composition of the waste gases as determined may vary considerably from the actual average composition.†

In this calculation it will be necessary that the composition of the waste gases be given in percentages of the weight instead of volumes, as is usually the case. It will not be difficult, however, to effect a recalculation of an analysis given in percentages of volume into percentages of weight.

EXAMPLE OF THE CALCULATION.†

At the charcoal blast furnace No. 2 at Vordernberg, producing white iron for puddling purposes, the consumption of smelting materials for the production of 100 kilogrammes of pig iron was on the average: Ore, 212·69 kg.; slate flux, 13·90 kg.; charcoal, 74·00 kg. The ore mixture consisted of one-third raw and two-thirds roasted ores, the composition of which was (exclusive of the slate flux) as follows:

Per cent.	Kg.	Per cent.	Kg.
Fe <sub>2</sub> O <sub>3</sub> .....	54·93	SiO <sub>2</sub> .....	10·46
FeO.....	8·48	H <sub>2</sub> O.....	9·52
CaO.....	9·58	CO <sub>2</sub> .....	16·64 (4·54 kg. C)
Mn <sub>2</sub> O <sub>3</sub> .....	4·97		100·00
Al <sub>2</sub> O <sub>3</sub> .....	3·00		212·69
MgO.....	1·83		

The composition of the slate flux was as follows:

Per cent.	Kg.	Per cent.	Kg.
SiO <sub>2</sub> .....	78·38	H <sub>2</sub> O.....	3·20
Al <sub>2</sub> O <sub>3</sub> .....	13·99		0·44
CaO.....	0·53		13·90
Fe <sub>2</sub> O <sub>3</sub> .....	3·90		

The composition of the charcoal was:

Per cent.	Kg.	Per cent.	Kg.
C.....	85·10	N.....	0·51
CO <sub>2</sub> .....	3·26 (0·89 C)	H <sub>2</sub> O.....	0·70
CO.....	1·36 (0·58 C)	Ash.....	2·00
CH <sub>4</sub> .....	0·70 (0·52 C)		1·48
H.....	0·07		100·00
			74·00

Grouping together the constituents of the charge per 100 kilogrammes of pig iron there were produced:

Fe <sub>2</sub> O <sub>3</sub> from ores.....	116·82 kg.		
flux.....	0·54 kg.		
	117·36 kg., containing	Fe.	O.
		82·15 kg.,	35·21 kg.
FeO from ores.....	18·04 kg.		
		14·03 kg.,	4·01 kg.
		96·18 kg.	39·22 kg.
SiO <sub>2</sub> from ores.....	10·46 kg.		
flux.....	10·90 kg.		
	21·36 kg., containing	Si.	O.
		9·98 kg.,	11·38 kg.
CO <sub>2</sub> from ores.....	16·64 kg., containing	C.	O.
charcoal.....	2·41	4·54	0·66
	19·05 kg.		
CO from charcoal.....	1·90	5·20 kg.,	13·85 kg.
CH <sub>4</sub> .....	0·32	0·43	0·57
H.....	0·05	0·38	
		62·97	
Total.....		68·98 kg.	
		Mn.	O.
Mn <sub>2</sub> O <sub>3</sub> from ores.....	10·57 kg., containing	7·63 kg.,	2·95 kg.
Al <sub>2</sub> O <sub>3</sub> from ores.....	6·38	CaO from ores.....	20·37
flux.....	1·95	flux.....	0·07
			20·44
MgO from ores.....	3·89	H <sub>2</sub> O from ores.....	9·52
Alkalies from charcoal.....	1·43	flux.....	0·44
H from charcoal.....	0·06	charcoal.....	5·18
N from charcoal.....	0·39		
		Total.....	15·14

All of these bodies must reappear in the pig iron, slag, and waste gases. According to analysis the pig iron contained: C, 3·122%; Si, 0·152% (arising from reduction of 0·33 kg. SiO<sub>2</sub>); Mn, 2·220% (arising from reduction of 3·08 kg. Mn<sub>2</sub>O<sub>3</sub>); Fe, 94·506%; total, 100·000%. Accordingly the slag should contain, per 100 kg. pig iron: FeO, 2·14 kg. (metallic iron 96·18% — 94·506% = 1·67 kg., with 0·47 kg. O), 3·32%; MnO, 7·07 kg. (10·57 — 3·08 = 7·49 kg. Mn<sub>2</sub>O<sub>3</sub> = 7·07 kg. MnO, with 1·59 kg. O), 10·98%; SiO<sub>2</sub>, 21·03 kg. (with 11·21 kg. O), 32·76%; Al<sub>2</sub>O<sub>3</sub>, 8·33 kg., 12·93%; CaO, 20·44 kg., 31·75%; MgO, 3·89 kg., 6·04%; alkalies, 1·48 kg., 2·22%; total, 64·38 kg., 110·00%. The calculated composition of the slag, and the ratio of the slag to the pig iron produced (64·38 : 100), was checked by analysis and actual weighing of the resulting slag, and found to agree very closely with the reality.

The analysis of the waste gases, expressed in percentages by weight (disregarding the H<sub>2</sub>O) was as follows: CO<sub>2</sub>, 22·37%, with 6·10 C; CO, 23·84%, with 10·22 C; CH<sub>4</sub>, 0·37%, with 0·28 C; H, 0·09%; N, 53·33%; total, 100·00%, with 16·60 C.

According to the composition for the production of 100 kilogrammes pig iron given above the blast furnace receives 68·98 kilogrammes C (from the charcoal and CO<sub>2</sub> of the ores); of this amount, however, according to the

pig iron analysis, 3·122 kilogrammes are absorbed by the pig iron, and therefore 68·99 — 3·122 = 65·858 kg. carbon reappear in the gases, and accordingly the quantity of the waste gases (in kilogrammes) per 100 kg. of pig iron is:

CO <sub>2</sub> .....	88·76 kg. with	24·22 kg. C.	64·54 kg. O.	.... kg. H.
CO.....	94·58	40·54	54·04	....
CH <sub>4</sub> .....	1·46	1·09	....	0·37
H.....	0·35	....	....	0·35
N.....	211·58	....	....	....

396·73 kg. with 65·85 kg. C, 118·58 kg. O, 0·72 kg. H.

Of the CO<sub>2</sub> in these gases, 19·05 kg. are derived from the charge; 88·76 — 19·05 = 69·71 kg. arose from the reduction of the ores by means of CO, and at the same time  $\frac{1}{11} \times 69·71 = 25·35$  kg. oxygen were given off by the ores.

The total oxygen given up by the ores in reduction was: Oxygen combined with iron, 39·22 — 0·47 = 38·75 kg.; combined with manganese, 2·95 — 1·59 = 1·36 kg.; combined with silicon, 11·38 — 11·21 = 0·17 kg.; total, 40·28 kg.; Of the total oxygen in the reduced bodies, there were derived: By indirect reduction, 25·35 kg., or 62%; by direct reduction (especially by secondary reduction of CO<sub>2</sub> to CO) 14·93 kg., or 38%; total, 40·28 kg., or 100%. In the same manner we can account for the behavior of the remaining bodies. The total O of the waste gases per 100 kilogrammes pig iron = 118·58 kg. Of this there are derived: By the process of reduction, 40·28 kg.; from the CO<sub>2</sub> of the ores and charcoal, 13·85 kg.; from the CO of the charcoal, 0·57 kg.; a total of 54·70 kg.; and from the blast (disregarding the O contained in its moisture), 63·88 kilogrammes.

These 63·88 kg. O equal  $\frac{63·88}{23} \times 100 = 277·7$  kg. or 215·2 cu. m., atmospheric air per 100 kg. pig. iron. The amount of pig iron produced in 24 hours was 15,000 kg., or 10·4 kg. per minute, and the quantity of the blast per minute was  $\frac{104 \times 215·2}{100} = 22·4$  cu. m.

Approximately the same result is obtained by making the calculation in reference to the N found in the gases. For every 100 kg. of pig iron produced the gases contain 211·58 kg.; or 169·2 cu. m. N, which equals  $\frac{169·2}{79} \times 100 = 214·2$  cubic meters atmospheric air; consequently the quantity of the blast per minute equals  $\frac{10·4 \times 214·2}{100} = 22·2$  cu. m.

The same could be ascertained from the percentage of H in the waste gases after subtracting that found in the fuel; it seems, however, that there is a slight mistake in the estimation of the H in the above example; namely, the total H in the gases per 100 kg. pig iron = 0·72 kg. Of this there are derived: From the CH<sub>4</sub> of the charcoal, 0·14 kg., and from the H the charcoal 0·05, making 0·19 kg.; while there is derived from the moisture of the blast, 0·53 kg., equal to 4·24 kg. of H<sub>2</sub>O, which is evidently too high.

In case the analyses, and especially the estimation of the H, were correct, we would have to infer a decomposition of the moisture in the charge, calculating the quantity of the blast from the cross-section of the nozzle and the pressure of the blast; according to Hauer's tables it was found to be, in the above case, 23 cu. m. per minute.

The Action of Oils on Metals.—The American Journal of Railway Appliances describes a series of tests, extending about 12 months, on the action of various oils on the different metals in contact with them. The metals were first thoroughly cleaned in ether, dried, carefully weighed, and then placed in closed vessels filled with oil, which were kept for one year at a uniform temperature in summer of 80° F., and in winter of about 50° F. In the case of iron, seal oil acted the least on it and tallow the most, bronze was not attacked at all by colza oil and but very slightly by olive oil; it was, on the other hand, vigorously eroded by linseed oil. In the case of lead, the most deleterious lubricant was whale oil and the best lubricant was olive oil. Whale, lard and sperm oils were about equally erosive. Zinc seemed to be but little attacked by mineral lubricating oils; the best oil was lard and the worst sperm. Copper was not attacked by any of the mineral oils; sperm oil had the least and tallow the most action on it. Generally mineral oil attacked the metals under test the least, and sperm oil the most. For the lubrication of the bearings of heavy machines, a mixture of colza or sperm oil with a mineral oil is recommended as having but little action on bronze or cast iron. Tallow, having considerable erosive action on iron, should be avoided as much as possible.

The Micro-Structure of Steel.—Sir Frederick Abel, president of the Iron and Steel Institute, in an address at the annual meeting of that body, in London, on the 6th inst., referring to the method of examination of iron and steel introduced by Dr. Sorby, consisting of microscopic inspection of prepared sections of metal after treatment with weak acid, stated that Faraday and Stodart had formerly proceeded upon somewhat similar lines. According to Dr. Wedding, Sorby's system is continually extending at the German works, and many series of experiments have demonstrated that by this system of examination characteristic features of grades of iron may be discovered, physical differences co-existing with identity of chemical composition explained, and evidences of the true grounds of disasters obtained. Sir Frederick Abel also referred to his own labors in a similar direction, in connection with his inquiry into the erosive action of the powder gases, when he showed, in a paper read before the Institute, that the development of structure of smooth surfaces of slices of the metal composing the barrels with which experiments were carried out by the very slow solvent action which a chromic acid solution exercises, afforded valuable evidence, attainable by simple inspection, of the comparative amount of work or mechanical treatment to which the different steel forgings had been subjected, and which was demonstrated to affect very importantly the amount of resistance opposed by the surface of the gun's bore to the erosive effects of powder gases. This method of examination, and the production of photographic records of the results, he had made use of 26 years ago, at the time when the British Government first entered upon experiments with projectiles of wrought iron and of steel, for use against armor-plates; he exhibited some photographs of small plates of metal, showing the effect of the chromic solution referred to, which were attached to a report made by him to the Ordnance Committee in 1865.

\* Gruner employed a copper tube, which he inserted into the down-comer across its full diameter, and in which there was a slit corresponding to this diameter. so that the gases from the full cross-section of the down-comer might enter the copper tube. (Analytical Studies of the Blast Furnace. German translation by J. H. Steffen, p. 23.)

† According to F. Friderici, Oesterreichische Zeitschrift für Berg-und Hüttenwesen, 1882, p. 2.

‡ Owing to its insignificance the total per cent. of ash is considered as alkali whereas in reality it contains in addition CO<sub>2</sub>, etc., etc.



PROMINENT MEN IN THE MINING INDUSTRY.

Heneage Mackenzie Griffin.

Heneage Mackenzie Griffin, the fortunate owner of the famous Seven-Thirty mine, and one of the most prominent men in the mining industry of Colorado, was born in London, June 1st, 1848, being the son of Alfred Griffin, Esq., of Brand Hall, Market Drayton, Shropshire, England. He was educated at Christ Church, in the University of Oxford. After leaving Oxford, he spent two years in traveling on the Continent, and resolved to come to America to seek his fortune. He arrived in New York in 1872, bringing such letters of introduction as at once secured him a position in the banking house of Jay Cooke & Co., then one of the leading financial houses in this country. Mr. Griffin remained with this firm for one year, having charge of its foreign correspondence, and it was there that he acquired the business and financial training that formed the foundation of his success in subsequent undertakings.

Severing his connection with Jay Cooke & Co., Mr. Griffin spent a year in an extended tour of the United States and Canada, and, impressed with the vast possibilities of the western portion of this country, he determined to settle in Colorado, whither he went in June, 1874. He spent some time in traveling about the State, making Denver his headquarters, and making some real-estate investments in that city soon after his arrival, he was engaged for the next four years in looking after these interests. In 1878, however, having previously purchased a one-third interest in the Seven-Thirty group of mines at Georgetown, Mr. Griffin, who had great faith in their prospective value, and was convinced that mining, conducted on sound business principles, was a better form of investment than any other, went into the mountains to undertake their exploration. He commenced the work with two men. The results were equal to his expectations, and purchasing the interests of his co-owners in the property, he continued the work until the Seven-Thirty mine was developed into one of the largest pro-



HENEAGE MACKENZIE GRIFFIN.

ducing and most profitable mines of Colorado, a position which it occupies at the present time.

Around the original two or three claims others have been grouped to the number of fifty, extending for sixteen miles on known veins. The main shaft on the Seven-Thirty vein has been sunk to a depth of 800 feet, and four miles of drifts and galleries, with an equal length of shafts, winzes and raises, have been opened. Records of ore shipments have been kept only in recent years, but these show a product of the mine amounting in value to \$1,100,000, after paying freight and smelting charges. At the present time a force of 150 men is employed in the Seven-Thirty mine, and the number is constantly being increased.

Mr. Griffin has always operated this mine under his own supervision, and it is certainly one of the most closely and carefully managed silver mines in this country. This, and all the mines owned by him, are worked under a form of the tribute system, unique in the West, which he has developed, whereby the leasers are induced to perform the proper exploration and development work.

About one year ago Mr. Griffin sold the Stevens mine, located near the Seven-Thirty, to an English company, the Mount McClellan Mining Company, Limited, of which he became the managing director. He has already brought this company to a paying basis, its first dividend having been declared during the past month. Besides these interests he is the largest stockholder and president of the Burleigh Tunnel Company, which is driving a tunnel 2,340 feet long to open the Seven-Thirty vein at a depth of 1,500 to 2,500 feet, and is also president of the Mammoth Gold and Silver Mining Company, and a director of several other mining and investment companies. He was elected a life member of the American Institute of Mining Engineers in 1884, and is an associate member of the Colorado Scientific Society.

Mr. Griffin is a man of extraordinary natural business qualifications and he has applied these talents in the conduct of his extensive mining interests in a manner which might well be copied by other operators. The earnings of his mines and the shrewd manner in which they have been invested have made him one of the richest men of Colorado.

EFFECT OF PRESERVATIVE AGENTS ON MINE TIMBER.\*

At Saint-Eloy, in Auvergne, experiments on the effect of antiseptic agents on the duration of timber underground, have been carried on since 1879, upon the following description of timber: (1) Oak from the Allier; 35 years old; (2) oak from Nièvre; 27 years old; fir from the Allier; 22 years old; pine from the Allier, 20 years old; and birch, beech and poplar; all from the Allier and each 5½ inches in diameter.

The method of treatment was as follows: A stem of each description of wood was sawn into fifty-two disks, each ¼ inch thick, the first and last of which were preserved in their natural condition above ground in the open air, but protected from damp; the remaining fifty were placed in a kind of cage in a damp level underground where the prevailing temperature was about 75° F. Two disks in each ten were left unprotected, while the remainder were subjected to treatment by the following substances: Sulphate of iron, sulphate of copper, chloride of zinc, creosote, oil paints, and mineral and vegetable tar. The strength of the first three solutions varied from 100 to 450 grams of the salt to 1 litre of water, and the period of immersion from one hour to four days. With the creosote, which was of the impure commercial kind, the disks were immersed for similar periods, while with the tars the time was five minutes. The painted disks were given three coats of the following colors: Pure white lead, white lead and yellow ochre, white lead and emerald green, red lead, white lead and lampblack, and white lead and prussian blue.

After preparation, the samples were kept in the office at the surface for 50 days before exposing them underground, and they were subsequently examined at five different periods, namely, six months, one and a half years, two and a half years, three and a half years and eight and a half years, the amount of alteration being noted at the various intervals. From these it appears that the unprotected specimens were almost all destroyed in a comparatively short time—two and a half years to three and a half years—the observed order of durability being as follows: 1. Beech; 2. Oak No. 1; 3. Poplar; 4. Oak No. 2; 5. Birch; 6. Fir; 7. Pine.

The preservative effects of the different substances employed are given in the following table, which represents the increase in the duration of the protected specimens in terms of that of the unprotected ones, the latter being taken as unit.

	Oak. No. 1.	Oak. No. 2.	Fir.	Pine.	Beech.	Birch.	Poplar.
Tar.....	28.7	24.6	263.5	87.5	105.4	26.2	150.5
Chloride of zinc.....	10.5	9.2	50.0	26.3	18.6	52.5	34.7
Oil paint.....	6.1	10.2	31.7	54.5	25.0	12.1	2.5
Sulphate of copper.....	42.1	26.1	12.0	8.0	1.8	2.5	15.5
Sulphate of iron.....	18.0	12.5	12.1	4.2	4.7	3.5	2.9
Creosote.....	1.7	0.9	2.5	4.4	0.6	3.3	1.3

**A New Use for Tubes Made by the Mannesmann Process.**—A new use has been found for tubes produced by the Mannesmann process, says the *Ironmonger*. At the funeral of Count von Moltke the troops were equipped for the first time with lances the shafts of which, instead of being of wood, as usual, were formed of very thin steel tubing, made at the Mannesmann works. The new process enables tubes to be rolled to such a degree of thinness that the shafts are actually lighter than wood, while at the same time possessing much greater elasticity and strength. The only drawback appears to be the less secure grip which the metal surface offers as compared with wood; but this can be overcome, it is said, by winding a thin strip of textile material round the shaft at the point where it is grasped. As soon as the question of price is satisfactorily settled, the substitution of steel for wood will probably be carried out throughout the army.

\* *Comptes Rendus Mensuels de la Société de l'Industrie minière*, November, 1890, p. 223.

PRODUCTION OF IRON AND ZINC ORES IN NEW JERSEY.

According to the statistics of the iron mines of New Jersey, obtained by Mr. Frank L. Nason, assistant state geologist, from mine owners and managers, published in the report of the Geological Survey of New Jersey for 1890, the total output during the past year amounted to 552,996 tons. The aggregate tonnage of the railway and canal transportation lines from stations in the State, and the amounts used at the furnaces which do not come in the reports of these companies, make a sum total of 537,066 tons. The difference is explained by the fact that not all of the ore which was mined during the year was shipped and this amount represents that which accumulates as stock at the mines in excess of that of the preceding year. The tonnage of the transportation lines is, however, fairly comparable with the output reported in preceding years, since the latter statistics also are from the returns received from these companies. Assuming the latter sum, the increase of 1890 above that of 1889 amounts to 54,897 tons or about 11%.

IRON ORE.					
Year.	Tons.	Year.	Tons.	Year.	Tons.
1830*	20,000	1870	302,636	1875	390,000
1855†	100,000	1871	450,000	1876	285,000
1861	164,900	1872	600,000	1877	315,000
1864	226,000	1873	665,000	1878	409,674
1867	275,067	1874	523,000	1879	488,028
				1880	393,710
				1885	745,000
				1886	500,501
				1887	547,389
				1888	447,738
				1889	482,169

\* Dr. Gordon's Gazetteer. † Dr. Kitchell's estimate. ‡ U. S. Census.

ZINC ORE.

The production of the zinc mines of the State, as per reports from the companies carrying the ore, amounted in 1890 to 49,618 tons, a decrease of 6,536 tons as compared with that of 1889, or equivalent to 11%. The production of zinc ore in preceding years was as follows:

Year.	Tons.	Year.	Tons.	Year.	Tons.	Year.	Tons.	Year.	Tons.
1871	22,000	1878	14,467	1881	49,178	1884	40,694	1887	50,220
1873	17,500	1879	21,937	1882	40,138	1885	38,526	1888	46,377
1874	13,500	1880	28,211	1883	56,085	1886	43,577	1889	56,154

ZINC-ORE MINING IN SWEDEN.\*

The position of Sweden as a zinc-producing country is mainly due to the work of the Vieille Montagne Company, which shortly before 1860 purchased the Ammeberg ore deposits, and built large dressing floors and a



RAPID TRANSIT FOR NEW YORK; THE FOUR-TRACK TUNNEL.

railway to navigable water for the export of the product. These mines are still the principal contributors to the total produce of the country—72% in 1889, the next place being held by the neighboring Laggesta mines, which, after lying idle for several years, were reopened in 1887, and in 1889 produced nearly one-fifth of the quantity raised at Ammeberg. The yield for the three years, 1887 to 1889, inclusive, was as follows:

Mines.	1887.	1888.	1889.
	Tons.	Tons.	Tons.
Ammeberg	41,673.5	42,195.4	43,069.0
Laggesta	561.0	3,963.6	7,784.0
Langfallsgruben	1,789.7	1,653.2	2,760.4
Dannemora	1,102.3	1,567.7	2,116.0
Tylshytte	.....	730.3	1,865.3
Kafveltorp	776.7	444.6	824.5
Sundry mines	332.1	9.1	1,021.8
Total	46,241.3	49,971.9	59,331.0

As regards the yield of the ore of the total output of 126,883 tons at Ammeberg during the years under review, 22,415 tons, or about 18%, were lump blende, which required no dressing, but only crushing and roasting. The remainder of the output, 82%, or 102,922 tons, were mixed ore stuff, which by dressing gave 43,529 tons of smelting ore, or 1 ton of the latter to 2.37 tons of the former. In the same period 64,410 tons of ore were roasted, giving 59,504 tons of calcined ore for export. In the dressing operations 5,533 tons of lead ore were saved as an accessory product, or about 4% of the weight of the zinc ore treated.

**Steel Railway Sleepers near the Sea or over Salt Soil.**—The government of India has recently ordered that steel railway sleepers are not to be used near the sea on account of their rapid deterioration. The steel sleepers of the broad-gauge State railway pattern cost \$3,572 per mile in England and the cost of renewal is consequently heavy. They are regarded as particularly objectionable, says the *Indian Engineer* for railways in close proximity to the seaboard.

\* *Oesterrichische Zeitschrift fuer Berg- und Huetteneesen*, vol. xxxix, 1891, p. 106.

RAPID TRANSIT FOR NEW YORK.

The Board of Rapid Transit Railway Commissioners of the city of New York held a meeting on the 27th instant and decided upon a route for an underground four-track electric railway through the west side of the city. The meeting of the commissioners was attended by President William Steinway and Commissioners John H. Starin, John H. Inman, Eugene L. Bushe and Samuel Spencer. The conclusions of the Commission were embodied in the following resolutions, unanimously adopted:

*Resolved*, That after a thorough investigation, it is the sense of this board that any additional rapid transit system for the City of New York should embrace the following essential features:

1. That it should be such as to provide not only for present needs, but also be susceptible by additions, and not by radical changes or alterations, of such expansion as the future growth of the city may require.

2. That it should provide for express trains at high speed for long distances and for way service for intermediate distances upon separate tracks so located as to facilitate at proper intervals an exchange from express to local and from local to express trains.

3. That the surface of the streets and avenues in the city should be obstructed to the least possible extent, and that wherever surface ground is required private instead of public property should be used, if practicable.

4. That the first lines of railway to be constructed should be on or near the important thoroughfares, coincident—or as nearly so as possible—with the main arteries of travel.

*Resolved*, That as meeting these requirements in the manner most feasible for the west side of the city, this board hereby approves of a plan for an underground four-track railway under Broadway, from a point at or near South Ferry to Fifty-ninth street; thence under the Boulevard to a point at or near One Hundred and Sixty-ninth street (with such length of viaduct at and near Manhattan street as may be necessary); thence under Eleventh avenue, or under private property immediately to the west thereof, as may be found most convenient, to such point as the contour of the ground may determine; thence by a viaduct across Spuyten Duyvil Creek, and by tunnel or viaduct to the city limits.

*Resolved*, That the general plan of construction from, at or near South Ferry to near Forty-second street shall be either by double-decked tunnel, with two tracks upon each deck or four tracks on the same level, as may be found upon examination and survey most expedient, the whole to be at such depth below the curb line as not to disturb the surface or endanger building foundations; from near Forty-second street north to be four parallel tracks upon the same level, as near the surface of the street as practicable when in tunnel, but not in open cut at any point.

*Resolved*, That the stations for such line of railway shall be upon property acquired for the purpose, and shall be provided with ample elevator capacity wherever the platforms shall be 20 feet or more below the curb line.

*Resolved*, That the motive power for such railway shall be electricity or some other power not requiring combustion within the tunnel.

*Resolved*, That the engineers of this board be and are hereby instructed to make

the necessary surveys and prepare in detail the plans and specifications for such railway, and submit the same promptly to this board for its further action in finally determining a general plan for submission to the Common Council, in accordance with the provisions of the Rapid Transit Act of Jan. 31, 1891.

Although nothing is said in the report regarding engineering and financial details, both these important incidents to the plan reported have been exhaustively considered, and it is certain that if private capital can be obtained for any kind of adequate rapid transit it can be obtained for the route and system recommended. The engineering work, including the preparation of plan for the Common Council, is in the hands of able men, Mr. William E. Worthen, and his assistant, Mr. William B. Parsons, both of whom have had much experience in this direction. While the plans and details of the rapid transit line just adopted are being prepared, the Commission will consider the selection of a route for the east side of the city. The route adopted for the west side, and the probable appearance of a station above Forty-second street, are shown in the accompanying cuts, for which we are indebted to the New York Recorder.

**Synthesis of Kainite and Tachydrate.**—Kainite, one of the Stassfurt minerals, having the composition  $KCl \cdot MgSO_4 \cdot 3 H_2O$ , may be reproduced artificially, says A. de Schultzer in *Compte Rendue*, 111, p. 928, by evaporating on the water-bath molecular proportions of potassium sulphate and magnesium sulphate with a large excess of magnesium chloride. The compound separates out in monoclinic crystals of 1 mm. to 5 mm. in length, which have the form and specific gravity of the natural mineral. The fact that the compound is not produced in the cold throws light on the mode of formation in nature. Tachydrate, another of the Stassfurt minerals, having the composition  $CaCl_2 \cdot 2 MgCl_2 \cdot 12 H_2O$ , may be formed by evaporating a solution of magnesium chloride with excess of calcium chloride on the water-bath. When sufficiently concentrated it is left to crystallize, large rhombohedral crystals being formed which possess the form and specific gravity of the natural mineral.



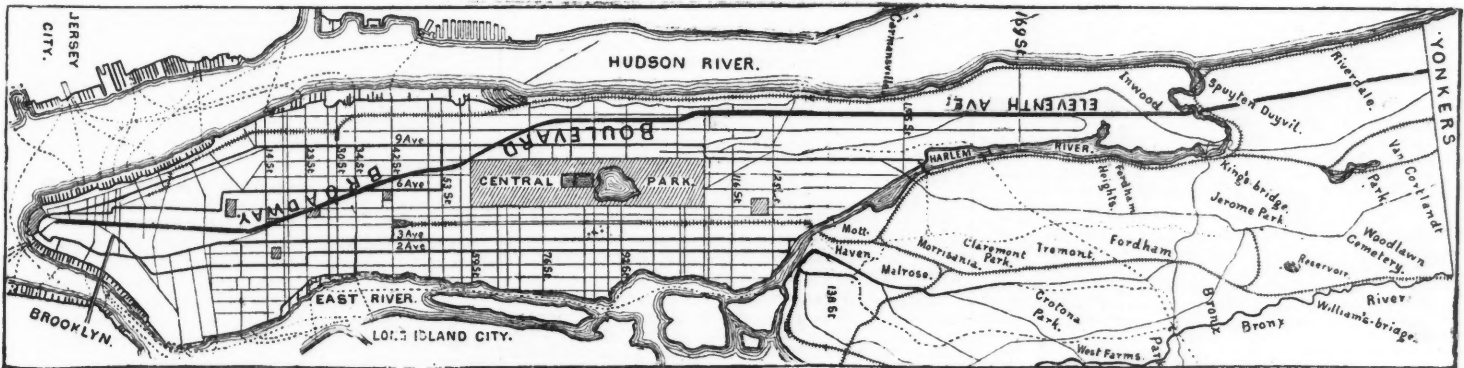
**Utilization of By-Products of Mineral Oil Manufacture for Alkali-Making.**—According to A. Veith and C. Schestopal, in *Dingler's Polytechnische Journal*, 279, p. 21, the acid and alkaline waste liquors obtained in purifying mineral oils contain sulphuric acid, caustic soda and higher hydrocarbons. It is proposed to unite these semi-liquids to obtain neutral sodium sulphate. In adding to this two-thirds of its weight of calcium carbonate and calcining, large quantities of soda are obtained. It is intended to carry out the experiments on a large scale, and so far the advantages claimed for this process are: An intimate mixture of the ingredients in consequence of their semi-liquid state at atmospheric temperature, and (2) the greater reducing action and heat developed by the combustion of the hydrocarbons in comparison with that by using "slack."

**The Topographical Survey of Connecticut.**—The topographical survey of Connecticut, which has been in progress for some time under the direction of a State commission appointed for that purpose, is now practically completed. The results of the survey will be published in 30 maps drawn to a scale of two miles to the inch. It is expected to have the drawings of the maps finished by July, 1892. Professor Brewer, of Yale University, chairman of the commission, states that the maps will give the contours and show the swamps, roads, forests, country houses and the county and township lines. The importance of the maps may be judged from the fact that the size of the townships and counties is very vaguely known, while the area of the State cannot be estimated without liability to an error of several hundred square miles.

**Value of Minerals and Gems Produced in India in 1889.**—The total value of minerals and gems produced in British India during the year 1889, says the *Indian Engineer*, amounted to 1,72,67,357 rupees (the rupee is now worth 32.2 cents), and those in Native States to 71,70,222 rupees, making a total of 2,44,37,579 rupees. Bengal heads the list with 58,47,439 rupees; next comes Mysore with 51,13,104 rupees; then Madras with 33,78,707 rupees; Bombay with 21,05,602 rupees (this includes Sindh and Native States), etc., and Coorg 28,185 rupees. As regards the production of gold, Mysore stands pre-eminent, with a money value of 42,62,050 rupees, followed by Madras with 1,39,473 rupees. The other places are Punjab, 14,866 rupees; Kashmir, 6,020 rupees; Northwestern Provinces and Oudh, 4,400 rupees; Bengal, 3,000 rupees, and Burma, 1,800 rupees.

ally increased in thickness from year to year, its lower part being changed to ice. When large portions of continents became thus ice-coated, the storms sweeping over them would be so rapidly cooled that the greater part of their snow-fall would take place upon the borders of the ice-sheet, within probably from 50 to 200 miles from its margin; but the snow-fall during the advance of the ice was probably in excess of the amount of evaporation and melting over the whole ice-covered area. In New England and New York the average ascent of the ice was from 25 to 30 feet per mile for the first 100 to 200 miles from its boundary. Toward its center the slope diminished, as on the interior ice of Greenland; but the ice-sheet enveloping the northeastern part of North America probably attained, as estimated by Prof. Dana, a maximum thickness of about two miles on the Laurentian highlands between the River St. Lawrence and Hudson Bay.

**The Precipitation of Manganese as Ammonium Manganous Phosphate.**—The determination of manganese by the usual process of precipitation as dioxide by bromine and subsequent ignition, is subject to two sources of error: First, the precipitate always carries down some of the potassium or sodium salts, whilst, if ammonium acetate be employed, the solution must be made alkaline before the precipitation by bromine, and the separation from calcium is then rendered less sharp. Secondly, the composition of the ignited precipitate varies somewhat according to the temperature of ignition and other causes. It is, therefore, now customary to redissolve the manganese dioxide and to reprecipitate it as ammonium manganous phosphate, as proposed by Wolcott Gibbs. Mr. A. G. McKenna, in the *Technology Quarterly*, 3, p. 333, states that he has examined this method of determination with the object of ascertaining what conditions are essential to accurate results. He finds that no appreciable error is introduced by precipitation and boiling in glass vessels, and that the precipitate is equally insoluble in hot water and in solutions of ammonia or ammonium nitrate. In fact, ammoniacal water dissolves a perceptible quantity of the precipitate when iron is present. The essential condition is that the precipitated ammonium manganous phosphate must be boiled long enough to transform the whole into characteristic silky crystals, which allow of easy filtration, and the time required is about eight minutes.



RAPID TRANSIT FOR NEW YORK; THE WEST-SIDE ROUTE.

**Improved Apparatus for the Evaporation of Brine.**—Mr. R. C. Wilson, of Birkenhead, England, has recently invented an improved apparatus for use in the manufacture of salt, in which the steam produced in the evaporation of brine in closed pans is drawn off and passed through a compressor, whereby its temperature is raised and its volume diminished. It is then delivered back again along tubes within the pans, and, being condensed, the latent heat evolved will evaporate more brine. The water formed by its condensation is still further utilized for heating the feed supply of brine. The pans are covered with wood and packed with a suitable non-conducting material. The steam which is being evolved from the pan should be at a rather higher pressure than that of the atmosphere outside. If desired, the steam from the first pan may be passed to a second and thence to a third. Each pan may or may not be furnished with a separate compressor driven by a common motor.

**The Corinth Ship Canal.**—Mr. Hill, the British vice-consul at the Piræus, in a recent report to the Foreign Office, states that the works on the Corinth Ship Canal, which had been suspended in 1889 on account of the financial difficulties of the Comptoir d'Escompte, were resumed on June 22, 1890. They were taken over by a Greek company of contractors, associated with an Athenian banker, and these have sublet the working to Messrs. Vlangaly and Matza, who again have given out small contracts to French and Italian contractors. When the work recommenced it was estimated that 3,358,000 cubic meters of earth had to be removed. It is hoped, eventually, to employ 2,000 men, and raise the monthly removal to 130,000 cubic meters; at present, however, there are less than 1,000 navvies employed, and the monthly result does not come anything near this quantity. Nevertheless, March 22, 1893, has been fixed for the opening, yet it is highly improbable that it will be finished by that date, but it is generally considered that the present company will be able to carry the work through. Whether the canal, even when completed, will be used for anything but coasting or Adriatic navigation is still to be seen, for apart from dues, which will of necessity be levied in order to pay interest on capital, the difficulties which attend navigation for larger vessels on either side of the isthmus must be considered.

**Climatic Conditions of the Glacial Period.**—According to a paper recently read by Prof. Warren Upham on the climatic conditions of the glacial period the formation of the great ice-sheet should be promoted by long-continued rather than an excessive cold, and an abundant supply of moisture by storms, giving plentiful precipitation of snow during more of the year than now, so as to include in the time of snow accumulation not only the present winter, but also the autumn and spring months. The summers, too, were probably cooler in glacial times than now, for their heat was not sufficient to melt away the accumulated snow, which gradu-

ally increased in thickness from year to year, its lower part being changed to ice. When large portions of continents became thus ice-coated, the storms sweeping over them would be so rapidly cooled that the greater part of their snow-fall would take place upon the borders of the ice-sheet, within probably from 50 to 200 miles from its margin; but the snow-fall during the advance of the ice was probably in excess of the amount of evaporation and melting over the whole ice-covered area. In New England and New York the average ascent of the ice was from 25 to 30 feet per mile for the first 100 to 200 miles from its boundary. Toward its center the slope diminished, as on the interior ice of Greenland; but the ice-sheet enveloping the northeastern part of North America probably attained, as estimated by Prof. Dana, a maximum thickness of about two miles on the Laurentian highlands between the River St. Lawrence and Hudson Bay.

**PATENTS GRANTED BY THE UNITED STATES PATENT OFFICE.**

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

TUESDAY, MAY 20TH, 1891.

- 452,773. Oiler for Engines. John G. Dailie, Springfield, O., Assignor to the James Leffel & Company, same place.
- 452,782. Pulverizing Mill. James K. Griffin, Brooklyn, N. Y.
- 452,794. Melting Furnace. William W. Keys, Bridgeport, Conn.
- 452,800. Method of Soldering Aluminum. Frank J. Page and Harry A. Anderson, Waterbury, Conn.
- 452,802. Apparatus for Removing Scale from Tubes in Steam Boilers. John Platt and Thomas Thorp, Salford, England.
- 452,813. Water Wheel. Fuller Trump, Springfield, O.
- 452,833. Rail Joint. William H. Connell, Wilmington, Del.
- 452,878. Well-drilling Machine. August C. Krassin and Thomas Boucher, Warren, Minn.
- 452,909. Machine for Making Tubes. Franz H. J. Wustenhofer, Arnsberg, Germany.
- 452,967. Process of Refining Linseed Oil. Thomas H. Gray, Bermondsey, Assignor to Thomas Baker Randall, County of Middlesex, England.
- 452,989. Method of Constructing Levees. George B. Boomer, Mount Pleasant, N. Y.
- 453,005. Apparatus for Producing Anhydrous Ammonia. Daniel L. Holden, New York, N. Y.
- 453,007. Apparatus for Rotating Cranes. Thomas James, Braddock, Pa.
- 453,050. Casting Plant. Thomas W. Welsh, Wilmerding, Pa.
- 453,107. Mining Car. Cornelius Burns, Burnside, Pa.
- 453,115. Mineral Wool. Charles H. Huhbell, St. Louis, Mo., Assignor of three-fourths to Frank J. Hunleth, Alexander Kilpatrick and Rachel Lowenstein, all of same place.
- 453,120. Furnace for Roasting Ores. Joseph Leyson and Bassett C. Leyson, Walkersville, Md.
- 453,137. Process of Making Basic Persulphate of Iron. Joseph Van Ruyambeke, Chicago, Ill., Assignor of one-half to William F. Jobbins, same place.
- 453,142. Apparatus for Feeding Hydrocarbon to Furnaces. John Burns, Rochester, Assignor of one-half to John H. Reynolds, Troy, N. Y.
- 453,143. Combined Exhaust Head and Smoke Cleaner. Marshall F. Eaton, Chicago, Ill., Assignor of one-half to Aaron G. Cromer, same place.
- 453,147. Boiler Tube Expander. Oliver Johnson, Kingston, Pa., Assignor of two-thirds to Mat. Sloan and William P. Somers, both of same place.
- 453,154. Triple Valve for Automatic Brake Mechanism. Frank Moore, Pittsburgh, Pa., Assignor to the Westinghouse Air Brake Company, same place.
- 453,159. Engineer's Instrument. John Paoli, Hoboken, N. J., Assignor to William Keuffel and Hermann Esser, New York, N. Y.
- 453,161. Rolls for Shaving and Perforating Iron. Zachariah V. Purdy, Vienna, Va.
- 453,162. Apparatus for Hardening and Tempering Steel and Iron. Elias E. Ries, Baltimore, Md.
- 453,164. Art of Repairing Metal Structures by the Aid of Electricity. Elias E. Ries, Baltimore, Md.

## PERSONALS.

Dr. Edward Orton, State Geologist of Ohio, is visiting the mining districts of the Pacific Coast.

Mr. John Gerber, president of the Yankee Boy Mining Company, is visiting the mine at Ouray, Colo.

Mr. F. J. V. Skiff, of Denver, has been appointed director of the Department of Mines and Mining of the World's Fair at Chicago.

Mr. James Calhoun has been appointed general freight agent of the Delaware & Hudson Canal Company, with headquarters at Albany, N. Y.

Mr. Otto F. Pfordtle, mining engineer, who recently returned from Peru, South America, sailed for Germany to-day. He will be absent until October.

Mr. Walter C. Hadley, M. E., of Lake Valley, New Mexico, late manager of the Silver Mining Company of Lake Valley, has been made chairman of the Socorro School of Mines.

Hon. E. P. Ferry, of Park City, Utah, manager of the Anchor Mining Company, was elected permanent president of the Trans-Mississippi Commercial Congress at the meeting held in Denver, Colo., on the 20th inst.

Mr. J. H. Burfeind, of the Alaska Treadwell Gold Mining Company, Limited, Douglas Island, Alaska, passed through this city this week on his way to Europe, where he will remain several weeks. On his return he will go to Utah.

Mr. Alexander Agassiz, the president, and Mr. E. D. Leavitt, the consulting engineer, of the Calumet & Hecla Mining Company have just completed their semi-annual tour to their company's mine and mills located in Houghton county, Michigan.

Messrs. A. S. Bigelow, of Boston, Mass.; Leonard Lewisohn, of New York, and John Daniell, of Oscola, Mich., are on their way home from Butte, Mont., where they went to inspect the property of the Boston & Montana Consolidated Copper and Silver Mining Company.

A board of army officers, to consist of Col. William P. Craighill, Maj. Daniel W. Lockwood and Capt. Thomas Turtle, have been ordered to assemble at the Lock near Louisa, Ky., to consider and report upon the subject of the dam to be built in the Big Sandy River near that place.

Hon. J. R. De Lamar, of De Lamar, Idaho, one of the most prominent mining men of that state, has offered to duplicate any sum that the citizens of Idaho may raise for an exhibit at the World's Fair. He is very enthusiastic upon the subject, and states that he is ready to subscribe \$100,000 or more if necessary. Capt. De Lamar is at present on his way to London to attend a meeting of the De Lamar Mining Company, Limited.

## OBITUARY.

Mayor James H. Luther died at Olean, N. Y., on the 23d inst., aged 65. He was a well-known manufacturer of oil-well supplies.

Houghton Duncan, for over forty years prominently connected with the copper-mining interests of the Lake Superior region, died in Hancock, Mich., on the 22d inst., aged 61 years.

Matthew T. Scott died at Bloomington, Ill., on the 21st inst., aged 63 years. He owned a controlling interest in the McLean coal mines at Bloomington, and recently disposed of the Cumberland Iron Works, near Nashville, Tenn., with 43,000 acres of land, to an English syndicate.

Francis A. Wilber, Professor of Analytical Chemistry at Rutgers College, died of pneumonia, at New Brunswick, N. J., on the 25th inst. Prof. Wilber was born in Michigan in 1851, and graduated from Rutgers in 1879. He was appointed to the professorship in 1883.

Henry Lane Kendrick died in New York on the 24th instant. He was born at Lebanon, N. H., in 1811, graduated from the West Point Military Academy in 1835, and was then made Brevet Second Lieutenant in the Second Infantry. After serving as an assistant professor at West Point he was appointed to the Second Artillery, in which he rose to be Captain in 1847. He was engaged in the Mexican War, and was made Brevet Major for gallant and meritorious conduct in the defense of Pueblo. Then he was variously employed in garrison and frontier duty until 1857, when he was appointed Professor of Chemistry, Mineralogy and Geology at the Military Academy. He held this position until 1880, when he was retired from active service at his own request. He was appointed Brigadier General of United States Volunteers in 1861, but declined the commission. The degree of A. M. was conferred on him by Dartmouth College in 1844, and that of LL.D. by the University of Missouri in 1868 and by the University of Rochester in 1869. Col. Kendrick was an honorary member of the Union League Club, and had been its Vice-President.

Thomas Beaver died at his residence at Danville, Pa., on the 19th inst., in his 77th year. He

was born in Pfoutz's Valley, Perry County, Pa., in 1814. His father, Rev. Peter Beaver, was a well-known Methodist preacher. In 1837 Mr. Beaver went to Philadelphia and entered the wholesale dry-goods house of Bray, Barcroft & Co. In 1840 he became a partner in the concern, and in 1844, on the retirement of Mr. Bray, the firm name was changed to Barcroft, Beaver & Co. He severed his connection with the firm in 1858, and went to Danville to wind up the affairs of the Montour Iron Company, which had gone down in the general crash of 1857, his old firm being one of the largest creditors. After acting as trustee for the creditors for a year Mr. Beaver formed a partnership with one of his co-trustees, Isaac S. Waterman, and the firm of Waterman & Beaver purchased the entire interest of the creditors in the personal effects of the old company in 1859, and in 1860 became the owner of the real estate also. The new firm rapidly built up a large business in the manufacture of iron and in general merchandise. In 1877 Mr. Beaversold out his interest in the Danville properties to his partner and retired from active business with a very large fortune. He still, however, retained his interest in the coal property at Kingston, which was incorporated as the Kingston Coal Company. He was also largely interested in railroad affairs and in the Gogebic iron-ore region of Michigan. He leaves a large fortune. His public benefactions have been numerous and large.

## SOCIETIES.

The American Society of Mechanical Engineers held a reunion on the evening of the 28th inst. at the house of the society, No. 12 West Thirty-first street. Dr. R. W. Raymond delivered a lecture on "Egypt, New and Old." A portrait of the late Henry R. Worthington was afterward unveiled. The picture was given by Charles C. Worthington.

## INDUSTRIAL NOTES.

The Allentown Iron Works, at Allentown, Pa., Track No. 5 was lighted on the 25th instant. The new railroad spike department of the Allentown Rolling Mills went into operation on the same date.

The Standard Steel Casting Company, Chester, Pa., settled the strike of its employes, which has been carried on for the past three months, on the 25th instant, by arbitration. The shop was made a union one.

The Stearns-Roger Manufacturing Company has been incorporated in Denver, with a capital of \$250,000, to take over the business of Stearns, Roger & Co., manufacturers of mining machinery, with works at Pueblo, Colo.

The Brooke Iron Company's sheet mill, rolling mill and nail factory, at Birdsboro, Pa., which have been idle three weeks because of a strike, will resume operations on the 1st prox. The differences have been adjusted.

Messrs. Gordon, Strobel & Laureau, Limited, of Philadelphia, Pa., have just closed a contract with the Topton Furnace Company, of Topton, Pa., for a plant of two chimney-top fire-brick stoves; also new bustle pipes, tuyere stock, gas mains and down comers.

The Atlas Tack Corporation, a tack combination, was formed at Boston on the 22d inst. It acquires the business of the five largest tack manufacturing concerns in the United States. The firms in the consolidation are located in Massachusetts, and represent nearly five-eighths of the tack-manufacturing interests of the country.

The American Screw Company, of Providence, R. I., is about to build a factory in Leeds, England, to be located on the banks of the Aire. It will cover an acre and a half of ground. In this factory the company will place a lot of its machinery now idle in this country. The McKinley bill and the high cost of raw material consequent is assigned as the reason of this change.

The Hancock Chemical Company's works, located near Hancock, Houghton county, Mich., were destroyed on the 24th inst. The buildings were ignited by forest fires. A number of explosions assisted in their destruction. The loss is estimated at \$25,000. The plant was owned by the representative capitalists of the Tamarack-Oscola interests. Blasting powder in its different grades was the product manufactured.

The Berlin Iron Bridge Company, of East Berlin, Conn., has issued an excellently prepared volume of 102 pages, generously illustrated, showing types and examples of the various forms of iron construction work of which it makes a specialty. These include iron bridges, roofs, buildings, suspension bridges, corrugated iron fire-proof doors and shutters, turn tables, beams, columns, girders, etc. The company has designed and built during the past few years some of the largest manufacturing buildings to be found in America, many of which are illustrated in this volume.

On June 15th the executors of the will of the late J. H. Shoemaker will offer for sale the decedent's interest in the firms of Shoemaker & Co. and Shoemaker, Speer & Co., of Pittsburg. The sale will be at public auction, at the Stock Exchange Building, in Pittsburg, at 10 o'clock. The

property of these firms consists of two large blast furnaces and the Juniata Iron and Steel Works in Pittsburg and 500 acres of coal and 45 acres of surface in Westmoreland county, Pa. The decedent held a five-thirty-second interest in the two firms, which interest has been appraised at \$208,079.82. The sale of this interest is rendered necessary in the course of the settlement of the estate.

The American Electric Elevator Company, of New York, has recently put in operation an electric elevator in the Grimes Building, Kansas City, which runs at a speed of 250 feet per minute, carrying an average load of 1,200 pounds, with 9 HP. This elevator is giving great satisfaction, and runs more smoothly and quietly than the average hydraulic elevator, and nearly equal to the very best hydraulic. The company is now installing a number of its elevators in various parts of the country from Minnesota to Texas, and is at present placing one in the Duquesne Traction Company's car house at Pittsburg, Pa., for the purpose of raising the cars, a load of 10,000 pounds, from the tracks on the first floor to the paint shop on the floor above.

The case of the Edison Electric Light Company against the United States Electric Lighting Company was begun in the United States Circuit Court in New York on the 26th inst. The action involves a patent granted to Edison in 1880, under which his company maintained that it has the exclusive right to manufacture incandescent electric lamps. Should judgment be given in favor of the Edison company it would be equivalent to an income of \$2,000,000 a year until the expiration of the patent in 1897, giving the company a monopoly in the manufacture of incandescent lamps. The action is for an accounting and to enjoin the defendant company from manufacturing or selling incandescent lamps. The defendant company disputes Edison's claims in general, and denies that he is the originator of the modern system of incandescent lighting.

## MACHINERY AND SUPPLIES WANTED AT HOME AND ABROAD.

If any one wanting Machinery or Supplies of any kind will notify the "Engineering and Mining Journal" of what he needs, his "Want" will be published in this column.

Any manufacturer or dealer wishing to communicate with the parties whose wants are given in this column can obtain their addresses from this office. No charge will be made for these services.

We also offer our services to foreign correspondents who desire to purchase American goods, and shall be pleased to furnish them information concerning American goods of any kind, and forward them catalogues and discounts of manufacturers in each line, thus enabling the purchaser to select the most suitable articles before ordering.

These services are rendered gratuitously in the interest of the subscribers and advertisers; the proprietors of the "Engineering and Mining Journal" are not brokers or exporters, nor have they any pecuniary interest in buying or selling goods of any kind.

## GOODS WANTED AT HOME.

2,242. A full line of sash, door, and blind machinery. Georgia.

2,243. A box board pointing machine, 4 cut-off saw tables, 4 improved rip-saw tables, 1 self feed box board matcher, 2 box shook bundlers, and an improved binder. Kentucky.

2,245. A small mill to grind 5 or 6 bags of nit. soda a day—either new or second hand. Michigan.

2,246. Machinery and supplies and bids for complete acid works. Georgia.

2,247. Machinery for making bark collars. Alabama.

2,248. A 75 horse-power horizontal engine of modern type. New York.

2,249. A 110 horse-power locomotive boiler, with hoiler feeder and all fixtures complete. Also a full set of furniture machinery, shafting and pulleys. North Carolina.

2,250. Two run stones for making cornmeal; also b lts, packers, elevators, conveyors, water-wheels, shafting, and pulleys. Georgia.

2,251. Foot and hand power scroll-sawing, broom, and brush machinery; also lathes for light work. Georgia.

2,252. Water motors and water meters. Georgia.

2,253. A 20 horse-power engine to drive a 56 and a 30 inch saw. Kentucky.

2,254. A good second-hand shaft 2½ inch x 12 feet long, with three pulleys, one 12½ inch, one 10 inch, and one 6 or 7 inch face. Kentucky.

2,255. A good second-hand iron planer 60 inches by 60 inches to 72 inches by 72 inches by 16 feet to 20 feet. Colorado.

2,256. Bids on both an electric and dummy line, four miles long. Georgia.

2,257. A full set of supplies for a broom-handle and broom factory. Tennessee.

2,259. An oxy-hydrogen blowpipe for laboratory use. Washington.

2,260. A hand-power hydraulic testing machine for ascertaining the tensile and crushing



strength of vitrified brick, stone, and all building material. Washington.

2,261. An electric-light plant. Georgia.

AMERICAN GOODS WANTED ABROAD.

2,233. Machinery for the extraction of the fibers of the agave or maguey produced in Mexico and South America.

2,240. A portable drilling machine with electric power for drilling holes in plates, castings, etc. Sweden.

2,244. A combination (letter) lock to be fixed to a strong wooden box with a door 2 inches thick. Size of lock required about 4 inches, with a combination capable of being changed from time to time. Mexico.

2,258. Machinery for making soap, candles, and starch. Mexico.

#### GENERAL MINING NEWS.

STANDARD OIL COMPANY.—The transfer of the McKirgan Oil Company's property to this company was recorded on the 23rd inst. in Newark, N. J. The property was valued at about \$200,000.

TENNESSEE COAL AND IRON AND RAILROAD COMPANY.—This company earned \$62,500 in April. Of this amount it is stated that \$26,500 was net. On the 22d inst. a gas explosion in shaft No. 1, of the Pratt mines, Alabama, owned by this company, killed five negro convict laborers and one free white laborer.

#### ALABAMA.

##### PICKENS COUNTY.

It is reported that a vein of galena ore containing silver has been found in the northern portion of this county, in a formation described in the State geological reports as the southern boundary of the coal measures of the State.

#### ARIZONA.

##### MOHAVE COUNTY.

ARK.—A large hoisting plant will arrive from the East in a few days for this mine, a ledge parallel to the San Antonio, near Mineral Park. The Ark as far as developed has produced quantities of rich copper-silver ore, but the large amount of water has greatly retarded the development of the property.

DISTAFF.—The new hoisting plant on this property is now in operation, and sinking on the main shaft has commenced. The shaft will be run down deeper than any in that section of country, and developments are awaited with interest by mine owners of the vicinity. The property, paid handsomely on the surface and hopes are entertained that it will prove as valuable lower down.

#### PIMA COUNTY.

(From our Special Correspondent.)

SAN FRANCISCO, May 21, 1891.

CROCKER MINING COMPANY.—Developments during the past week have been quite encouraging. The indications in the south drift, 440-foot level, are very good, promising a decided improvement in grade. Crosscuts have shown the vein to be 80 feet wide at some places, and other drifts will be run to still further ascertain what reserves the company has to draw upon.

PEER MINING COMPANY.—Work has been much retarded, owing to a lack of men. Good progress is being made in the raise on the 100-foot level. The vein is strong and shows a good body of milling ore. Shaft No. 1 is down 44 feet below the 100 level.

#### PINAL COUNTY.

CENTRAL SILVER MINING COMPANY.—President Hillard, of this company, called a meeting of stockholders for the 27th inst. at the company's office in St. Louis for the purpose of devising some plan to raise money with which to resume work on the property. The directors are of the opinion that \$3,000 will be all that is required, and to contributors toward this fund the bonds of the company will be issued as security, or the output of the smelter can be pledged for the repayment of the sum so advanced.

#### YAVAPAI COUNTY.

Captain D. B. Keating, from Camp Hattersley, reports the experimental hydraulic work there as satisfactory. About 50,000 tons of tailings have been shot through the sluice boxes. The little giants will probably run five or six weeks yet before a change is made for general clean up and more extended operations next fall.

(From our Special Correspondent.)

CROWNED KING MINING COMPANY.—The mine never looked better than at present; five feet of high-grade ore is showing in the deepest workings. A train of 30 jacks is kept employed packing ore to the Black Cañon road, whence it is being hauled in wagons to the stamping mill at Prescott.

#### CALIFORNIA.

##### AMADOR COUNTY.

BRUNSWICK CONSOLIDATED GOLD MINING COMPANY.—H. R. Lounsbury, treasurer of this company, has received a letter of May 14th from Mr. E. Fitzgerald, superintendent of the mine, from which the following extracts are made: The ledge is now two feet in width, and from the indications likely to be much wider. The hanging wall is full of stringers making to the bedrock, and it is not un-

likely to fill the full size of the drift with quartz. It is really looking so well that he expects to get the good chute of ore very soon; as it is, the showing by assay is high. The sinking of the shaft will be resumed probably next week. The yield per ton of rock is given at \$35.13.

PLYMOUTH MINING COMPANY.—This mine, under Mr. W. T. Jones, as superintendent, has been undergoing a continuous system of exploration, with good ore in sight. From the 1,245 foot level a drift has been run 1,100 feet into the Indiana ground, and a vein 15 inches wide of very good ore encountered. Twenty stamps of the old mill are now dropping, and should the vein widen, as it usually has done, the remaining 40 may be started in the near future.

#### NEVADA COUNTY.

ORIGINAL EMPIRE MINING COMPANY.—This property, the oldest working mine in this district, has improved wonderfully during the last year, under the very efficient superintendency of Geo. W. Starr. A large force is employed, and some 25 tributaries are also at work in the mine. The 1,700 and 1,800 are the principal levels, and are full of promise.

#### PLACER COUNTY.

MAYFLOWER GRAVEL MINING COMPANY.—The hullion shipments from this mine for March were \$17,851.73; for April, \$29,533.97. The assets of the company are at present said to be \$20,374.84, and the liabilities \$36.12. The company, it is reported, has canceled about \$60,000 indebtedness during the last six months, and is now free of debt. About 70 men find employment about the mine, under the efficient management of Superintendent H. T. Power.

(From our Special Correspondent.)

CINCINNATI BELLE MINING COMPANY.—At the bottom of the shaft, 110 feet from the surface, a beautifully grained white quartz, thickly studded with free gold, has been uncovered. The quantity taken out so far has been very limited; but it is said that the indications for more are very good. The specimens referred to yield all the way from \$2,500 to \$3,000 per ton.

#### COLORADO.

Mineral surveys approved by the United States Surveyor General of Colorado during the week ending May 23d, 1891:

Survey Number, 6,895; land district, Durango; name of claim, Contact and Confidence; 6,903, Central City, Hudson; 6,801, Montrose, U. S. Bell, Memphis and Silver Lockett; 6,898, Central City, East Centennial and Eleventh Hour; 6,826, Leadville, Inspector. Amended survey, 4,527, Leadville, Gold Wedge.

#### CLEAR CREEK COUNTY.

AMERICAN SISTERS MINING COMPANY.—This company has temporarily leased the Miners' Sampling Works to crush and sample its ores.

COLORADO CENTRAL CONSOLIDATED MINING COMPANY.—The case of John Turck against this company, which has been pending since 1885, came up before the United States Circuit Court at Denver last week, and on the 20th a verdict was given in favor of the plaintiff. The company is not satisfied with the result, as in the opinion of its officers the instructions of Judge Hallett were very much adverse to them, and on this ground it will carry the case to the United States Supreme Court.

#### GUNNISON COUNTY.

MAY-MAZEPPA MINING AND MILLING COMPANY.—The main ore chute was reached by the 550-foot level on the 20th inst., at a distance of 140 feet from the incline. The ore is said to be of better quality than in the 500-foot level and the chute apparently larger. The 550 will be the last level run from the incline as the Dividend shaft now down 70 feet will open the ground more economically.

#### LAKE COUNTY.

BANKOK-CORA-BELLE MINING COMPANY.—The secretary of this company reports receipts during April, \$36.00; disbursements, \$1,424.65. The cash balance in the treasury May 1 was \$10,394.39. Excellent progress is being made in sinking the new shaft.

SILVER CORD COMBINATION MINING COMPANY.—The eleventh annual meeting of this company was held in Leadville on the 19th inst. Of the 450,000 shares composing the capital stock, 303,433 were represented in person or by proxy. The following directors were elected for the ensuing year: Charles H. Gross, J. B. Grant, Tingley S. Wood, A. V. Hunter, Theodore D. Borden, W. M. Warne, W. A. Dripps, W. W. Weighley and A. G. Buzby. It was unanimously decided that the cross-cut tunnel project now being carried out be pushed to completion. The total length of the tunnel will be 2,850 feet, of which about 1,500 feet have been completed. A large concentrating mill is to be built at the mouth of the tunnel. Over seven miles of ditches and pipe line, to secure the necessary water supply, have been constructed, and the power house at the end of the line is rapidly approaching completion.

#### OURAY COUNTY.

MINE OWNERS' TRUST, LIMITED.—An important strike is reported in the Colorado Boy mine. A streak of ore two feet in width, assaying high in silver, is reported to have been uncovered at a depth of 50 feet from the surface.

#### PITKIN COUNTY.

Mr. H. B. Gillespie, late of Aspen, who sold his interest in the Mollie Gison Company to Mr. J. J. Hagerman, of Colorado Springs, last January, has been threatening to bring suit against the latter to recover his stock, alleging that the fact that a rich strike had been made in the mine had been concealed from him. Mr. Gillespie made these charges in an interview published in the *Rocky Mountain News*, whereupon Mr. Hagerman promptly sued him for libel, claiming \$50,000 damages.

LITTLE ANNIE MINING COMPANY.—This company has purchased the Iron, Eclipse, Richmond, and two fractional claims adjoining its property for \$50,000. The company now owns 2,000 feet along the apex of the vein. Mr. B. Clark Wheeler, president of the company, has withdrawn his application to list its shares on the Denver Mining Stock Exchange, on account of the demand of the directors of the latter that he should place 400,000 shares of stock in escrow as security that the lien on the property would be paid. Mr. Wheeler claimed that the 200,000 shares which he offered to deposit was quite enough for this purpose.

#### SAN JUAN COUNTY.

Messrs. Duykinck & Co., of Silverton, are now sampling an average of 10 car-loads of ore per day. Contracts have been let for the new works to be erected at Durango. The firm has been appointed sole agent for the San Juan Smelting and Mining Company for the Silverton district.

#### SAN MIGUEL COUNTY.

BELMONT.—It is reported that this gold mine has been sold to a syndicate of Englishmen living in Shanghai, China, composed principally of shareholders in the Sheridan Mining Company, for \$100,000, and that the new company will immediately increase the capacity of the mill to 100 tons of ore per day. Judge Costigan, of Telluride, was the owner of the property, and the sale was negotiated by Mr. J. H. E. Waters, manager of the Sheridan Mining Company. The Belmont was first discovered in 1875, but has never been worked extensively and is comparatively undeveloped at the present time, although there is little doubt but that it is a good property. The Tom Boy mine is included in the sale.

SMUGGLER MINING COMPANY.—The directors of this company and the Union Consolidated Mining Company held their annual meeting in Denver on the 18th inst., and elected the following officers for both companies: Hon. J. A. Porter, president; Richard Pearce, vice-president, and A. H. Fowler, secretary and treasurer. The consolidation of the two companies, which we mentioned in our issue of May 16th, has not yet been consummated. The matter was considered at the meeting on the 18th inst., and preliminary steps were taken for effecting the consolidation on June 29th. The shareholders in the two companies are practically the same, and the carrying out of this plan is simply a matter of detail.

#### SUMMIT COUNTY.

LITTLE CORPORAL.—On the 27th inst. three miners in connecting a raise with an abandoned winze, struck foul air and were immediately overcome by the gas. A fourth man climbed to the top of the raise and carried one of the insensible men down, but on returning was himself overcome and not found until too late. The man whom he carried down recovered soon after reaching the air, but the others died.

#### IDAHO.

##### ALTURAS COUNTY.

RED CLOUD MINING COMPANY.—This property, owned and operated by Col. E. B. True, L. Price, E. B. Lemmon and the Porter Bros., is said to pay the handsome dividend of \$10,000 per month. Ore is now being taken from the fifth level, 600 feet from the surface, and the vein is showing an average about two feet wide. It assays about 60% lead and 65 to 70 ounces silver.

RED ELEPHANT MINING COMPANY.—This mine owned and operated by Col. G. V. Bryan and G. W. Venable, is an old property, on which good paying ore, assaying 65 per cent. lead and 125 ounces silver has recently been found. Some of the ore runs even higher. Three veins are being worked from the main tunnel which is 1,100 feet in length. One of these veins is eight feet wide; there is a raise of 90 feet. Work is being vigorously prosecuted on the first and fourth levels. The company has a concentrator of a reported capacity of 52 tons daily. Colonel Bryan is superintending the mining operations.

##### CUSTER COUNTY.

DICKENS-CUSTER MINING COMPANY, LIMITED.—The mill was put in operation on the 11th inst.

##### OWYHEE COUNTY.

DE LAMAR MINING COMPANY, LIMITED.—During the month of April the mill worked 25 days, and crushed 1,250 tons of ore. Bullion to the amount of \$38,000 was shipped, and smelting ore estimated at \$10,000, making the total produce for the month \$48,000. The total expenses were \$18,500.

POORMAN MINES, LIMITED.—The drift on the Oso vein is being pushed ahead for a connection with the Poorman shaft. The stope where the recent rich strike was made is holding out; 4 to 6 inches of this ore are very rich, while the entire crevice, 3 to 4 feet wide, is good milling ore. The



mine is being put in shape for a heavy output as fast as possible. A new mill, it is thought, will soon be built at the mine.

## ILLINOIS.

## COAL.

The coal operators of Spring Valley, after signing a scale for a year, took out the flat-bar screens and substituted diamond screens, making a difference of 200 or 300 pounds per ton in favor of the company. At a mass meeting of the miners on the 27th inst. it was resolved to take out their tools and quit work until the company put back the old screens or adopt the gross-weight system, the consideration of which is now pending before the legislature.

## INDIAN TERRITORY.

**CHOCTAW COAL AND RAILWAY COMPANY.**—Receivers Chadwick and Gowen, of this company, have filed their report in the United States District Court. It shows the total indebtedness of the company to be \$2,750,000; total receipts, \$533,860; disbursements, \$564,088; balance, \$29,717. Gross earnings for March are \$35,131; net, \$16,190. April gross earnings are \$56,946; net, \$24,479. Approximate receipts for the first 15 days of May, \$30,000. Miles operated, 65; constructed, 103.

## INDIANA.

The bituminous coal operators at Terre Haute have notified the striking miners that they will grant last year's prices for mining.

The miners at Clinton have accepted the price offered by the operators—70 cents per ton.

**CABOT COAL COMPANY.**—The officials of the United Mine Workers have declared a strike against this company because it has refused to submit to the board of arbitration. One thousand men are involved.

## IOWA.

The Phillips Coal Company imported 50 negroes on the 26th to displace the striking miners. The company has put them to work in the mines at Diamond. The aid of the sheriff of Appanose county was invoked to prevent violence, and no disturbance arose. The same policy will obtain in the mines at Foster, Mystic, and other places where this company has interests. Other operators say that if the strike continues another month there will be at least 3,000 negroes imported to dig coal.

## KANSAS.

A special report shows that during the week ending May 23d the output of ore from the mining districts of Galena and Empire City was: Rough ore, pounds milled, 1,950,450; zinc ore, pounds sold, 1,070,325; lead ore, pounds sold, 54,650; sales aggregated a total value of \$12,875.

## MICHIGAN.

## COPPER.

Published information regarding the mooted consolidation of the Detroit & Lake Superior Smelting Works at Hancock, Mich., and the Tamarack-Osceola works at Dollar Bay, Mich., has been rather meager. The fact is, says the *Boston Herald*, that a preliminary agreement has been reached and awaits completion of details. The consolidation applies only to the smelting branch of the works. Each company will continue to manage its other departments. The smelting works will be brought together, it is understood, upon equal terms. A new company will be formed to be managed by the Tamarack-Osceola people. The capital stock has not been fixed upon yet. A meeting will be held in July to perfect the deal.

**ADVENTURE MINING COMPANY.**—Steps are being taken to resurrect the property of this company, which is located in Ontonagon county. Superintendent Harris, of the Quincy, mine has the work in charge. The first step, after the necessary machinery is on the ground, will be to sink a shaft 100 feet deep on the vein, and drift laterally therefrom. Roads leading to the location are being put into good shape for the transportation of supplies and machinery.

**CALUMET & HECLA MINING COMPANY.**—The *Calumet News* notes a number of improvements which have been made and are being carried forward on this company's property. The Calumet No. 1 and the Hecla No. 1 shaft-houses have been taken down, and also part of the Hecla No. 2; in the place of the last a shaft and rock house combined is in course of erection. It is generally understood that as soon as this is done and hoisting re-commenced, the No. 3 shaft-house at the Hecla will be pulled down, and a rock and shaft-house combined built on the site; at the same time the shaft will be enlarged. The No. 7 shaft is now down to about the 27th level. Most of the timbers for the rock-house which is to be erected at this shaft are on the ground. All the rock sent from the Hecla end to the stamp-mill is hoisted in Nos. 3 and 6 shafts, and in the South Hecla from Nos. 8, 9 and 10, 11 and 12. At the Calumet end three shafts are in commission, viz., Nos. 2, 4 and 5. Calumet Nos. 1 and 3 and Hecla No. 1 have been abandoned since the fire. In the Hecla No. 6 shaft stringers are done away with, the rails being laid directly on the sleepers and steadied by the occasional use of clamps run into the foot-wall. The extra room thus gained is utilized by the use of the larger skips.

A new departure is being made underground on the 27th, 29th and 31st levels, in the neighborhood

of Hecla No. 2. Cross cuts are being run east 80 feet into the foot wall, the rock from which is used in filling up the stopes on the lode, this being an experiment to determine whether a rock filling is cheaper than timber stulls. The big engine (Jumbo) at the Calumet is used for hoisting from Calumet Nos. 2, 4 and 5, and Hecla No. 3. The big engine at the Hecla is now only used for hoisting from No. 6. It will also hoist from No. 7 when that shaft is put in commission.

The *Marquette Mining Journal* furnishes the following information concerning the Red Jacket vertical shaft and its equipment. The work of sinking this shaft, which is now 2,500 feet deep, has been stopped on account of the lack of sufficient hoisting power. Two temporary hoisting engines will be ready for use in thirty days, however. Underground, the first cross-cut to the old workings, started at a vertical depth of 2,106 feet, has reached No. 4 Calumet shaft at the 36th level. A second cross-cut has been started at a depth of 2,296 feet and a third at 2,486 feet. The entrances to each of these cross-cuts from the mine are made through three openings, the center or direct one being on the east side, the others on the north and south sides. From the shaft they make a curve until they reach the main level, leaving a pillar of solid rock 32 feet 9 inches thick to support the openings. This arrangement makes it possible to run three tram-cars in each level to the stopping ground on the vein. It will be nearly a year before the three connecting drifts will be completed. Consulting Engineer E. D. Leavitt has designed the two hoisting engines, the "Minong" and the "Siskowit," which are to do permanent duty at this shaft. Their foundations have been laid and nearly all of the parts are on the ground. The endless rope system will be used.

**NATIONAL MINING COMPANY.**—No. 2 shaft of this mine has reached the fourteenth level. Drifting east and west is about to be commenced. Connection has been made with the winze at the thirteenth level. The fissure lode has been struck at the thirteenth level and about 200 pounds of copper taken out. All the pumps, plungers, pipes and rods have been removed from the mine, there being no further use for them since the adit for draining the mine was driven.

**TAMARACK, JR., MINING COMPANY.**—Superintendent Daniell writes as follows concerning this company's property: "We have begun to cut a station or plat at the second level, No. 1 shaft. I intend to push this so that we can sink to the third level as early as possible. The drifts north and south continue to show very well for copper, the north opening being best. The winze under the first level has been holed to the second level. No. 2 shaft was sunk for the week 18 feet. Have started the foundation for a compressor, and am moving the machinery to the ground."

## GOLD.

**MICHIGAN GOLD COMPANY.**—At a recent meeting of the directors of this company it was decided to vigorously push the work of opening the property, confining operations for the present to the No. 4 shaft, which is now 42 feet deep. The Huntington mill, owned by the company, will be put in shape for immediate use.

**ROPES GOLD AND SILVER MINING COMPANY.**—Forty stamps are dropping at this company's mine; to this number more will probably be added in the near future. A chute of ore was recently struck in the twelfth level, which shows two feet in thickness, and assays at the rate of \$18 per ton. It runs better in gold than the level above, at which place the product is largely silver. On the eighth level miners are still raising, and have reached a point near the seventh level. The product of bullion for the first half of the month was \$3,200.

## IRON.

## GOGEBIC RANGE.

**SUNDAY LAKE MINING COMPANY.**—This company has been incorporated at Milwaukee, with a capital stock of \$100,000, by Ferdinand Schlesinger, Leopold Kruielsheimer and Karl Feldtkeller.

## IRON—MENOMINEE RANGE.

The *Lake Superior Democrat*, from returns received from the different mines on the Marquette range, learns that there is now in stock and in transit 1,193,000 tons of iron ore on that range which was mined since the close of navigation. This would be an average of 199,000 tons a month. At the same rate for the five remaining months of the producing season, the Marquette range would produce in 1891 1,993,664 tons. When compared with its 1890 output the curtailment for this range on its present basis of production will be 804,664 tons. The same ratio of restriction on the remaining three ranges, Menominee, Gogebic and Vermilion, which produced 6,010,037 tons last year, means a total production in the Lake Superior region of 6,596,000 tons, or a decrease of 2,405,676 tons.

## IRON—MARQUETTE RANGE.

**CLEVELAND IRON MINING COMPANY.**—The union of the drifts run by this company beneath Lake Angeline has been effected. The total length is 1,400 feet; the dimensions 7x7 feet within the timbers. The completion of the work contributes materially to the ventilation of the mine and the safety of the miners. Notwithstanding that there is 40 feet of water above this drift no water courses were cut, and very little trouble is occasioned by

water, a No. 10 Knowles pump being amply able to keep the workings clear. The bottom of the lake is pipe clay, impervious to water.

**PITTSBURG AND LAKE ANGELENE IRON COMPANY.**—This company will place a diamond drill at the new shaft located near the east end of the lake to further test the 26-foot lense of ore it recently cut there.

## MINNESOTA.

**DULUTH, MESABI & NORTHERN RAILWAY COMPANY.**—This company filed articles of incorporation at St. Paul on the 26th inst. The capital stock is \$5,000,000. The company proposes to build a line from some navigable point on Lake Superior, St. Louis Bay or the St. Louis River to some point on the northern boundary of the State, to be determined hereafter. Its object is to tap the iron and timber fields of the Mesaba and Vermilion iron ranges. At present the Duluth & Iron Range Railroad, a line 120 miles long, is the only one running into that country. The incorporators are: K. D. Chase, of Faribault; J. T. Hale, S. R. Payne and Roswell H. Palmer, of Duluth, and Alfred Merritt, C. C. Merritt, A. R. Merritt, Leonidas Merritt and N. B. Merritt, of West Duluth.

## MISSOURI.

## JASPER COUNTY.

(From our Special Correspondent.)

## JOPLIN, May 25.

Messrs. Vivian & Sons, of Swansea, Wales, are evidently in this ore market to stay; last week they shipped two train loads of ore to Europe, and purchased 1,000 tons of ore for immediate shipment. This transaction has caused the ore market to advance from \$1 to \$2 per ton. The average price paid last week for zinc ore was \$22, but choice clean lots were in good demand at \$24. Lead remains at the same point—\$23.75 per thousand pounds. Following are the sales from the different camps as far as reported:

Joplin mines 2,851,400 pounds zinc ore and 138,520 lead; value \$33,935.50.

Webb City mines 999,650 pounds zinc ore and 103,710 lead; value \$13,326.75.

Cartersville mines 1,473,000 pounds zinc ore and 135,120 lead; value \$19,046.85.

Zincite mines 203,250 pounds zinc ore and 2,040 lead; value \$2,385.

Lehigh mines 110,000 pounds zinc ore; value \$2,400.

Oronogo mines, 84,030 pounds zinc ore and 9,640 lead; value \$1,150.90.

Galena Kans. mines, 1,498,110 pounds zinc ore and 54,650 lead; value \$14,721.

District, total value \$86,906.

Pittsburg and Wier City, Kan., spelter output: R. Lanyon, 188,800 pounds; S. H. Lanyon & Bro., 96,500 pounds; W. & J. Lanyon, 97,000 pounds; Granby M. & S. Co., 96,700 pounds; Wier City Zinc Company, 167,000 pounds; total, 646,000 pounds. The coal output was 900 cars, aggregating 18,000 tons.

The Lead and Zinc Association of southwest Missouri and southeast Kansas has just completed arrangements to send Professor A. V. Weise to Europe in the interests of the district. He will sail from New York May 30, and is well supplied with specimens of zinc ore from each camp of the entire district. It is his intention to visit the large smelting companies and call their attention directly to the zinc interests of this district, which is expected to result in great benefit to the mine operators.

F. M. Sharp, who has been operating a mine in Poor Man's Gulch on the Granby land, just northwest of the city limits, sold 400 tons of zinc ore last week to Vivian & Sons. Less than one year ago this was an undeveloped tract of land; to-day there are 16 producing mines on the land.

The English syndicate operating on the Dougherty & Robb land, southeast of the city, is opening up a fine property.

## MONTANA.

**BUTTE, ANACONDA AND PACIFIC RAILWAY COMPANY.**—The difficulties which have perennially been arising between the Anaconda Mining Company and the Montana Union Railroad Company have at last culminated in the incorporation of the Butte, Anaconda & Pacific Railroad. The incorporators are William L. Hoge, Stephen A. Estes, Shelley Tuttle, W. M. Thornton and J. B. Losee, all of Anaconda. The general route is from Butte and the mines in Silver Bow county, down Silver Bow Creek to the head of Deer Lodge Valley; thence skirting the foot-hills lying south of said valley to the town of Anaconda and its vicinity in the county of Deer Lodge; thence up Warm Spring Creek to the divide, crossing the divide near the source of Flint Creek, southwesterly to the east fork of Rock Creek; thence across Rock Creek to the west fork of said creek, and following said fork to the divide between Rock Creek and the Bitter Root River, crossing said divide near the source of Skalkaho creek and following said stream downward to its junction with the Bitter Root River; thence down the Bitter Root Valley to the town of Missoula in Missoula county, and thence westerly to the western boundary of Montana. The capital stock is fixed at \$5,000,000 and the principal office of the company is at Anaconda.

## MEAGHER COUNTY.

**CUMBERLAND MINING AND SMELTING COMPANY.**—The new shaft is now connected with the old workings and the carbonate ore is being taken out



that way, while the sulphuret ore is hoisted through the old shaft and first roasted before smelting. The mine is being put in such shape that when the smelter starts in a few days the ore can be taken out cheaply and transported directly to the smelter. The smelter machinery is all in place, and as soon as coke arrives the furnace will be blown in.

MISSOULA COUNTY.

O. R. & N. MINING COMPANY.—Some weeks ago this company's mine, in the Spring Gulch mining district, was leased by Dr. J. M. Hargreave and Helena parties, represented by Henry Bernard. For some reason the lease has now been canceled, and the original company has resumed the management of the property. A couple of car-loads of ore are now en route to the Omaha smelter, and it is expected favorable returns will be received.

SILVER BOW COUNTY.

(From our Special Correspondent.)

JERSEY BLUE MINING COMPANY.—This company has recently ordered a new hoisting plant for its property east of Walkerville, and will begin operations on an extensive scale as soon as the new machinery arrives from Chicago. The company, it is said, has in its treasury a working capital of \$11,000, with which work will be pushed during the summer.

MAUD S.—This property, situated five miles southeast of Butte in the main range of the Continental Divide, is under lease and bond for \$100,000 to Eastern parties. The claim is developed by an adit tunnel 600 feet long. There are two parallel leads 14 to 20 feet apart, one showing gold and the other silver. A stamp mill will be built on the creek 2,000 feet down the mountain, and the ore delivered to the mill by an aerial tramway. The gold is very free, and is said to average \$30 across the pay streak. The silver ore is also free milling.

NEVADA.

ELKO COUNTY.

(From our Special Correspondent.)

SAN FRANCISCO, May 21, 1891.

COMMONWEALTH MINING COMPANY.—At the annual meeting held recently the old board of directors was re-elected, and the officers of the company continue the same. On May 1st the company had an indebtedness of \$1,324.26, but the mine is looking well, and last week 18 cars of first-class ore, averaging \$203 per ton, and 39 cars, averaging \$42 per ton, were taken out.

NORTH COMMONWEALTH MINING COMPANY.—There were crushed last week at the Union Mills 270 tons of this company's ore, the battery pulp assays averaging \$217.60 per ton. The concentrating plant was started last week, and worked 200 tons of ore, the average assay being \$27 per ton. Bullion, valued at \$41,000, has been shipped this week, leaving crude bullion at the mill amounting to \$23,000.

ESMERALDA COUNTY.

MOUNT DIABLO MINING AND MILLING COMPANY.—This mine is producing the usual amount of ore, assaying from \$40 to \$70 per ton. The company's mill at Soda Springs has lately been put in good repair.

EUREKA COUNTY.

CORTEZ MINES, LIMITED.—The production of this company during April was 35,106 ounces silver, and the expenses were \$13,360. The amount of ore crushed was 625 tons; the expenditure for development work was \$3,130.

STOREY COUNTY—COMSTOCK LODGE.

(From our Special Correspondent.)

The following is the statement of Comstock ore milled, with the battery assay values, for the week ending May 16th:

Mine.	Tons.	Assay value.	
		May 16.	May 9.
Con. Cal. and Va.....	2,060	\$32.94	\$33.32
Chollar.....	516	19.94	22.22
Savage.....	660	17.20	17.50

CONSOLIDATED CALIFORNIA AND VIRGINIA MINING COMPANY.—The last 50 feet of the southwest drift, 1,100 foot level, has been running in \$30 ore, the face still continuing in ore, but of a lower grade. The width and quality of ore exposed in the 1,500 level, 43 feet above the sill floor, continues to hold good, and the body holds good as it extends northeast. The 1,600, 1,650 and 1,750 levels are supplying their usual quota of ore.

CROWN POINT MINING COMPANY.—The inflow of water in the incline above the 1,700-foot level, which has occasioned so much delay in pumping operations, has been overcome, and the submerged Dow pump has been recovered. The work of draining the Gold Hill mines is now progressing as usual.

CHOLLAR MINING COMPANY.—The output of this company during April was 2,300 tons of ore, of which the gross yield was \$26,958.03; the cost of reduction was \$16,100. The average assay value per ton was \$19.10, and gross yield \$11.72 per ton, the ore being worked consequently to 60% of its assay value.

JUSTICE MINING COMPANY.—The north drift, 822-foot level, is now in 688 feet, the face being in fair-grade ore. Stopping has been commenced in the raise 270 feet south of the switch. The Washoe stamp mill started up on the 18th inst.

NEW MEXICO.

GRANT COUNTY.

ANSON S. COPPER FURNACE.—This smelter is now producing from 5,000 to 8,000 pounds of copper bullion per day, not 800 pounds as we erroneously stated in our issue of May 16.

MIMBRES CONSOLIDATED MINING COMPANY.—The Satisfaction shaft of this company has recently been sunk 50 feet deeper, and it is reported a prospecting cross-cut will be driven 200 feet south in the limestone. A large number of leasers, some of whom are doing very well, are working in the company's mines.

SOCORRO COUNTY.

CONFIDENCE.—This mine at Cooney is said to be in bonanza. A four-foot vein of cerargyrite, plentifully mixed with wire-silver, was struck recently. The tunnel has been driven through good average ore, but nothing like the new find had been anticipated. The ores composing the new strike will, it is stated, easily run 1,000 ounces in silver per ton.

(From our Special Correspondent.)

LAST CHANCE.—The building at Mogollon was finished about May 16th, completing Mr. Wilkie's contract. Work on the "Middle Tunnel" is being rapidly pushed. A crosscut shows the vein to be twenty feet wide at one point, with the entire ore body of fair milling grade. The tunnel ran recently into a chute of ore, averaging \$94 per ton, and four feet wide. This is the most important strike yet made in the regular development of the property. From "Middle Tunnel" a gravity road 850 feet long will carry the ore to the mill. The main working tunnel will be started about four hundred feet below the former, and just above the mill level. This work is soon to be commenced.

SIERRA COUNTY.

(From Our Special Correspondent.)

THOMPSON AND GALLES.—These mines at Hillsboro, that were being actively developed five months ago, are now idle, with only one man to guard them and keep the water pumped out of the drifts. The suits pending against this company are docketed for the ensuing June term of district court, when it is believed the debts will all be promptly liquidated and the mines will resume work.

OREGON.

LYNN COUNTY.

(From our Special Correspondent.)

ALBANY MINING AND MILLING COMPANY.—At the annual meeting of this company, held recently, J. L. Cowan was elected president; J. V. Pipe, secretary; G. W. Marston, treasurer, and J. W. Hazleton, superintendent. The company is well satisfied with the results being obtained from the mine, the ore continuing to be of high grade. The 5-stamp mill is kept running steadily and 10 stamps are to be added at once. The company intended to erect a new 20-stamp mill this summer, but this plan has been abandoned for the present.

PENNSYLVANIA.

COAL.

Owing to the scarcity of water in the Monongahela River and the fact that the coal barges are all loaded, the river mines have discontinued operations.

It is reported that Mr. Cummings, the accredited agent of W. J. Rainey, has just closed up the deal for the purchase of the coal underlying the farms of Samuel Warden, Adam Fox, Ahrum Ruff, R. K. Hissem and Daniel Byers. The whole field, which lies from one to five miles northwest of Mt. Pleasant, embraces about 700 acres. The price ranged from \$300 to \$515 per acre.

The river miners of the Pittsburgh district met on the 26th inst., and, after censuring their local officers, formally withdrew from the United Mine Workers' Association of the Federation of Labor. In taking this action the resolution said that "they would rather have struck for eight hours and lost on May 1st than be parties to the backdown of the Federation of Labor on that issue." The district will at once enter the Knights of Labor organization.

CRESSON & CLEARFIELD COAL AND COKE COMPANY.—Forest fires recently destroyed the plant of this company's No. 4 colliery at Frugality. It will necessitate the suspension of work for three weeks, cutting off a daily production of 1,000 tons during that time.

CUMBERLAND & SUMMIT COAL COMPANY.—This company is erecting an experimental plant of 10 ovens at Myersdale.

NOBLE COAL COMPANY.—This company is to operate property in the Toby Valley basin in Elk county. It will open and thoroughly equip its property and erect 100 houses. The officers are as follows: B. B. Cartwright, president; Andrew Kirkpatrick, vice-president; Edwin Smith, secretary and treasurer. Directors: B. E. Cartwright, Andrew Kirkpatrick, Joseph M. Smith, E. M. Campbell and R. A. Cartwright.

LEAD.

NEW GALENA.—Active operations are to begin at once at these lead mines, about four miles from Doylestown, which have been idle for several years. McFarren & Coxey, agents for a Colorado mining company, have leased the mines for six

months for \$500, and if a vein of lead 12 inches in thickness is struck the company will pay \$14,000 for the property. The Patterson farm, adjoining the lead mines, has also been sold for \$10,000, C. E. Rosenzi, of Philadelphia, president of the Eastern Oil and Mining Company, being the purchaser. The purchaser will not be given possession before next December.

SOUTH DAKOTA.

LAWRENCE COUNTY.

GOLDEN REWARD CHLORINATION WORKS.—The regular semi-monthly shipment of bullion from Black Hills mines was made by Wells-Fargo Express on the 9th inst. The value of the bars sent out aggregated nearly, if not quite, \$170,000, and included a brick weighing 391 ounces and worth \$7,900. This brick was the result of only six and one-half days' run, fixing the production at the rate of \$39,000 per month. The mill, for want of ore, impossible to get because of the execrable conditions of the roads, was idle for 18 days last month, and yet cleaned up \$14,000. This was with but one barrel and four roasters. The new barrel is now in use, as well as roaster No. 5. The capacity has been increased by these additions from 50 tons to 80 tons per day, and the bullion output will therefore probably run up from \$39,000 to \$45,000 or \$50,000 per month.

TEXAS.

EL PASO COUNTY.

(From our Special Correspondent.)

CONSOLIDATED KANSAS CITY SMELTING AND REFINING COMPANY.—The smelter at El Paso has been obliged to close down on account of the high water in the Rio Grande, and much difficulty is experienced by the various mining companies in New Mexico in getting cars for the shipment of ore, because of the various washouts along the lines of railway.

UTAH.

JUAB COUNTY.

CENTENNIAL-EUREKA MINING COMPANY.—The rich ore body recently struck by this company, which we mentioned in our last issue, was encountered by the 300-foot level at the extreme south end of the mine. The breast of this level is now 1,000 feet from the shaft. The ore is very rich and some of it assays from 2,000 ounces as high as 5,000 ounces silver per ton. The company is at present shipping its low-grade ore only, i. e., ore which runs from 100 to 200 ounces silver per ton. The policy of the management is to leave the rich ore standing until the price of silver is higher. The company paid a dividend of \$30,000 in May, which will be the regular monthly rate hereafter.

MAMMOTH MINING COMPANY.—Seventy men have been discharged by this company, and the mine is practically shut down. The reason given by the company is that it is going to make changes in its plant of machinery. The boilers and air compressor, which are now located underground, are to be removed to the mouth of the tunnel, leaving no machinery underground except the hoisting engine. Of course, this change necessitates suspension of work in the lower levels. It has been generally hinted in Salt Lake City for some time that the ore reserves of the mine were being rapidly exhausted, and that the company had been paying its dividends out of its surplus, which at the beginning of the year was very large. The shares of the company have fallen during the past two months from \$4.20 to \$2.75. This has been attributed simply to a bear movement, but it is now thought to be due to the condition of the mine.

SALT LAKE COUNTY.

The Alta tramway has been opened for the season and ore which has accumulated at the mines in Little Cottonwood Cañon since November is now being shipped.

EMMA MINING COMPANY, LIMITED.—The manager of this company reports that the outlook in the Emma mine is improving constantly. In a drift, northwest from the old Emma tunnel 12 inches of high-grade and 18 inches of low-grade ore have been exposed. There are 12 inches of rich galena ore and 24 inches of low-grade ore in a raise from a drift on the Illinois tunnel level, and the quality of this ore is improving daily. In the first drift above the 4th level northwest a body of low-grade ore, 24 inches wide, has been uncovered. The concentrating mill started on the 20th inst.

VIRGINIA.

About eight years ago the Southwest Virginia Improvement Company opened the first coal mine in Southwest Virginia at Pocahontas, in Tazewell county. It was soon followed by the building of coke ovens and the manufacture of coke. From a small beginning the development has been rapid. There are now three different districts operating in the No. 3, or Nelson coal seam, namely, the Pocahontas, Bluestone and Elkhorn, in which there are 17 large coal and coke companies operating extensive plants, with four more new companies already organized and chartered, with leases secured. The coal produced from this field, exclusive of that which is consumed in the coke ovens, averages between 35,000 and 40,000 tons per week. The growth of the coke industry has been



as rapid as that of the coal production. There are 2,138 ovens in the Flat Top region; 647 more are being built, while 450 are contemplated. The entire coke product of the region, except a small portion put out by two companies who have interests in state blast furnaces, is handled by the Hull Coal and Coke Company.

#### LOUISIANA COUNTY.

(From our Special Correspondent.)

**VIRGINIA PYRITES MINING COMPANY.**—This company has been incorporated with a capital stock of \$100,000, for the purpose of developing pyrites mines in this county, manufacturing sulphuric acid, &c. The officers are E. C. McColloek, president; J. A. Morris, vice-president, and J. I. Boswell, Jr., secretary.

#### FOREIGN MINING NEWS.

##### CANADA.

##### PROVINCE OF BRITISH COLUMBIA.

**NEW VANCOUVER COAL COMPANY.**—This is one of the first Canadian mining companies to call electricity to its aid for the practical development and working of its property. An order has been placed with the Edison Electric Company for the necessary plant, to cost, complete, between \$50,000 and \$100,000. This will include an underground tramway, with power sufficient to maintain a uniform speed of eight to nine miles an hour, with 150 loaded cars continually moving. Six hundred incandescent lights will also be used, and the drills and cutters will be operated by the same current.

##### PROVINCE OF NOVA SCOTIA.

**EASTERN DEVELOPMENT COMPANY, LIMITED.**—The No. 3 shaft, at the Coxheath copper mine, is a perpendicular shaft sunk in the middle of a large surface ore showing; for the first fifty feet the shaft was in rich ore on all sides, the width of the vein not being determined. The latest advices from the mine state that at 53 feet in depth a strong foot wall has developed dipping towards the north, to vein B; the ore which, for a few feet back, had been somewhat lean, has again improved in quality. The hanging wall has not yet been cut, showing the ore body to be one of considerable width.

##### PROVINCE OF ONTARIO.

**NICKEL MINING COMPANY.**—This company was recently organized in Duluth with a paid-up capital of \$500,000 to operate a nickel property in the southeast  $\frac{1}{4}$  of section 17, Victoria township. The officers are: Robert Forbes, president and general manager; Marion Douglas, vice-president; W. F. Draper, secretary, and Geo. N. Stevenson treasurer. Other promoters of the enterprise are Geo. F. Davis, James T. Wilson, L. R. Weld and Wm. H. Trescott.

##### GERMANY.

**MECHERNICH (RHENISH PRUSSIA) MINING COMPANY.**—The annual meeting of the shareholders of this company was held at Cologne during the last week of April. From the report of the directors we learn that during 1890 the company raised out of the open workings 103,176 cubic meters of sandstone, out of shaft Schafsborg 115,604 cubic meters, and shaft Virginia 128,926 cubic meters—a total of 347,707 cubic meters, which, after dressing, produced 733 tons of Potter's ore and 33,245 tons of lead ore. The percentage of lead contained in the whole sandstone was 2.318, or 0.063 less than in the preceding year. At the smelting works 14 roast and 6 blast furnaces were at work and produced 24,083 tons of lead and 8,195 kilos (216,824 ounces) of silver. The number of men employed by the company at the beginning of 1890 was 2,993, at the end 3,048. Workmen's wages in 1889 amounted to 2,071,348 marks (mark equals 23.8 cents); in 1890, 2,095,816 marks. The profits of the company for the year amounted to 2,057,906 marks. Writing off 475,000 marks, the net profits were 1,582,806 marks, out of which donations to workmen's relief funds, etc., were paid, a dividend of 15% or 1,440,000 marks declared, and a balance of 177 marks carried forward.

#### MEETINGS.

American Oil Company, at the office of Messrs. Moody & Washbaugh, Lee street, Deadwood, S. Dak., June 2d, at 1 P. M.

Caledonia Gold Mining Company, at the office of the company, No. 328 Montgomery street, San Francisco, Cal., June 2d, at 3 P. M.

Clara Consolidated Mining Company, at the office of the company, No. 325 Montgomery street, San Francisco, Cal., June 2d, at 11 A. M.

Emmett Mining Company, at the office of the secretary, in Deadwood, S. Dak., June 2d, at 1 P. M.

Hermit Mining Company, at the office of Gilbert M. Fay, on Main street, Deadwood, S. Dak., June 9th, at 4 P. M.

Hot Spur Mining Company, at the office of John Baggaley, in Deadwood, S. Dak., June 2d, at 8 P. M.

Home Mining Company, at the office of the secretary, in Deadwood, S. Dak., June 9th, at 4 P. M.

Iron Hill Mining Company, at the office of the company, City Hall, in Deadwood, S. Dak., June 2d, at 1 P. M.

Pennsylvania Coal Company at the office, of the company, at Dunmore, Pa., June 9th, at 12 o'clock noon.

Pinal Consolidated Mining Company, at the office of the company, No. 328 Montgomery street, San Francisco, Cal., June 2d, at 2 P. M.

Seabury Calkins Consolidated Mining Company, at the office of the company, in Carbonate, S. Dak., June 2d, at 12 o'clock noon.

Troy Mining Company, at the office of Ed. Reilly, Central City, S. Dak., June 9th, at 4 P. M.

Welcome Mining Company, at the office of the company, at the mines, Terry's Peak, S. Dak., June 23d, at 12 o'clock, noon.

#### DIVIDENDS.

Delaware & Hudson Canal Company, quarterly dividend of 1% per cent., payable June 15 at the office of the company, No. 21 Cortlandt street, New York.

National Lead Trust, quarterly dividend of fifty cents per share, payable July 15th, at the office of the company, New York City.

#### ASSESSMENTS.

COMPANY.	No.	When levied.	D't'nt' in office.	Day of sale.	Amn't per share.
Alliance, Utah.....	13	Apr. 21	May 26	June 15	.10
Caledonia Silver, Nev.....	44	May 2	June 4	June 25	.15
Chollar, Nev.....	29	Apr. 6	May 12	June 2	.50
Consol. Imperial, Nev.....	31	May 6	June 11	July 1	.05
East Sierra Nevada, Nev.....	2	Apr. 14	May 25	June 15	.05
Idlewild, Cal.....	2	May 1	June 1	June 20	.10
Live Oak Drift Gravel, Cal.....	13	Apr. 15	June 2	June 22	.02½
Navajo, Nev.....	21	May 20	June 25	July 17	.20
New Basil Con., Cal.....	18	Apr. 15	May 18	June 15	.05
Peerless, Ariz.....	16	Apr. 24	May 29	June 18	.10
Scorpion, Nev.....	2	Apr. 14	May 22	June 15	.10
Scorpion Silver, Nev.....	26	Apr. 14	May 22	June 15	.15
Sierra Nevada, Nev.....	93	May 13	June 17	July 7	.50
Silver Hill, Nev.....	28	Apr. 23	May 28	June 18	.20
Union Con., Nev.....	43	May 15	June 22	July 13	.30
Utah, Nev.....	12	May 6	June 12	June 20	.25
Valley View, Cal.....	2	Apr. 13	May 18	June 8	.02
Yellow Jacket, Nev.....	45	Apr. 14	May 16	June 20	.50

#### MINING STOCKS.

For complete quotations of shares listed in New York, Boston, San Francisco, Baltimore, Denver, Kansas City, St. Louis, Pittsburg, Birmingham, Ala.; London and Paris, see pages 647 and 648.

NEW YORK, Friday evening, May 29.

The New York mining stock market was dull, even to stagnation, during the greater portion of the week under review. However, it responded to a better demand to-day, and closed to night for the week—to-morrow being a legal holiday—with a better inquiry, and more sales to its credit, but still weak on prices. The market, if such it can be truthfully called, has become so emaciated of late that it responds to almost any condition which has even a remote bearing upon it. Notwithstanding that it is in the great financial center of the country, it continues to follow in the wake of the San Francisco Exchange. At the present time the great financial stringency is probably the damper which keeps prices from rising, even in response to an occasional bull movement.

The sales for the week aggregated 54,755 shares. Of this number 11,075 shares were dividend paying stocks. The sales for the corresponding week in 1890 were 73,040.

The Comstocks, in which there was an embryonic panic on the San Francisco Exchange last week did not begin to recover until yesterday. A few sales made at or near Western quotations showed an increasing inquiry, but not at prices which brought out much stock. The closing seemed to give promise of a greater inquiry and an upward tendency in prices during the coming week. The market in detail is as follows: Alta on very moderate sales declined 15 cents during the week. It opened at \$1.05 and closed at 90 cents. Andes was quoted on Saturday at \$2, against the quotation of \$1.10 February 28th. Best & Belcher from the closing of \$4.70, sold on Saturday at \$5, from which figure it dropped to and closed at \$4.25 to-day. Chollar is to be credited with a slight gain. Yesterday and to-day it sold at \$2.45 and \$2.50, as against last week's closing of \$2.40. Comstock Tunnel was the active stock of the week, and its career a speculative one. It opened at 20 cents, and on numerous small sales dropped off to 18 cents yesterday, rallying and closing at 20 cents to-night. The transactions involved 10,000 shares. Julia is to be credited with a 500-share sale at 23 cents, as against its last quotation of May 8th at 37 cents. Mexican was quite active on very small sales. From the closing of \$3.50 last week it opened at \$3.70, gradually dropped to \$3.15, and rallying, closed at \$3.25. Occidental sold during the middle of the week at \$1.10, and closed at \$1.35; its sales aggregating 500 shares. Potosi did not make its appearance until to-day, when it sold at \$4.90 to the extent of 100 shares. Seg. Belcher appeared last Saturday at \$1.40, selling 200 shares. In April

it sold at \$1.60; Union Consolidated, from the closing of \$2.50, opened at \$2.30, and rallying, closed at \$2.85. Utah, comparatively speaking, was quite active. It opened at \$1.05, lost 30 cents on subsequent quotations, and finally closed at 90 cents on sales of 800 shares. Bulwer, from the quotation of 41 cents, May 18th, sold 700 shares on Saturday at 30 cents. Consolidated California and Virginia was remarkably quiet. There were few inquiries and few sales. From an opening of \$11.50 it reacted to \$10 on Thursday, and closed to-day at \$11.38. Crown Point from the closing of \$2.25, opened at \$2, made a gain of 10 cents, and reacting, closed at its opening figure. Its sales were light. Navajo sold 100 shares on Thursday at 20 cents, as against 40 cents May 8th. Ophir did not appear in the market until to-day, when 100 shares were sold at \$5.25. Its quotation two weeks ago was \$7.50. Sierra Nevada from the quotation of \$4.10 last week fell to \$2.15, at which 100 shares changed hands. Yellow Jacket on three sales reacted from \$2.80 to \$2.70, its closing price, as compared with \$3 the week previous.

Colorado stocks were quite numerous in the market, but experienced very light sales. Prices generally were fairly well maintained. It is difficult to determine the character of these transactions, but it is believed that they were picked up for speculative investment. Crescent disposed of an odd lot of 200 shares on Tuesday at 12 cents, which figure has been the ruling price for some time. Laerosse was quoted at 5 cents on a sale early in the week. A later sale brought the price down to 4 cents. Aspen, which has been something of a conundrum to the market since it took the tumble noted in our last issue, received one sale on Saturday at \$2.50. It was in good demand at this price. Only the one lot of 200 shares was called out. Two hundred shares of Brece was sold on Tuesday at 31c. and 32c., as compared with 40c., its quotation January 6th. Catalpa on the same day disposed of 500 shares at 30c. A 100-share lot of Chrysolite was disposed of Saturday at 26c. Freeland likewise received a single sale of 15c., the same being the last quotation May 16th. Leadville Consolidated was quite active during the week, 3,775 shares changing hands. The quotation of 11c. ruled until yesterday, when it closed at 10c. Little Chief from the closing of 31c. opened at the same figure, rose to 33c. the day following, and closed Thursday at 30c.; sales moderate.

The California stocks were quite active. In fact, their cheapness recommended them to the investing public. About 20,000 shares of the penny variety went to swell the total of the week's transactions. A few of the better stocks were also quite active, and at prices which were better, comparatively speaking, than those of other districts. Bodie Consolidated, which was quoted last on April 11th at \$1.30, opened at \$1.05 Saturday and sold on the subsequent day at \$1.75. Martin White, almost a total stranger in the market, was called out to-day at 90c. to the extent of 400 shares. Mono, another of those inactive stocks, sold 100 shares to-day at 50c. Both sales are regarded as odd lots of a holder who wished to realize. Standard, on very small sales, was quite active. From the closing of 93c. it opened at 90c., and after several ups and downs closed at \$1 to-day. Astoria, after ruling at its usual price of 1c. during the first part of the week, made one sale to-day at 2c.; the total transactions involved 9,500 shares. Belmont, whose career has been steadily upward, was quite active on hundred-share sales. From a closing and opening of 50c. it made a gain of a cent per day and closed to-night strong at 60c.; 2,400 shares were transferred. Brunswick, generally an active stock, did not appear until Wednesday, when it sold at 9c. It is credited with one sale to-day at 8c. The stock does not seem to reflect the flattering report issued to the press by the officers of its company. Middle Bar can be charged with having fallen into the "slough of despond." From its lofty pinnacle of 4c. and 5c. it tumbled to a 1c. pedestal, where it rested during the week. However, one small sale is to be credited with 2c.; 9,800 shares changed hands.

A lot of 100 shares of Father de Smet was picked up yesterday at 35c. The stock sold on May 6th at 40c. That price was bid to-day, and could be obtained next week. Caledonia reflected a bull movement, which was started last week, by a sale to-day of 100 shares at 90c. The stockholders of this company are still anxiously waiting some tangible news concerning its affairs.

Ontario on Saturday sold 100 shares at \$40, against the quotation of \$39.25 May 14th. The company's annual report has just been issued and makes a good financial showing. The fact that the stock does not receive more transactions on the local board is indicative that it is rather high priced for local speculators and investors.

Phoenix of Arizona was quite active at 40c. and 43c. It closed at the former figure in good demand.

El Cristo from the closing of 45c. last week, sold on two different occasions at 40c. on 300 shares.

Mutual Smelting and Mining developed considerable strength, ruling during the greater part of the week at \$1.45. It sold 700 shares.

Silver Hill from the closing of 35c. sold Saturday at 30c., and yesterday at 27c. to the extent of 2,000 shares.

The stock of the Copper Queen Consolidated Mining Company, of Arizona is in the hands of



but a few parties, and it is very seldom that a sale of this stock is made. This week some 200 shares were sold at auction at \$12 per share.

**Boston.** May 23.

(From our Special Correspondent.)

The market continues to rule extremely dull, although there is some quiet buying of the best stock on the list, either for investment or speculation, which may develop more activity in the future. Boston and Montana touched \$42 to-day, a gain of \$1 for the week, although the trading has been very light.

Calumet & Hecla sold this week, ex-dividend (\$5), at \$250@253, and there is more inquiry for it. There was quite a spurt in Centennial a day or two since on the good reports from the mine, which advanced the price to \$16½, but it was short-lived; the attempt to sell long stock on a dull market forced a decline to \$14½, the lowest price for the year. Kearsarge sold down to \$11½ after selling at \$12½, recovering to-day to \$11½.

Butte & Boston has ruled very steady, but dull at \$15½ to \$15.

Oscicola sold up to \$36½, and declined to \$35½, with very little doing in it. There was only one sale of 50 shares.

Franklin reported for the week at \$17½, a gain of ½ from last sale.

A lot of 5 shares of Quincy sold at \$105, a gain of \$3½ over last sale.

Tamarack was very firm, selling up to \$151, with last sale at \$150, a gain of \$2 for the week.

Allouez sold at \$3¼@3½. Huron at \$2¼@2. Santa Fe declined to 50c.

3 P. M.—Since the noon hour there has been a marked change in the temper of the market in consequence of the advance of copper in London to £55, and there is more disposition to buy copper stocks at advanced rates. Boston and Montana advanced to \$43, Butte & Boston to \$16½, Calumet & Hecla to \$253, Centennial to \$17, Franklin to \$18½, Kearsarge to \$13, Oscicola to \$36½, Tamarack to \$151½, Huron to \$2½, and Santa Fe to 57½c. Atlantic sold at \$16. The market closes strong.

By Telegraph.—Boston & Montana, \$44½; Oscicola, \$37½; Quincy, \$110; Calumet & Hecla, \$251; Tamarack, \$150; Centennial, \$17; Kearsarge, \$53½; Atlantic, \$15½; Allouez, \$3½; Huron, \$2½; Butte & Boston, \$16½; Franklin, \$18½.

**Denver.**

Prices and sales for the week ending May 23d, 1891:

Company.	Open- ing.	H.	L.	Clos- ing.	Sales.
Mines.					
Alleghany	15b	116	116	106	1,000
Amity	03½b	*04	03¼	03¼	9,800
Bangkok-C-B.	07¼b	07¾	07¼	07	4,200
Bates Hunter	68b	70	69	69	2,600
Brownlow	08b	*08¾	08	07¾	24,600
Calliope	17b	.....	.....	17	.....
Cash	11b	.....	.....	12	.....
Clay County	107b	1120	109	112	3,100
Gettysburg	19b	20	18	15	800
Leavenworth	16b	.....	.....	15	.....
Little Itule	109b	110	109	108	500
Matchless	285b	.....	.....	.....	.....
May-Mazepa	121a	120	119	121	1,200
Oro	50b	.....	.....	61	1,000
Pav Rock	02¾b	*03¼	02¾	02¾	12,900
Fuzler	07¾b	*07¾	06¾	06¾	.....
Head National	56b	.....	.....	57	.....
Rialto	*100b	102	97	102	3,100
Running Lode	24b	25	24	24	1,600
Whale	.....	.....	.....	.....	.....
Bal. Smuggler	134b	30	24	25	8,800
Prospects.					
Argonaut	25b	.....	.....	20a	.....
Big Indian	10¼	112¼	09¼	09¼	4,300
Big Six	13¼b	12	13	13	700
Century	32¼b	*36	32¼	35¼	3,800
Claudia J.	09¾b	10½	09¾	09¾	4,000
Nat. G. & Oil Co.	13b	13	12½	11½	1,100
Diamond B.	05¾	*06	05	05	19,300
Emmons	45a	47½	45	45	17,100
Golden Treas.	30	17	30	32¼	4,400
Inroad	03¼	*03¾	03¼	03¼	5,400
John Jay	06¼b	*06¼	05¼	05	1,000
Justice	123¼b	123¼	123¼	113	1,000
Legal Tender	04	04	03¾	03¾	9,300
Morning Glim.	.....	45	44	44	500
Park Consolidated	19b	*20	19	18	200
Potosi	07b	108	06¾	06¾	6,700
Total	.....	.....	.....	.....	153,100

\* Buyer 30. † Buyer 60. a Asked. b Bid.

**San Francisco.** May 21.

(From our Special Correspondent.)

The declining tendency of the mining stock market, which was alluded to last week, resulted in a break in prices on Saturday and Monday that in any other city would probably have resulted in a panic. Consolidated California & Virginia, the sole reliance of the market just now, was, of course, the stock attacked, and the bearish onslaught made has been the means of precipitating upon the market such large blocks of miscellaneous stock that things just at present are in a rather demoralized condition.

Last Friday Consolidated California & Virginia sold at \$17, an advance on the ruling price of the previous day, but on Saturday it was hammered down as low as \$12.25, the highest quotation that day being \$13.75.

The official reports, of a conservatively favorable character, published on Sunday, failed to stem the tide, and on Monday morning, while opening prices were firmer, Consolidated California & Virginia selling for \$14.50, the market became weak and prices were battered down to the lowest

figures. Consolidated California & Virginia broke to \$9.50, a drop of \$5 during the day, and, although the losses in the other north-enders were not so great, they were proportionately serious.

During the recent advance the Consolidated California & Virginia shares sold at a price representing \$4,536,000 for the mine; on Monday its value was \$2,052,000, a depreciation of \$2,584,000 from its highest value during the recent movement. In the two days, Saturday and Monday, the depreciation was \$1,512,000.

What is the exact meaning of this sudden break is an open question just now, but it is not considered probable that the "bonanza" ring engineered a movement that in a moment disrupted the gradually increasing public confidence that it has taken months to build up.

The absence of Jim. Flood from the city gave rise to the report that the Jones faction was responsible for the situation, and that to prevent them from reaping a profit from their operations Messrs. Flood & Co. played the game of "diamond cut diamond," and beat them at their own game. To a large extent, however, this is mere surmise, but the fact remains that margin holders have been crowded very close, and but for the intrinsic value of the leading stocks a state of utter demoralization would have marked the current week's trading.

In the crash on Monday Andes sold down to \$1.75; Mexican, \$3.25; Ophir, \$4.75; Sierra Nevada, \$2.60, and Union \$2.95. In the middle group Best & Belcher sold down to \$4.25, and Hale & Norcross, \$2.10.

The Gold Hill Stocks were not so much affected, but Bullion weakened to \$1.75; Belcher to \$2, and the others in proportion.

On Tuesday a slight reaction made itself felt, and since then prices have been gradually recovering strength and next week in all probability the market will have returned to its normal condition.

This morning Consolidated California & Virginia was ruling at \$10.75, with moderate sales; Ophir at \$5.75 and Mexican at \$3.40. The fluctuations are rapid and fairly large just now, and for the nonce the market is simply a gambling one. The big operators are in the field, however, and as soon as the street has recovered from its scare trading will be much steadier.

The outside stocks have been quite neglected during the week, and some of the Tuscaroras are quoted much below their value. Commonwealth has been ruling at \$5 to 90c., and North Commonwealth at 70c. The mines are looking well, ore is being steadily extracted, and the latter company says that dividends will soon be declared. The great drawback to the Tuscarora stocks is the utter lack of confidence in the management, their past records not being such as to inspire confidence.

By Telegraph.—Following is given the opening quotations on the San Francisco Stock Exchange, Friday, May 23rd: Alta, 75c.; Best & Belcher, \$4.20; Belle Isle, 65c.; Bodie, \$1.15; Bulwer, 30c.; California and Virginia, \$11½; Chollar, \$2.70; Crown Point, \$1.85; Commonwealth, 70c.; Eureka Consolidated, \$3.50; Gould & Curry, \$2.30; Hale & Norcross, \$2.65; Mexican, \$3.25; Mono, 50c.; Navajo, 15c.; North Belle Isle, 70c.; Nevada Queen, 25c.; Ophir, \$5.50; Potosi, \$4.15; Savage, \$2.55; Sierra Nevada, \$2.25; Utah, 80c.; Yellow Jacket, \$2.70.

**St. Louis.** May 27.

(From our Special Correspondent.)  
The St. Louis market shows a much better tone and decided improvement over last week. Prices are somewhat stronger. Trading has been carried on more briskly.

Bi-metallic was in good demand, but the stock was held too strongly to permit of any trading. The stock is quoted at \$34. At a meeting of the directors this week a dividend of 35c. per share was declared.

Granite Mountain had a few sales, though the market was very weak. It opened at \$24.50, fell as low as \$23.25@24.25, and closed at \$23.75. During the week 500 shares sold at \$24 and 100 shares at \$24.75. The regular shipments amounted to 43 bars, containing 57,200 ounces of silver and 75 ounces of gold.

Yuma was active all week, the market continuing steady at 80c. Five hundred shares in lots of 100 were sold at that figure.

Elizabeth was on the right side of the market, and prices rose considerably from the opening quotation. It opened at \$2.02½, with a sale of 200 shares; on Friday it had a sale of 500 shares at \$2.07½@2.10, and on the following day 100 shares went for \$2.10. On Tuesday the market was much higher than before, and 600 shares sold at \$2.12½, at which figure the stock closes to-day. Reports from the mines are very favorable.

Little Albert continues at 11@10c., with a very fair market, about 1,100 shares selling during the week.

American & Nettie had good news from the mines, and as a result, both in price and demand the stock advanced well. It opened on call at 31½c., and sold 700 shares at 31½@35c. The following day 100 shares sold at 36½c., with 100 more at 37½c. Tuesday, 100 shares sold at an advance of 6½c. over former prices. To day the stock is quoted at 45c.

Adams opened and closed at \$1.92½. On Thursday a sale of 100 shares at \$1.97½ was made. The demand is fair.

Silver Age declined from \$1.87½ to \$1.52½, at

which it closes; during the week 300 shares sold at \$1.85 and 100 shares at \$1.80.

Breen opened at 72½c., with a sale of 200 shares; fell to 60c. On Tuesday 100 shares were sold at 65@67½c. To-day 67½c. was bid.

One thousand shares of Montrose went for 50 @51½c., followed by a sale of 700 shares at 50c. and 100 shares at 51½c.

Fifteen hundred shares of Central Silver sold at 2c.

**Aspen.** May 23.

Mining stocks are still quite active, and generally are very firm. Mollie Gibson is quoted at \$3.75; Argentine Juniata, \$1.75; Bushwhacker firm at 33c.; Little Annie, 26c.; Best Friend, 23c.; Pontiac, 10c. and Nolan Creek, 10½c. St. Joe and Mineral Farm had some early sales at 19½c., closing firm at 22c. asked.

**Deadwood.** May 23.

The interest of the local market centered in the coming annual meeting of the Iron Hill Mining Company, which, it is thought by some, may make a difference in the value of the stock through changes in the administration. The old directors have refused to act again. The stock has not been over-strong, and has changed hands at prices ranging from 72c. to 30c. A slight weakness developed in Golden Reward, probably because there was more offering than the market was willing to take. Opening at 40c., it sold down to 38½c., at which it closed. Other reported sales were: Seabury-Calkins, 4c.; Retriever, 20¼@21c.; Ruby Bell, 12¼@12½c.; Steward, 9¼@10c.; Rainbow, 5¼@6c.; Hermit, 5@6c.; Double Standard, 10@10½c.; Ross Hannibal, 9¼@9½c.; Elk Mountain, 1¼c.; Tornado, 13c.; Emmett, 1c.; Myrtle May, 1c. Transactions for the past week aggregate 57,000 shares, as compared with 112,000 shares of the previous week.

**Helena.** May 23.

Montana mining stocks have been very dull, and few sales of any consequence were made. Iron Mountain at the close was offered at 75c. for 1,000 shares, with no buyers. Curlew is held at \$2.50. Hiawatha has dropped to 12½c. bid and 15c. asked; Glengarry, \$2.25 bid. One thousand shares of Milwaukee were offered at 7c., but no one seemed to want it. Coeur d'Alene was quoted at 95c. Of the Castle mines, Cumberland stood at \$2.60 bid, \$3 asked. Yellowstone had a sale at 75c., and Great Eastern was bid at 75c., with \$1 asked. Champion, in the Oro Fino district, was held pretty steadily at 45c. for 1,000-share lots, with only 32½c. offering. For Florence (Meihart) 25c. was bid, 30c. asked, and Bald Butte was for sale at \$3, with no bids.

**Lake Superior Iron Stocks.**

(Special Report by A. M. Helmer, Milwaukee, Wis.)

IRON STOCKS.	
Ashland	\$52.50
Aurora	9.00
Anvil	3.75
Brotherton	2.75
Germania	9.00
Gogebic Iron Syndicate	.25
Bessemer Consol	20
Bouds	.25
Inter Ocean	20
Great Northern Iron & Steel Co.	1.00
Iron Belt	1.50
Montreal	10.50
Metropolitan	56.50
Northern Chief	34.00
Odanah	14.00
Pence	1.50
Clingstone	.25
Ryan	.40
Sec. 33	15.00
Champion	78.00
*Wisconsin Iron and Steel Co.	.60
American	2.00
Cleveland	16.50
Commonwealth	10.50
Vermillion P. I. & L. Co.	\$2.25
Jackson	105.00
Lake Superior	57.00
Milwaukee Iron Co.	5.00
Sheridan	5.00
East New York	2.00
Pittsburg & Lake	145.00
Angeline	27.50
Republic	60.00
Illinois Steel Co.	2.25
River Side	2.25
Lincoln	37.50
Chandler	37.50
Chapin	106.00
Chicago & Minne-	73.00
sota Ore Co.	106.00
Minnesota Iron Co.	73.00
Vermillion	2.25
North Pahst.	2.25
MISCELLANEOUS:	
Ropes Gold and Sil-	1.75
ver Mining Co.	
Michigan Gold Min-	.30
ing Co.	
Badger Silver Min-	3.50
ing Co.	
*Formerly Pence & Snider Co.	

**Salt Lake City.**

PRICES AND SALES FOR THE WEEK ENDING MAY 23, 1891.

Name and Location of Company.	Open- ing.	High- est.	Low- est.	Clos- ing.	Sales.
Allee, Mont.	1.60	1.75	1.60	1.65	100
Alliance, Utah	.....	.....	.....	.....	.....
Anchor, Utah	6.25	6.25	6.00	6.25	.....
Apex, Utah	.14	.14	.12	.13½	11,000
Barnes Sulphur, Utah	.....	.....	.....	.....	.....
Big Hole Placer, Mont.	.09	.09	.08	.08	2,000
Centen'l Eureka, Utah	40.00	40.00	40.00	40.00	.....
Congo, Utah	.17	.17	.17	.17	3,000
Crescent, Utah	.35	.38	.33	.38	1,000
Daly, Utah	18.75	18.75	18.50	18.50	.....
Glencoe, Utah	.....	.....	.....	.....	.....
Horn Silver, Utah	.....	.....	.....	.....	.....
Malad Con., Idaho	.02¼	.02¼	.02	.02¼	12,000
Mammoth, Utah	2.50	2.85	2.20	2.60	600
Northern Spy, Utah	.....	.....	.....	.....	.....
Ontario, Utah	40.00	40.00	40.00	40.00	.....
Stanley, Utah	.14	.14	.14	.14	.....
Utah L. & C. Co.	.....	.....	.....	.....	.....
Utah Oil Co., Utah	.....	.....	.....	.....	.....
Woodside, Utah	.....	.....	.....	.....	.....
Total sales	.....	.....	.....	.....	29,760

**PIPE LINE CERTIFICATES.**

The petroleum market this week has been neglected and without radical change. There has been a little more demand for Lima oil at about 16c. to 16½c., on the theory that it is much cheaper relatively than Pennsylvania oil selling four times as high. The probability is that the first speculative movement will be in the Ohio rather than the Pennsylvania product.



The exports of Russian oil to Europe during 1890 were considerably in excess of those for the preceding year, and that country is now a greater competitor than ever before with the refined product marketed in Europe, chiefly through the Standard Oil Company.

#### CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
May 23.....	68 $\frac{3}{4}$	68 $\frac{3}{4}$	68 $\frac{3}{4}$	68 $\frac{3}{4}$	8,000
25.....	68 $\frac{3}{4}$	68 $\frac{3}{4}$	67 $\frac{3}{4}$	67 $\frac{3}{4}$	17,000
27.....	68 $\frac{3}{4}$	68 $\frac{3}{4}$	68 $\frac{3}{4}$	68 $\frac{3}{4}$	19,000
28.....	68	68 $\frac{3}{4}$	68	68 $\frac{3}{4}$	20,000
29.....	68 $\frac{3}{4}$	68 $\frac{3}{4}$	68 $\frac{3}{4}$	68	44,000
29.....	68 $\frac{3}{4}$	68 $\frac{3}{4}$	68	68	107,000
Total sales in barrels.....					215,000

#### NEW YORK STOCK EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
May 23.....	68 $\frac{3}{4}$	68 $\frac{3}{4}$	68 $\frac{3}{4}$	68 $\frac{3}{4}$	3,000
25.....	68	68	68	68	5,000
27.....	68 $\frac{3}{4}$	68 $\frac{3}{4}$	68 $\frac{3}{4}$	68 $\frac{3}{4}$	5,000
28.....	68 $\frac{3}{4}$	68 $\frac{3}{4}$	68 $\frac{3}{4}$	68 $\frac{3}{4}$	5,000
29.....	68 $\frac{3}{4}$	68 $\frac{3}{4}$	68 $\frac{3}{4}$	68	46,000
Total sales in barrels.....					59,000

#### COAL TRADE REVIEW.

New York, Friday Evening, May 29.  
STATEMENT OF shipments of anthracite coal (approximated) for the week ending May 23d, 1891, compared with corresponding period last year.

Regions.	May 23, 1891.	May 24, 1890.	Difference.
Wyoming Region, Tons	423,031	346,587	Inc. 76,444
Lehigh Region "	112,601	124,015	Dec. 11,414
Schuylkill Region "	229,164	172,511	Inc. 56,653
Total..... Tons	764,796	643,513	Inc. 121,283
Total for year to date			
Tons	13,393,458	11,264,485	Inc. 2,128,973

PRODUCTION OF BITUMINOUS COAL for week ending May 23d, 1st day from January 1st:  
EASTERN AND NORTHERN SHIPMENTS.

	Week.	Year.	1890.
Phila. & Erie R.R.....	1,022	45,826	46,268
Cumberland, Md.....	86,987	1,623,494	1,428,816
Barclay, Pa.....	3,541	69,347	53,004
Broad Top, Pa.....	5,404	13,113	305,522
Clearfield, Pa.....	67,537	1,713,864	1,527,123
Allegheny, Pa.....	22,015	548,090	522,430
Beach Creek, Pa.....	41,272	925,323	741,694
Poconantas Flat Top.....	50,673	969,073	747,466
Kanawha, W. Va.....	44,872	903,445	788,200
Total.....	323,323	6,809,180	6,158,523

	Estimated.	WESTERN SHIPMENTS.	Year.
Pittsburg, Pa.....	16,666	433,530	359,907
Westmoreland, Pa.....	32,151	762,748	667,659
Monongahela, Pa.....	6,446	213,546	114,955
Total.....	55,263	1,409,824	1,142,521
Grand total.....	378,586	8,219,004	7,301,044

PRODUCTION OF COKE on line of Pennsylvania R. R. for the week ending May 23d, 1891, and year from January 1st, in tons of 2,000 lbs.: Week, 60,514 tons; year, 1,133,433 tons; to corresponding date in 1890—2,198,023.

#### Anthracite.

For the week ending May 23d the production was 764,796 tons. The increase for the year to that date was 2,128,973 tons.

The Western sales agents held a meeting yesterday at which the fact was developed that there is now less stock on hand in the North and West than there was at the corresponding period in 1890, and that the trade in these quarters is in a very satisfactory condition. Prices were advanced 15c. as follows: Buffalo and the bridges, \$4.30 for grate; \$4.40 for stove, egg and chestnut, per gross ton; for f. o. b. 30c. additional. At Chicago the rate is \$5.40 per net ton, all sizes.

Thursday afternoon the Eastern sales agents held their regular monthly meeting. It was of a most harmonious character and was devoted to the determination of the June tonnage and advance in prices. It was decided that the best interests of the trade would be served by an allotment of 3,200,000 tons for the month. The advance of 15c. in price is undoubtedly the first step in a programme which will bring the price of certain sizes, probably domestic, up to \$1.00 a ton by the time the fall trade becomes active. Prices as they stand for June are: For grate, \$3.65; egg, \$3.75; stove, \$3.90; chestnut, \$3.65. Lehigh coals will probably be advanced proportionally. A meeting of certain of the Lehigh operators was called for Thursday afternoon for the purpose of giving the subject attention, but failed to materialize through a lack of attendance. The subject of an advance will be given attention the coming week. The question naturally arises, "How will the trade stand this advance?" The belief is that it will respond very sluggishly for the reason that, statements to the contrary notwithstanding, there has been sold a large tonnage of coal at May prices for June delivery.

We understand the Lehigh Valley Coal Company's prices for Packer and Spring Mountain Lehighs are to be about as follows during June: Broken, \$3.95; egg, \$4.00; stove, \$4.00; chestnut, \$3.85, f. o. b. net.

The matter of a readjustment of percentages of the different companies did not come up at this meeting, and, from all that we can learn, will not be brought up for any extended consideration. There is plenty of talk just now to the effect that the Reading, having obtained 1,000,000 tons additional through the Coxé Bros. & Co. contract, will insist on having its percentage proportionately increased, and at the expense of the roads losing the tonnage. If this is their expectation they will probably be disappointed. We have sufficiently felt the sentiment of the trade to warrant the statement that the roads losing the tonnage in question will do nothing more or less than make it up from their own collieries. When the matter comes up for consideration, if it does, it will be a subject which the general and traffic managers of the different roads interested—the Pennsylvania, Jersey Central and Lehigh Valley—and not the sales agents, will be called upon to settle. Be this as it may, the subject will receive no very serious attention before September.

The recently published report that the stocks at tidewater no longer represent the stock on hand, for the reason that immense storage yards are being built at the mines and other inland points in which a large tonnage is being stocked, is absurd, and may be dismissed without consideration. It is a fact that the stock at tidewater, May 1st, of 784,587 tons, with the addition of a few hundred thousand tons in western docks and yards, represented the stock on hand on that date. Consequently the 2,000,000 tons' excess has gone into consumption. For months the trade has been puzzling itself to determine the medium through which this tonnage has been absorbed. The conclusion reached is that a greater portion of it has gone to meet a demand created by depleted stocks. These having been replenished the consumption will not be apt to stand a proportionate increase during the remainder of the year. However, many men prominent in the trade will be found who have the belief that the total production for 1891 will be 40,000,000 tons, or an excess of 5,000,000 tons over last year.

The Interstate Commerce Commission has brought suit in a Pennsylvania court against the Lehigh Valley Railroad to compel a compliance with the mandate issued in the Coxé Bros. & Co. case.

#### Bituminous.

The opinion seems to prevail that the bituminous coal trade is in a fair way to contract temporary indigestion. During the past few weeks an immense tonnage has been coming forward. To be sure, a fairly large proportion of it is for immediate consumption. Nevertheless, the remainder, which is considerable, is going into stock. This tonnage is being moved in answer to the demand of contractors who are drawing much in excess of their stipulated monthly instalments, and for no other apparent reason than to take advantage of the exceedingly—and, we might say, almost unprecedented—low ocean freights. The reaction which must follow will make things rather dull during June. To meet this demand the companies are producing at a rate considerably in excess of their yearly allotments. In so doing, however, none are taking chances, as they have not gone beyond their depth, or, in other words, have not contracted beyond their appointment. They are simply borrowing tonnage from themselves as it were, to be repaid later in the form of restriction. This tendency to make hay in the May sunshine will necessitate one of two things: either production must be materially lessened or allotments increased. This latter contingency will be most agreeable to the producer. It is said that the majority of the Seaboard Association is in favor of such an increase. It is generally known that the question is being advocated, and if prices continue firm and the future shows a fair demand, this feeling will intensify and shape itself in action. The only point which gives apprehension is the effect which a measure of this nature would have on prices. The better element of the trade will move, however, with caution in a matter that is in any way liable to weaken the combination.

The man cannot be found who will dispute the fact that more bituminous coal is going into consumption to-day than a year ago. A large proportion of the increase is absorbed by the manufacturing industries; but the amount which is replacing anthracite is not inconsiderable, and never has this been more marked than since the anthracite companies commenced restriction. When working on half time an anthracite operator is not in the market with pea, as that proportion of this size which is not used in operating the colliery goes to meet the local demand. Bituminous is then called in to take its place. This consumption, which along certain lines was at first but temporary, now promises to become permanent.

We learn from the companies handling the best grades of coal that they have contracted up to or near their present limit, and are now refusing tonnage offered, most of which is a spot business. In the face of this condition the question naturally arises, "How about higher prices?" The answer is found in the existence of this feeling that there is a possibility that the seaboard allotment will be increased. The coal bear, having lost almost every other support, now clings tenaciously to this rumor.

The cause of the prevailing low ocean freight rates is one of the most difficult conundrums of

the trade. Notwithstanding the heavy tonnage which is being moved, rates are lower than they have been in years. The only plausible solution which has been advanced is the competition brought about by the recent introduction of a number of steam colliers. Vessels at lower ports are threatening to tie up. Rates rule at about the figure the shipper elects to pay. We quote: From Baltimore to Boston, 70c.; to Sound ports, 60c.; Philadelphia to Sound ports, 70c.; to Boston and other Eastern ports, 70c.75c.; Norfolk to New York, 60c.

A point pertinent to the bituminous trade is the stand which is being made in the line trade by certain railroad companies. The rail tariff which went into effect April 1st was an advance of about 25 cents per ton to points north and east. The Boston & Albany, Grand Trunk, and New York Central railroads, which consume an aggregate tonnage of about 3,000,000 tons, have thus far stood out against allowing this advance to be added to the price of their coal. The shipping railroads interested, namely, the Pennsylvania, Beach Creek, and the Buffalo, Rochester & Pittsburg, have taken an equally stubborn stand, and in consequence, the operator has his hands tied. The Beach Creek, which is practically a side-issue of the New York Central, is backed in its demand by the latter corporation on the ground that the advance is necessary to meet the interest on the capital invested. The Pennsylvania, whose general freight agent, Wm. H. Joyce, left for Europe two weeks ago, followed this week by General Manager Pugh, both to be absent several months, is not to be thought of in connection with a reduction. Aside from these facts, now that the tidewater trade has firmly settled to a business on the new tariff, a change of any kind, even in the line trade, is out of the question. The operators interested do not seem disposed to meet these differences. It is not unlikely that the railroads wanting the coal will be starved into submission.

This week we met with several instances in the trade where inquiries had been made for coal for shipment to the West Indies and to South America, and an almost unprecedented application was that of a certain shipper for a cargo of 2,000 tons of coal for Montreal.

Locally business is quiet. Certain of the companies do not care for new business, and others are not being called upon. In fact, the trade has been thoroughly covered by contracts, leaving the amount of spot business at a minimum.

#### NOTES OF THE WEEK.

The Delaware & Hudson Canal Company has declared its quarterly dividend of 1%, payable June 15th. The books are closed until the 16th inst.

It is said that a few insurance risks on coal consigned to Lake Superior and Lake Michigan ports have been taken at the low rate of 14c., while a 16c. rate is quite common. The lowest rates last year were 17c. and 18c.

The Columbus, Lima & Milwaukee Railroad, it is said, has been absorbed by Norfolk & Western Railroad. This will give the latter, via their Iron River and Scioto Valley lines, a route from the Ohio River to Muskegon, where connection can be made by boat to Lake Superior points.

The Philadelphia Reading Railroad and Coal and Iron Companies' combined financial statements show \$101,838 deficit for April and \$494,544 deficit for the five months of the fiscal year that have passed. Compared with the previous year this shows a loss of \$3,694 for April, and a gain of \$425,366 for the five months.

The members of the trade who participated in the excursion under the auspices of the Retail Coal Exchanges of Brooklyn and New York, as outlined in this column May 9th, returned on the 28th inst., thoroughly convinced that the people of Maryland, Pennsylvania, and the District of Columbia, whom it was their good fortune to visit, have a deserved reputation for genuine hospitality.

The termination of the Connellsville coke strike a week ago has resulted in the application of more of the strikers for work than the companies care to take back. A large number of the leaders have been blacklisted and in consequence cannot secure work at any of the plants in the region. The Frick, McClure, Hecla and Whitney companies have announced June prices as follows: furnace \$1.90, dealers \$2.15, foundry \$2.30.

#### Boston.

May 23.

(From our Special Correspondent.)

The tone of the anthracite market continues fair, although the volume of business passing is very small. Dealers are conscious of the condition of the market, and are content to rest until the demand improves. Stocks are ample for the present, and with the exception of some sizes there is coal enough to satisfy the call.

The conditions of the bituminous market are practically unchanged from last report. Coal is coming forward freely, and buyers, always bears on the market, claim that it has weakened prices somewhat. Agents claim that the circular price is being adhered to, and say that all sales command \$2.50 f. o. b. tidewater. Coal on cars is offering in large quantities at about \$3.65.

Freights are low and weak, with a discrimination in favor of Baltimore. The retail situation moves in a steady manner



and presents little new. The demand is small and prices are holding steady.

The receipts of coal at this port for the week ending May 23 were 54,772 tons of anthracite and 40,543 tons of bituminous, against 33,978 tons of anthracite and 18,001 tons of bituminous for the corresponding week last year. The total receipts thus far this year have been 585,528 tons of anthracite and 531,631 tons of bituminous, against 475,692 tons of anthracite and 362,365 tons of bituminous for the same time last year.

**Chicago.** May 28.  
(From our Special Correspondent.)

The anthracite coal companies in the East are instructing Western agents generally not to accept contracts for future delivery at present prices. The demand is improving, and smaller dealers are feeling the market. Indications point to an active season's trade. Quite a number of outside dealers, tributary to this market, are in the city talking business. Steam sizes continue in good demand. The condition of the market is healthy, and the situation an improvement over that of the corresponding period last year.

Bituminous coal is not as active as a month ago. However, the stocks secured in April, in anticipation of strikes, are becoming greatly reduced, and, in some cases, exhausted. The demand is improving. Dealers also report that better prices are realized than those which prevailed before the expected strikes. In quite a number of instances offers of orders have been refused for stated amounts at prices now ruling. Operators and heavy shippers are firmly convinced that they will be able to secure an advance very early in the fall.

Resumption at Connellsville is becoming more general, and in about thirty days the supply of coke will be more abundant and large consumers enabled to run their works to full capacity. There is now only about 50% of the needed supply of furnace coke coming forward, and but very little foundry grades. Many operators affirm that foundry coke will be scarce for another two weeks. Virginia coke continues in good demand, and during the late trouble in the Connellsville basin some of the larger Virginia companies producing a first-class article succeeded in securing contracts running from six to twelve months.

Prices of anthracite per ton of 2,000 pounds f. o. b. Chicago are: Lehigh lump, \$6.75; large egg, \$5; small egg, range and chestnut, \$5. Retail prices per ton are: Large egg, \$6.25; small egg, range and chestnut, \$6.50.

Prices of bituminous per ton of 2,000 pounds f. o. b. Chicago are: Pittsburg, \$3.25; Hocking Valley, \$3; Youghiogheny, \$3.40; Indiana hock, \$2.35; Illinois hock, \$2.20.

**Coke.**—Connellsville, 72-bour, per ton f. o. b. Chicago, \$5.50; crushed, \$5.40; Walston, \$5.20; New River, \$5.50.

**Pittsburg.** May 28.  
(From our Special Correspondent.)

**Coal.**—The market rules firm, with a good demand. There were no shipments during May. The amount of coal loaded in the ports and in our harbor exceeds 17,000,000 bushels, all ready to pass down the Ohio as soon as there is sufficient water; at present the prospect for this is not very good. Coal in the lower markets is becoming very scarce. Shipments by the Ohio River for the first four months of 1890 were 56,233,000 bushels; same time in 1891, 18,376,000 bushels; deficiency this year, 37,857,000 bushels. Coal at Cincinnati and Louisville is selling at 9½¢@10¢. per bushel; at New Orleans, 40¢. per barrel, which contains 2½ bushels. At New Orleans there are 180 boats with coal; at points above, 124 boats; total, 304. This stock will soon be exhausted unless there comes a rise in the Ohio.

**Coke.**—The strike is over at last; the leaders forced the men to remain out until most of their places had been filled with new men, and now there are not places enough for all. The men are very bitter against their leaders on account of the result of the strike. The coke men refuse to recognize the leaders in any manner, and the men will hereafter deal with the companies directly. The new scale of wages is for three years. The new scale of coke prices is not yet made out. Coal shipped last week, 50,825 tons; previous week, 45,095.

**METAL MARKET.**

**Prices of Silver Per Ounce Troy.**  
New York, Friday Evening, May 29, 1891.

May	Sterling Exch'ge	London Price.	N. Y. Cts.	May	Sterling Exch'ge	London Price.	N. Y. Cts.
23	4.87½	44¼	96¾	27	4.88	44 5-16	97
25	4.87½	44¼	96¾	28	4.88	44¼	97
26	4.87½	44¼	96¾	29	4.88	44¼	96¾

The fluctuations in silver for the past week have been very slight. There has been no foreign demand, and as speculation in silver is tame at present, we have no movements in the metal to report, beyond the usual Government purchases, the month's quota being completed to-day.

The United States Assay Office at New York reports the receipts of silver for the week to be 62,000 ounces.

**Government Silver Purchases.**

The Treasury Department informs us that the amount of silver purchased by the Government during the past week was as follows:

	Offered ounces.	Purchased ounces.	Average price.
May 23	669,500	315,500	97.26
May 27	883,000	294,000	97.45

WASHINGTON, D. C., May 29.—(By Telegraph.)—The Treasury Department purchased 120,000 ounces of silver at 97 per ounce.

**Silver Bullion Certificates.**

	Price.		Sales.
	H.	L.	
May 23			
May 25			
May 26			
May 27	97½	97¼	100,000
May 28	97½	97	80,000
May 29	97	96¾	85,000
Total sales			265,000

**Domestic and Foreign Coin.**

The following are the latest market quotations for American and other coin:

	Bid.	Asked.
Trade dollars	76	79
Mexican dollars	76	77
Peruvian soles and Chilean pesos	75	76½
English silver	4.86	4.88
Five francs	.94	.95
Victoria sovereigns	4.88	4.90
Twenty francs	3.87	3.89
Twenty marks	4.75	4.78
Spanish doubloons	15.55	15.70
Spanish 25 pesetas	4.73	4.85
Mexican doubloons	15.55	15.70
Mexican 20 pesos	19.50	19.90
Ten guilders	3.96	4.00
Bar silver	.97	.97½

**Foreign Bank Statements.**

The governors of the Bank of England, at their weekly meeting on Thursday, made no change in its minimum rate of discount, which remains at 5%. In the week the bank gained £2,297,700 bullion, and the proportion of reserve to liabilities was raised from 35.50 to 40.60%, against a decline from 42.13 to 41.94% in the corresponding week last year, when its discount rate was unchanged at 3%. On the 28th inst. the bank gained £967,000 bullion on balance. The weekly statement of the Bank of France showed an increase of 12,625,000 francs gold and 7,000,000 francs silver.

**Copper.**—Since our last report the market has experienced a sudden—and in some quarters a quite unexpected—change for the better. This better feeling originated in the London market, where, during this week, prices for G. M. Bs. continued to advance steadily. The market last week closed quiet with £52 2s. 6d. for spot and £52 15s. for futures, whereas to-day's closing prices are £55 5s. @ £56—an advance of over £3. Although, as set forth in our last report, this advance in G. M. Bs. is doubtless due to a great extent to the covering of short sales, it is evident that the general feeling regarding the position of copper is radically changed, and not only G. M. Bs. but other kinds of copper are showing a marked improvement. There seems to be no doubt that the feeling of distrust on the part of consumers and dealers has abated to a considerable extent, which has been undoubtedly brought about by the favorable statistical position of the article. In this connection we desire to point out that in our issue of April 18th, in which we published Messrs. Henry R. Merton & Co.'s statistics regarding the production and consumption of copper in 1890, we drew the attention of our readers to the very secure position of copper. This position has now considerably improved, a result to which the uncertainty and falling off of shipments from Chili and the closing of the Anaconda mine have in some measure contributed. A further important factor in influencing the market was the sale of a lot of 5,000 tons of Anaconda matte at 10s. 6d. direct to consumers. The American market, which, so far, was the weak point in the whole situation, is already responding to this bullish feeling evinced abroad, and we now hear that 13c. is being paid for large lots of Lake copper after 12½¢. had been accepted in the early part of the week. The chief Arizona mining companies appear to have sold most of their product for some time ahead, as offerings of Arizona hars are very light indeed. Casting copper is held by sellers at prices ranging between 11½¢@11¾¢, and stocks not being heavy we are disposed to think that higher prices will be exacted in the near future.

We quote to-day: English tough, £56@£56 10s.; best selected, \$59@£59 10s.; strong sheets, £82@£82 10s.; India sheets, £60@£60 10s.; yellow metal, £5 ¾d.

The exports of copper from the port of New York during the past week were as follows:

To	Copper.	Lbs.	
To Bordeaux—	24 bars.	3,328	\$432
By S. S. Panama.....	20 pigs.	3,130	329
" " " " " " " "	80 casks.	100,000	14,000
To Rotterdam—			
By S. S. Wer Kendam.	120 casks.	150,000	\$19,500
" " " " " " " "	416 pigs.	105,688	13,000
" " " " " " " "	1,641 bars.	225,749	29,299
To Liverpool—	Copper Matte.	Lbs.	
By S. S. Nomadic.....	1,923 bags.	203,944	\$15,000
" " " " " " " "	5,216 bags.	589,401	41,000
" " " " " " " "	58 bbls.	92,185	10,500
" " " " " " " "	2,259 bags.	242,836	16,000
" " " " " " " "	180 casks.	224,500	27,000
" " " " " " " "	809 bars.	112,016	13,400

To	Copper.	Lbs.	
To Hamburg—			
By S. S. California.....	20 pigs.	3,130	\$343
" " " " " " " "	492 " "	112,062	14,000
To Havre—	Copper.	Lbs.	
By S. S. La Bourgogne.	272 pigs.	89,756	\$11,000

**Tin.**—Tin has been comparatively quiet but very firm during the week, a moderate amount of business having been done at the Metal Exchange, mostly for June and July delivery, at an average price of about 20.30c. The market, however, closes firmer, with 20.50c. bid for June and July, and no sellers thereat. Yesterday a contract of 25 tons was closed at 20.55c. The great body of consumers are evidently awaiting further developments before entering the market more freely. The current demand continues on a fair scale.

The change in the London market has also been very slight indeed, last Friday's market closing at £92 17s. 6d. for spot and £9 17s. 6d. for futures, the only feature of interest being the advance in the price of futures, which closed to-day at £92 7s. 6d., spot being \$92 2s. 6d.

**Lead.**—The market is firm at the advance of last week. Several hundred tons have changed hands at prices ranging from 4.35@4.40c., and further quantities could only be bought at an advance on that price. The consumptive demand has rather increased at the advance, which confirms our statement of last week that consumers were very poorly supplied.

The London market does not show any change, and we quote Spanish at £12 10s. and English at £12 15s.

**Chicago Lead Market.**—Messrs. Everett & Post telegraph us as follows: "The market is quiet, but very firm. Sales have aggregated 300 tons at 4.25c., with little offering. Consumers seem to be fairly supplied for near-by delivery and are indifferent. The general trade is improving."

**St. Louis Lead Market.**—John Wahl Commission Company telegraphs us as follows: "Lead is strong and higher. Transactions have been moderately liberal. About 800 tons have been sold at or near 4.15c. Buyers view the sensitive undercurrent of the metal with a great deal of interest. At 4.15c. there are certainly more buyers than sellers."

**Spelter.**—The market is quiet and we have to report no change regarding the same. Carload lots are selling here at 5c. The English market is steady and quotations are unchanged from last week, being £22 15s. for ordinaries, and £23 for specials.

**Antimony.**—Prices have not changed from last week, and our quotations remain, Hallett's 14½¢. @ 14¾¢.; L X 15c.; and Cookson's 15½¢.

**IRON MARKET REVIEW.**

NEW YORK, Friday Evening, May 29.

Another week has passed without bringing about any change either in the local or the general iron market. In this city business is more than dull; there is scarcely anything doing. The strike among the foundrymen and the housesmiths is still on, and the men who are out are holding to their demands with grim persistence. On Monday last one, or two founders resumed work, according to their intention expressed in the week previous. None of them is running on full time, however, as few of the old men have returned to work. These foundries are the exceptions, and nearly all of those which are engaged on housework iron are still idle, so that practically the only business which is being done in the local pig iron market is in meeting the demand from outside points which depend upon New York.

During the past week, the great coke strike which has been in effect in the Connellsville region since Feb. 9th was settled, the companies being victorious, as for the past month it has been expected that they would be. As the strike has resulted, coke remains at the same price as it was before, and as one of the reasons that the furnaces of the Mahoning and Shenango valleys were blown out was the high price of coke, it does not seem likely that there will be any general blowing in now, although, as we go to press, there are reports that some of these furnaces are making contracts for coke preparatory for a resumption of work. In any case, the matter will have comparatively little effect upon the local market, where there is little demand for the lower grades of iron which will be particularly affected.

**American Pig Iron.**—Notwithstanding the almost complete falling off in demand, the prices of pig iron remain firm, and we hear of no concessions being made. Dealers are simply holding back their iron at the furnaces, and in the case of the Southern furnaces producing standard brands of iron this affects them little on account of the increasing demand for this material from other quarters.

Quite a large amount of Southern iron is now going to Boston for the New England trade, and there is undoubtedly an improved demand there for the better grades of iron. We quote prices unchanged: Northern No. 1 X, \$17.50@18; No. 2 X, \$16.50@17.50. Southern, No. 1 X, \$17.50@18; No. 2 X, \$16.50@17.

In the general demoralization of the iron market at the present time there are some exceptions. Mr. B. G. Clarke of the Thomas Iron Company reports



that by July 1 its shipments from January 1 will exceed 100,000 tons and will be larger than for any period of six months for many years. The company, also, has practically no stock at the furnace. It is true that the Thomas Iron Company occupies a comparatively independent position in the iron trade, but this condition of affairs is striking in view of the general situation.

**Spiegeleisen and Ferro-Manganese.**—The market is dull. Spiegeleisen, 20%, is quoted nominally at \$27.50@28.50; ferro-manganese, 80%, is a trifle firmer and prices range from \$64.50 to \$65.50. Small sales are reported at the latter figure.

**Steel Rails.**—Sales amounting to 40,000 tons are reported, one lot being of 4,000 tons, one of 30,000 tons, and one of 6,000 tons, the last being to a Southern road. The price was \$30, at the mill. There is prospect of more activity as there are inquiries in the market for other large lots.

**Rail Fastenings.**—Dealers say that it is a long time since they have known the market to be so dull. The amount of business passing is very small indeed. Nothing more is said of the combination of spike manufacturers, and if any such arrangement has been made it certainly has not yet resulted in an increase in prices. Indeed, it is hardly likely that such a move could be successfully made in the present state of affairs. We quote, nominally: Spikes, \$1.90@2; angle plates, 1.70@1.80c.; bolts and square nuts, 2.65@2.75c.; hexagonal nuts, 2.85c.; complete joint, iron and steel, according to weight. There is sharp competition for orders, and these prices are undoubtedly shaded.

**Tubes and Pipe.**—There is no change. We quote prices and discounts on car-load lots as follows: 47½% on butt, black; 40% on galvanized; 60% on lap, black; 47½% on lap, galvanized; boiler tubes, 50% on all sizes; casing, all sizes, 50%.

**Structural Iron and Steel.**—The strike of the house-smiths still being in effect, the market is as stagnant as last week. We quote prices: Universal plates, \$2.25; bridge plates, \$2.10; angles, \$2.20; beams, \$3.10.

**Merchant Steel.**—Business has been good during the week, a number of large orders having been placed. Prices are firm at the following figures: Best English tool, 15c., net; American tool steel, 7@8c.; special grades, 13@20c.; crucible machinery steel, 5c.; crucible spring, 3½c.; open heart machinery, 2.60c.; open hearth spring, 2.60c.; tire steel, 2.60c.; toe calks, 2.60c.; first quality sheet, 10c.; second quality sheet, 8c.

**Old Rails.**—Old rails are still dull. We quote nominally, \$21.50@22.50 for tees and \$25 for doubles.

**Wrought Iron Scrap.**—The market is lifeless. We quote: \$21@22 at yards.

Chicago. May 28

(From our Special Correspondent.)

The market is not quite so active as during the previous two weeks. Still the demand is good and in some branches enlarging, the exception being in those lines more particularly affected by railroad interests. The consumption of pig iron in Chicago and vicinity is steadily increasing and some consumers who have been using only 25 to 50 tons a month are now using double and in some instances quadruple that amount. Manufactured iron and steel are in good inquiry and structurals briskly moving, but old material and scrap are very dull. The outlook is promising, and the crops once assured, late summer and fall trade bids fair to be active.

**Pig Iron.**—Now that the coke strike is over several furnaces in this district are preparing to go into blast, and of these, "Bay View," at Milwaukee, and the North Chicago furnaces, may blow in this week, if the fuel arrives on time. The agents for these coke furnaces report that their yards are bare of stock of Nos. 1 and 2 foundry iron. The local demand for pig iron is large and steadily increasing, but is less brisk than it was, as many consumers of charcoal iron have purchased for at least six months ahead. The larger charcoal furnaces are now asking \$18 for their product and are very independent as to accepting further business at those figures. Agents report that May was the heaviest on record so far as tonnage is concerned. The recent advance of 50c. on coke iron has probably somewhat checked sales, but as consumers need iron and stocks are small active buying will soon be resumed. Southern coke is in better demand and some large contracts were placed during the week.

Quotations per gross ton f. o. b. Chicago are: Lake Superior charcoal, \$18.00@18.50; Lake Superior coke, No. 1, \$15.75@16; No. 2, \$15.50@15.75; No. 3, \$14.75@15; Lake Superior Bessemer, \$17; Lake Superior Scotch, \$17@17.50; American Scotch, \$18.50@19; Southern coke, Foundry No. 1, \$16.25; No. 2, \$15.75; No. 3, \$15.25; Southern coke, soft, No. 1, \$15.75; No. 2, \$14.75; Ohio silveries, No. 1, \$18; No. 2, \$17; Ohio strong softeners, No. 1, \$18.50; No. 2, \$17.50; Tennessee Charcoal, No. 1, \$18; No. 2, \$17.50; Southern Standard Car Wheel, \$21@23.

**Structural Iron and Steel.**—The German theatre to be erected on Randolph street will require 2,000 tons of iron and steel and the Merchants' Club House 1,500 tons. These specifications are now in the market and contracts will be

closed this week. Demand continues good both for building and bridge material. Quotations remain unchanged for car lots f. o. b. Chicago: Angles, \$2.20@2.25; tees, \$2.75@2.85; universal plates, \$2.35@2.45; sheared plates, \$2.30@2.40; beams and channels, \$3.20.

**Plates.**—A local firm secured the Duluth order for steel plates aggregating nearly 1,000 tons. Some fair-sized orders are also reported for tank and flange steel, and store demand is good for the season. Quotations remain unchanged: Steel sheets, 10 to 14, \$2.70@2.80; iron sheets, 10 to 14, \$2.60@2.70; tank iron or steel, \$2.50@2.70; shell iron or steel, \$3@3.25; firebox steel, \$4.25@4.50; flange steel, \$3.25@3.40; holler rivets, \$1.25; boiler tubes, 2½ inches and smaller 55% larger than 2½ inch 60%.

**Merchant Steel.**—Demand is heavy and numerous contracts are reported from implement men, who usually place their orders in July and August. In two weeks one western Pennsylvania mill secured nearly 2,000 tons, hence the inference that the aggregate tonnage must be large. The tide has turned at last, and prices will probably appreciate in the near future. A fair demand is noticed for tool steel. Prices remain unchanged: Tool steel, \$6.75@7; tire steel, \$2.30@2.50; toe calk, \$2.50@2.65; Bessemer machinery, \$2.20@2.30; open-hearth machinery, \$2.60@2.75; open hearth spring, \$2.75@3; crucible spring, \$3.75@4.

**Steel Rails.**—The situation is improving, and some railroads are inquiring for larger amounts, and we look forward to increased activity in this line. Other track supplies are also in better request for increased quantities. Quotations remain unchanged at \$31@32.50 per ton f. o. b. Chicago. Splice hars at \$1.95@2 for steel and \$1.85@1.95 for iron, and spikes at \$2@2.05 per 100 pounds.

**Galvanized Sheet Iron.**—Warehouse trade has been good during the week, and a very fair mill business has been booked. Discounts are steadier at 67½% off on Juniata and 67½% and 5% off on charcoal.

**Black Sheet Iron.**—Mill agents report a strong demand from dealers and manufacturers, and mills hold very firm to 2.85c. for No. 27 common at mill. Sheet steel is in fair demand at 3.30c. rates. Dealers quote 3.50@3.20c. for common iron.

**Bar Iron.**—Several specifications for car iron are in the market and car companies are in receipt of orders for new rolling stock, which together with current business, make the market more active. The mills here now name \$1.70, with half extras added, and are decidedly unwilling to enter orders for forward delivery at that price. Valley mills still quote 1.55@1.60c. at mill. Out of store prices are 1.85@2c., according to quantity and quality, and trade fair.

**Nails.**—Demand from mill is only light, but prices are perhaps a trifle firmer. Mills quote \$1.60 on regular specifications. Store prices are \$1.75@1.80 for small lots. Wire nails are in better inquiry in from 500 to 1,000 keg lots, and some mill agents report they are selling and shipping to full capacity. Factory price is \$1.95, and from store, \$2.15 in carloads and \$2.20 for small quantities.

**Scrap.**—Demand for all grades is exceedingly light, and orders of any kind are for small amounts, and prices nominal. Quotations per net ton f. o. b. Chicago are: No. 1 railroad, \$18.50; No. 1 fish, \$18; No. 1 mill, \$14; fish-plates, \$21; axles, \$23.50; horseshoes, \$18; pipes and flues, \$13; cast borings, \$8; wrought turnings, \$10.50; axle turnings, \$12.50; machinery castings, \$11.50; stove plates, \$8; mixed steel, \$11; coil steel, \$15.50; leaf steel, \$15.50; tires, \$17.

**Old Rails and Wheels.**—Old material of all kinds is in very limited demand, and no sales reported in this market. Iron rails are quoted at \$22.50, but some holders ask more. Old steel rails are quiet at \$17 for selected and \$14 for short or mixed lengths. Old car wheels are dull at \$16.50.

Louisville. May 23

(Special Report by Hall Bros. & Co.)

Reports from different districts still show considerable variations in prices of pig-iron sales for the last week; we refer more particularly to coke iron, but in the line of charcoal metals also, prices have been very irregular indeed, having run almost entirely in the buyers' favor. Several round lots have been absorbed at figures remarkably low, and in some instances it is believed prices obtained were below the cost of production. It is well understood, however, that this condition cannot prevail very long, and as sales of considerable quantities have been made, absorbing part of stocks on hand and partaking liberally of future product, it is thought that charcoal furnaces will soon be in shape to hold out for better figures. Sales in this immediate vicinity have been mostly in small lots, but inquiries from distant points have been more frequent and for larger quantities, and on the whole the general situation is somewhat improved. The recent heavy rains enhance the crop prospects and add a renewed feeling of confidence. We quote:

**Hot Blast Foundry Irons.**—Southern coke, No. 1, \$14.25@14.50; No. 2, \$13.75@14; No. 3, \$13.25@13.50. Southern charcoal, No. 1, \$16.50@17; No. 2, \$16@16.50. Missouri charcoal, No. 1, \$17@17.50; No. 2, \$16.50@17.

**Forge Irons.**—Neutral coke, \$12.50@13; cold short, \$12.50@13; mottled, \$12@12.25.

**Car Wheel and Malleable Irons.**—Southern, standard brands, \$19.50@20; Southern, other brands, \$17.50@18. Lake Superior, \$20.50@21.50.

Philadelphia. May 28.

(From our Special Correspondent.)

**Pig Iron.**—The situation in the pig iron market has not changed sufficiently to warrant the expression of any different opinion or the multiplication of quotations. Careful inquiry shows that brokers and furnacemen are transacting only an ordinary business, and are not meeting with that degree of inquiry for summer deliveries which, even as late as a week ago, they thought they would soon begin to receive. Outside competition, that is from the South, is having some influence upon makers in the way of keeping them contented with present quotations rather than asking a little more. Founders are purchasing the finer brands where they need them a few weeks in advance, but all ordinary brands are purchased as wanted. Mill men are not buying largely in advance, the same reasons actuating them as have existed for two or three months past. Quotations for No. 1 are \$17.50@18; fair No. 2, \$16.50; forge, \$15; ordinary forgc, \$14.25@14.50. Bessemer is quoted all the way from \$17.50 to \$19.50; no sales reported this week.

**Foreign Material.**—Quotations, \$64 to \$65. Small sales.

**Muck Bars.**—Several sales have been made since Monday at \$26.50.

**Steel Billets.**—A moderate amount of business is being done at \$27.50 to \$28.50, according to distance from point of manufacture. There is a restriction of production in nail slabs.

**Merchant Iron.**—Several lots of merchant iron have been taken as low as \$1.60 at interior mills; city mills sell at \$1.70. Retail lots bring \$1.80. There is not much activity, although some people talk about a moderate improvement from week to week.

**Skelp Iron.**—There is nothing new to report. Quotations \$1.70 to \$1.85 respectively.

**Wrought Iron Pipe.**—Quite a number of orders have been secured since Monday, all of them small, but the aggregate stimulates the hope that a better season is now at hand; no change in discounts.

**Sheet Iron.**—A good deal of irregularity is shown in sheet iron quotations, even for small lots. Some mill men are quite anxious to gather up business for the summer, and are offering extra inducements.

**Plate and Tank Iron.**—An improvement in demand has set in within a few days, and all the large orders that are likely to be placed next week will go in at very favorable prices to the buyers. Quite a number of large buyers are in the market, and mill men feel like predicting big business soon. As yet quotations have not been changed, though it is possible that on small lots prices will harden a little.

**Structural Material.**—An improvement has also set in for structural iron, but orders are still small. One or two manufacturers think that the month of June will be an exceptionally active one, and it is to be hoped it will, for orders have been annoyingly small all season.

**Steel Rails.**—Since Monday orders for 11,000 to 12,000 tons have been booked in Eastern mills, and on the authority of two or three brokers it is to be stated that orders for perhaps 15,000 tons will go through next week. Prices are firm at \$30 at mill.

**Old Rails.**—Quotations are given at \$22, but there is not any business to report.

Pittsburg. May 23.

(From Our Special Correspondent.)

**Raw Iron and Steel.**—Trade has not been so active during the past week as in the previous; still, as regards the volume of business, we see little reason for complaint. In respect to prices the situation is entirely different, values in many instances showing a wide range. Bessemer pig for some weeks has attracted a good share of attention, the operations having been large and for various deliveries. We learn of one transaction of about 10,000 tons, deliverable monthly until January 1st, 1892, and other sales have been made extending several months in the future. The price at which Bessemer is ruling, which is considered low, is undoubtedly the principal cause of so many purchases of that description of material.

The coke question being settled, there will now be an ample supply of fuel, but this is not likely to influence the iron market much. A leading dealer says concerning the question: "It is not likely that the settlement of the strike will induce the resumption of operations to any great extent on the part of furnaces now idle, and it is not probable that there will be any material increase in the production of pig iron until the demand shall broaden."

Our remarks last week concerning Southern pig iron were well received by the iron men, and were pronounced correct in all respects; one dealer said: "Our attempt to introduce Southern pig iron cost us over \$500, when we gave it up and do not purpose to experiment any more." Stocks of pig iron in the Mahoning and Shenango valleys are re-



ported exceedingly light, the principal amount made being consumed at home.

Sales of iron ore during the week amounted to 100,000 tons, taken from the Cleveland wharf, at prices ranging from \$4.50 to \$5.25, as per quality. There have been no special sales of new steel rails since our last report; the market is firm, with sales at \$30 at the mills.

The situation may be summed up as follows: Prices of Bessemer are weak and very uncertain; late deliveries have sold at low prices. Standard brands of grey forge are held firmly, with light stocks in the market. Steel slabs and billets are unchanged; the demand has fallen off, however. Ferric manganese is also unchanged. The demand for muck bar has fallen off; there have been light sales at last week's prices. Sales of bloom ends have been made at 25 cents' decline. Steel wire rods declined 25 cents. Skelp iron is unchanged. Old iron and steel rails dull and weaker. Scrap material shows a slight decline.

**Coke Smelted Lake and Native Ores.**

3,000 Tons Bessemer.....	\$15 75 cash.
2,500 Tons Bessemer.....	16.00 cash.
2,500 Tons Bessemer.....	16.00 cash.
2,000 Tons Bessemer.....	16.25 cash.
1,500 Tons Bessemer.....	16.40 cash.
1,500 Tons Bessemer at Valley furnace.....	15.25 cash.
1,000 Tons Bessemer.....	16.00 cash.
1,000 Tons Bessemer.....	16.00 cash.
1,000 Tons Grey Forge.....	14.25 cash.
1,000 Tons Grey Forge.....	14.25 cash.
1,000 Tons No. 3 Foundry.....	14.75 cash.
600 Tons Grey Forge.....	14.25 cash.
500 Tons Grey Forge at Valley furnace.....	13.75 cash.
500 Tons Grey Forge at Youngstown.....	14.25 cash.
500 Tons Virginia Grey Forge.....	13.75 cash.
200 Tons extra Grey Forge.....	14.50 cash.
200 Tons No. 1 Foundry, all ore.....	16.50 cash.
100 Tons Silvery.....	16.00 cash.
100 Tons No. 2 Foundry.....	16.00 cash.

**Steel Slabs and Billets.**

1,000 Tons Billets.....	26.00 cash.
1,000 Tons Rod Billets.....	25.50 cash.
500 Tons Billets.....	25.50 cash.
500 Tons Billets.....	26.00 cash.

**Muck Bars.**

750 Tons Neutral, June, July.....	26.50 cash.
500 Tons Neutral, June.....	26.50 cash.
500 Tons Neutral, June.....	26.25 cash.
300 Tons Neutral, June.....	26.25 cash.

**Skelp Iron.**

350 Tons Sheared Iron.....	1.85 4 m.
300 Tons Wide Grooved.....	1.65 4 m.
250 Tons Narrow Grooved.....	1.62 1/2 4 m.

**Steel Wire Rods.**

600 Tons American lines.....	36.00 cash.
------------------------------	-------------

**Ferro-Manganese.**

100 Tons 80%, Seaboard.....	64.25 cash.
100 Tons 80%, New York.....	64.50 cash.
75 Tons 80%, Pittsburg.....	66.50 cash.

**Scrap Material.**

250 Tons No. 1 W. Scrap, Net.....	\$19.50 cash.
150 Tons Hammered Iron Axes, Extra, Net.....	27.50 cash.
150 Tons Wrought Iron Turnings, Net.....	15.00 cash.
125 Tons Steel Rails, Short, Gross.....	17.00 cash.
125 Tons Hammered Iron Axes, Extra, Net.....	27.75 cash.
100 Tons O. H. Steel, Gross.....	17.25 cash.
100 Tons No. 1 W. Scrap, Net.....	19.00 cash.
100 Tons Cast Scrap, Gross.....	14.00 cash.
100 Tons Cast Iron Turnings, Gross.....	11.00 cash.

**Old Iron and Steel Rails.**

500 Tons American T's.....	23.25 cash.
500 Tons American T's.....	24.61 cash.
500 Tons American T's, Valley Delivery.....	24.25 cash.
450 Tons Old Steel Rails, Long.....	17.00 cash.

**Bloom and Rail Ends.**

1,200 Tons Bloom and Beam Ends.....	17.25 cash.
-------------------------------------	-------------

**CHEMICALS AND MINERALS.**

NEW YORK, Friday Evening, May 29.

Notwithstanding decreased production and very small stocks, that should under normal conditions have operated to give strength to this market, the demand has been so small and the prospects for any increase in that direction in the near future are so slight that the other influences have been almost overbalanced and values close rather weak on a slight advance over our last quotations. The demoralized condition of the glass trade cannot but have some effect on the raw materials, and the decision of some of the factories to close for the summer a month earlier than usual, coupled with the uncertainty as to when they will be started anew, has done much toward diminishing the demand for heavy chemicals and has materially weakened the position of present holders. Fortunately the stocks in New York of almost all the chemicals on the list are very small, and comparisons of shipments during the last four months and of similar periods of previous years show quite a falling off in everything but soda ash and salt cake. This, in conjunction with the recent cessation of production, the very small stocks, and the probability of a better understanding between the manufacturers and the glass jobbers, which was discussed at a meeting during the week in Chicago, would indicate that a general improvement in prices may be the ultimate result, but generally speaking the immediate outlook is anything but bright. Monetary and other conditions having a bearing on the subject in this country and abroad are such that an immediate rise is improbable.

Caustic Soda, 60%.—Arrivals have come in and gone into second hands almost completely, so that stocks, which have been gradually growing smaller, have now very nearly reached low-water mark. It would probably be impossible to secure any large quantity for immediate delivery, but under existing circumstances there seems no danger of any demand of that kind arising. Con-

tracts for May, June, and July shipments have been made in a small way at 3'25@3'30c., and the week closes with hardly more than a nominal demand. 70@74%.—Some few sales from dock comprise the business of the week. Values have been fairly well maintained at their former level, but there are few inquiries. For spot 3'07 1/2@3'10c. is being asked, and contracts for forward shipments could be made at 3'10@3'12 1/2c., according to quality. 77%.—The usual demand is filled at 3'07 1/2@3'10c.

Alkali, 48%.—The demand is hardly more than nominal, but most arrivals have gone immediately into consumers' hands, and, as stocks available for immediate delivery are very small, values have been maintained. Contracts for forward shipments of B. M. have been made at 1'55c. High test of the same make has come in quite freely, without, however, any accumulation of stocks resulting. Sales have been made at 1'45@1'50c. for future delivery, according to location and quantity. The market is rather full of some of the other makes, and these figures for large lots could doubtless be shaded. Sales have been reported at as low as 1'40c.

Caustic Soda Ash, 48%.—Every once in a while an order is obtained, but the demand is so intermittent that the whole aggregate of business is hardly worthy of consideration. Dealers are asking 1'55@1'60c. for spot. For future delivery a little more advantageous terms might possibly be obtained.

Sal Soda.—Apparently a somewhat better feeling prevails. Stocks have been considerably reduced within the last fortnight, although there is no very large demand. For large lots 1'05c. has been shaded, but the general quotation is 1'05@1'10c.

Bleaching Powder.—With the recent shutdown and decreased importations this market has every reason for recovering its tone, and has in fact partly done so, although the first rise consequent upon the restricted production of the Alkali Union was followed by a slight reaction. The demand has been fair and is filled at from 1'72 1/2 to 1'77 1/2c., at which the market closes firm.

Acids.—This market remains practically unchanged in the position it has so long occupied. The demand for sulphuric acid has been fairly good and the tendency to maintain prices continues a decided characteristic of the market. The topic of the week is the retirement from business of the Phoenix Chemical Company, which was one of the oldest and largest producers of acid. This serves as a fair indication of what the business has been for some time past, and would seem to indicate that the gentlemen interested see no prospect of a change for the better in the near future. It is but a natural sequence of the metamorphosis which the acid trade is now undergoing. With more widely disseminated information on the subject, the prejudice against pyrites acid is daily becoming less marked, and consumers no longer feel called upon to pay the premium for brimstone. It would seem merely a question of time until those using brimstone will form the exception and the manufacture of acid from pyrites will be the rule.

The demand for acetic acid has been small and consequently but little business has been passing. Nitric and muriatic have gone a little more freely into second hands, and at the close a fair demand is still a feature of the market.

We quote: Acid per 100 pounds in New York and vicinity: Muriatic, 18', 80c.@\$1; muriatic, 20', 90c.@\$1.10; muriatic, 22', \$1@1.20; nitric, 40', is selling for \$4.50, and from that upward, according to quality, etc.; nitric, 42', \$5@5.25; sulphuric, 60', 80c.@1.05; sulphuric, 66', 95c.@1.25.

Fertilizers.—The demand has been rather smaller than for some time past, and while stocks have not increased to any noticeable extent the tone of the general market has suffered a little. The most decided change is in the position of brimstone; according to advices from abroad, the efforts made by both speculators and the owners of mines to hold prices, though backed by the banks, have proven futile. The increase in value was not only instrumental in curtailing the consumptive demand, but gave an additional impetus to production. Forward deliveries are quoted 10s. below the prompt, and even the latter are selling very much below quite recent quotations.

South Carolina phosphate rock has gone steadily into consumers' hands, but business during the week has not been very active and a tendency to hold back seems a prominent feature. Our quotations remain the same, viz., \$6.50@7.50, wet and dry respectively, f. o. b. vessels at mines, and \$6.75@7.75 f. o. b. cars. For ground rock, dealers are getting from \$8.50 to \$11, \$11 in New York, bags returnable.

Sulphate of Ammonia made from gas liquor is in good request at 3'20@3'22 1/2c. for spot lots, of which there are not many on the market. Shipments can be obtained at 3'17 1/2@3'20c. Bone sulphate of ammonia is still in good stock, so that the market continues easy; but probably not much better than 3'12 1/2@3'17 1/2c. could be done. The supply of dried blood is larger, so that the market closes easier, 2c. being asked for high grade and 1'90c. for low grade. Azotine continues firm at \$2@2.05 per unit. Bone black is still very firm, and \$19.50@20 is generally quoted, though an offer slightly more advantageous to seller would probably have to be made to bring out any, and even then only small quantities would be procurable.

Bone meal is steady at \$22.50@23.50, with not

much changing hands. Raw is selling at \$24@25, according to quantity, etc. Double manure salt is in fair request at 1'07 1/2@1'12 1/2c.; basis, 48%. For 90% to 95%, basis 90%, foreign invoice, weights and test, 2'07 1/2@2'10c. is being asked, and business has been quite active at these figures.

Muriate of Potash.—Trade has been very quiet. Some inquiry for forward shipments, fall delivery, is noted and resulted in contracts for 200 tons. The arrivals during the week aggregated 350 tons and were immediately absorbed on forward contracts.

Brimstone.—The spot market is very nearly bare, only very small quantities offering. For future delivery, June, July shipments, the demands of dealers are gradually dropping to former levels. Contracts could now easily be made at \$28.50@27.50, and the market closes very weak at these figures. We are indebted to Messrs. Alfred S. Malcomson for the following statistics of shipments from Sicily: For April, 1891, 33,117 tons; for April, 1890, 38,858 tons; stocks in Sicily April 30, 75,520 tons, as compared with 71,735 tons for the same period last year.

Thirds are selling at \$25.50@26 50 for shipments.

Nitrate of Soda.—Another large shipment of 13,000 bags came to hand in the "Lottie Moore." This had been previously placed, and so had not much influence on the market. Values have stiffened a little, and probably nothing could be done under 2'10@2'15c. Any danger of a further shipment from Europe is now almost entirely removed. It is thought that the recent arrivals from there were placed at a considerable loss to those interested.

**Liverpool. May 20.**

(Special Correspondence of J. P. Brunner & Co.)

Since our last, export orders have come to hand rather more freely, although at the same time the Whitsuntide holidays have interfered with the home consumption. With the present restricted production of caustic soda and bleaching powder manufacturers are very firm in their ideas, and late quotations are fully maintained.

Soda Ash.—There are not many orders in the market, and it is only the best brands that find favor with buyers. For some special makes a premium has to be paid, makers being fully sold. The minimum quotations are:

Caustic ash, 48%, £5 2s. 6d.; 58%, £6 4s., net cash. Carb. ash, 48%, £5 7s. 6d.; 58%, £6 10s., net cash.

Soda Crystals are in very moderate supply, and held for £3 7s. 6d. to £3 15s. per ton, net cash.

Caustic Soda.—There has been more inquiry from the States, more especially for 74%, and a fair number of orders have been placed. Some second-hand lots have been picked up at a shade under "Union" quotations, but these resale parcels are getting extremely scarce, and the "Union" is doing all it can to stop this resale business. The syndicate quotations are as follows: 60%, £9 10s.@£9 15s.; 70%, £10 15s.@£11; 74%, £11 15s.@£12; 76%, £13 upward, all net cash, according to quantity and delivery. For special brands a premium is demanded.

Bleaching Powders.—Buyers are inquiring more freely for this article and fair business is said to have been done by the Union at £7 per ton, net cash. There are now practically no second-hand lots offering.

Chlorate of Potash is receiving very little attention from buyers, but prices are steady at 5 1/2c. per lb. less 5%.

Bicarbonate Soda is very scarce at the moment, and firm at £6 15s.@£7 per ton, less 2 1/2%, for one cwt. kegs, according to brand and quantity, with usual allowances for larger packages.

Sulphate of Ammonia is unchanged. As usual at this time of the year this article is in small compass, but at the same time the demand is small. Nearest spot values are £11@£11 2s. 6d. for good grey 24% in single bags and £11 12s. 6d.@£11 15s. per ton for 25% in single bags, f. o. h. here.

**BUILDING MATERIAL MARKET.**

NEW YORK, Friday Evening, May 29.

This market is as lifeless as for the past two or three weeks. The overtures of the striking laborers were altogether too undecided to result in any agreement, and as the employers quite generally express a determination to continue until no objection shall be made to their managing their own business, any settlement seems again only a matter of conjecture. It is thought the strike will ultimately end in an unconditional surrender on the part of the strikers, and the only matter of doubt seems to be the length of time it will take them to come to that conclusion.

Bricks.—Inquiry for special-grade lots is the only agreeable feature of the market. Very large quantities have slowly been accumulating, and now they can be bought for from \$3 to \$6.50 per thousand for hard brick, the widest range that has been known in the Exchange for years. Very large stocks of pale have been allowed to accumulate, and as the demand is merely nominal buyers have things pretty much their own way. We quote \$2 @ \$2.25.

Lime.—The demand has been much better than was or could be expected under the circumstances, and leaves the market well sold up and very firm at our old quotation, \$1 for finishing and 90c. for common Rockland lime.



DIVIDEND-PAYING MINES.

NON-DIVIDEND PAYING MINES.

Main table with columns for Name and Location of Company, Capital Stock, Shares, Assessments, Dividends, and Date & amount of last. Includes entries for Adams, S. L. C., Alice, S., and many others.

G. Gold, S. Silver, L. Lead, C. Copper. \*Non-assessable. +This company, as the Western, up to December 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 August, 1884, the California had paid \$31,320,000 in dividends, and the Con. Virginia \$40,000,000. \*Previous to the consolidation of the Copper Queen with the Atlanta, August, 1885, the Copper Queen had paid \$1,350,000 in dividends. †This company paid \$190,000 before reorganization in 1880. ‡This company acquired the property of the Raymond & Ely Company, which had paid \$5,075,000 in dividends.



NEW YORK MINING STOCKS QUOTATIONS. DIVIDEND-PAYING MINES. NON-DIVIDEND-PAYING MINES.

Main table of New York Mining Stocks Quotations, listing company names, locations, and stock prices for dividend-paying and non-dividend-paying mines from May 23 to May 29, 1891.

\*Ex dividend. †Dealt at in the New York Stock Ex. Unlisted securities. ‡Assessment paid. §Assessment unpaid. ¶Dividend shares sold, 11,075. Non-dividend shares sold, 43,709. Total New York, 54,775.

BOSTON MINING STOCK QUOTATIONS.

Main table of Boston Mining Stock Quotations, listing company names and stock prices from May 22 to May 28, 1891.

Boston: Dividend shares sold, 5,464. Non-dividend shares sold, 7,590. Total Boston, 13,054.

COAL STOCKS.

Table of Coal Stocks, listing company names, par values, and stock prices from May 23 to May 29, 1891.

\*Sales in New York, 5,860; in Philadelphia, 16,638. Total sales, 61,728.

San Francisco Mining Stock Quotations.

Table of San Francisco Mining Stock Quotations, listing company names and closing quotations from May 22 to May 28, 1891.

