



The question of reducing the cost of transportation over country roads is, of course, the paramount one. Not the least of the advantages which would accrue from improvement in this direction, however, would be the increase in value of country property, especially that in vicinity of our towns and cities, which would surely result. Being rendered more accessible, and the roads pleasanter to travel over, the tendency of the people of this country to gravitate to the towns and cities, which has been clearly shown by the figures of the last census, would undoubtedly be checked in a measure, a corresponding increase taking place in the suburban population.

#### THE ORIGIN OF PETROLEUM.

In a late number of the Austrian *Zeitschrift für Berg-und Hüttenwesen*, Professor Hofer sums up the discussion of this subject, and claims a substantial victory for the theory of the animal origin of petroleum, which he has steadfastly maintained since 1877.

The arguments in favor of this theory were at first chiefly drawn from the observed geological conditions of the occurrence of petroleum; and the principal argument against it has always been a chemical one. It has been urged that the absence of nitrogen in petroleum must be fatal to the theory of its animal origin, because an oil produced from animal substances could not fail to be nitrogenous. One answer to this argument was furnished when Dr. Engler actually produced from blubber and other animal fats an artificial petroleum, free from nitrogen, as might have been expected, since the fats are non-nitrogenous. And Engler declares that the absence of nitrogen in natural petroleum is a necessary result of its production from animal remains, because the nitrogenous flesh decays rapidly and assumes soluble forms, so that it would be removed before the fat, which is peculiarly stable, began to be transformed by the slower process of dry distillation. This proposition was confirmed by Dr. M. Albrecht, who treated several thousand mussels and fishes in this way, and found that the ammonia and nitrogenous organic bases incidentally produced were easily removed by reason of their extreme solubility in water.

But Peckham's examinations of the petroleum of California, Texas, West Virginia and Ohio showed the presence of nitrogen, and led to the general acceptance for these oils of the theory of an animal origin, which was still denied by many for the non-nitrogenous Pennsylvania oil. Prof. Hofer, however, still held to his former view, declaring the geological conditions of the Pennsylvania and New York oil-fields to be such as could not be reconciled satisfactorily with the hypothesis of vegetable origin.

In his latest paper he repeats and enlarges an argument based on the presence in natural gas of more nitrogen than can be accounted for by an admixture of air. If natural gas be admitted to have resulted from the decomposition or distillation of animal remains, the probability of a similar origin for petroleum is greatly strengthened.

The large percentage of nitrogen in the natural gas of Pennsylvania—amounting to something more than 25 per cent.—is well-known. The gases in Baku have been shown to be nitrogenous likewise. Certain earth-gases in Alsatia have yielded by analysis up to 17 per cent. of nitrogen. And in all these cases the amount of oxygen, free or combined, revealed by the analysis, is too little to account for the nitrogen as derived from an admixture of air.

To these evidences, Professor Hofer now adds the analyses of the natural gas of Ohio and Indiana, as given by Orton in the *Economic Geology of Ohio* and by Howard in the *Mineral Resources of the United States* for 1888. All three of Professor Howard's analyses and two of the four given by Orton show an excess of nitrogen over the amount necessary to form air with the total oxygen.

Moreover, the gases from the mud-volcanoes of northeastern Italy have been repeatedly analyzed; and Professor Hofer cites 13 analyses, the provinces of Bologna, Florence and Ravenna, in which the amount of nitrogen clearly bears no relation to that of oxygen (here present as CO<sub>2</sub>).

A further proof is drawn from the interesting report, published last summer by Gumbel, on the mineral and geological character of the samples taken from the sea-bottom during the scientific exploring-voyage of the "Gazelle." In samples taken from depths of 500 meters and over, fine globules of fat were found—similar in character to the *adipocere* sometimes found in ancient graves, or the fat still remaining in some fossil bones. Director Gumbel recognizes the possible significance of this discovery in connection with the origin of petroleum. It is clear that, to some extent, the *adipocere* of small marine organisms is at the present time accumulating in the ooze of the deep sea-bottom. The frequent presence of petroleum in nummulitic Eocene strata is at once suggested as a related phenomenon; and I may add that the petroleum found in the Niagara limestone, and particularly in the pores of *Favosites niagarensis*, seems to be another corroborative occurrence.

The contention of Professor Hofer may be considered, perhaps, as still lacking complete demonstration—that is to say, it may be said that he has not proved the animal origin of all petroleum or absolutely disproved the vegetable origin of that of the Pennsylvania field. But it seems to me that he has made out a strong case, and that the chemical

argument once relied upon in opposition to his theory has been much reduced in force, if not entirely destroyed.

R. W. R.

#### NEW PUBLICATIONS.

EMERSON & BAILEY'S MAP OF THE PORTAGE LAKE, MICH., MINING DISTRICT. By L. G. Emerson and C. E. Bailey, Civil and Mining Engineers, Hancock, Mich., 1891. Price \$2.25, \$2.75 or \$3.00, according to mounting.

This topographical map of the Portage Lake, Mich., mining district, recently published, is a correct topographical representation of a very important section of mining country. It treats on a scale of one inch to the mile a territory 36 miles long, and known as the base and neck of the Keweenaw Peninsula. The mineral belt of the region is made up of numerous conglomerate and amygdaloid beds or lodes which run its entire length and outcrop near its center. They dip to the west at an angle which causes them to mineralize nearly every section of land west of a center line passing longitudinally through the region. It is in these belts that the great native-copper mines of the world are found. The Calumet & Hecla, Tamarack, Quincy, Osceola, Atlantic, Franklin, Allouez, Kearsarge, Huron, and Peninsula mining companies are located here. In addition there are many non-producing mining properties, as well as estates of individuals and corporations. Chief among them are the Centennial, St. Mary's Canal Mineral Land Company, Lake Superior Ship Canal and Iron Company, Marquette, Houghton & Ontonagon Railroad Company, Sturgeon River Lumber Company, and the Shelden estate. These different properties are represented by an individual coloring and marking, made with a regard to the latest official record of real estate transfers. The geographical treatment of the country is excellent. Counties, townships, rivers, lakes, towns and mines are appropriately outlined and marked. The work is especially valuable to one interested in the country it so admirably treats.

#### 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.]

Fourth Biennial Report of the State Inspector of Coal Mines of the State of Colorado for 1889-1890. John McNeil, M. E., Inspector of Mines. Illustrated, 100 pages. Denver, 1890.

#### 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.

#### Determination of Titanium in Ores.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: My attention was attracted by the article on the "Determination of Titanium in Ores," by W. A. Noyes, which was published in the *Journal of Analytical and Applied Chemistry*, January, 1891, and which was reprinted in the *ENGINEERING AND MINING JOURNAL* of April 18th. In February, 1886, at the Pittsburg meeting of the American Institute of Mining Engineers, Mr. Horace L. Wells, of New Haven, Conn., read a paper on the "Determination of Small Quantities of Titanium in Irons and Steels," which covered the same ground as Mr. Noyes' article, except the use of a fluoride for decomposing the ores. Mr. Wells' paper shows how to determine titanium in the presence of large quantities of iron with great accuracy, and, as Mr. Noyes seems unacquainted with Mr. Wells' paper, I take this opportunity of calling his attention to it. I have used it myself for the past three years, and found it extremely convenient.

TILLY FOSTER, N. Y., April 22, 1891.

EDWARD K. LANDIS.

#### Alice Gold and Silver Mining Company.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your issue of April 11th, just received, you publish an extract of the report of the Alice Gold and Silver Mining Company for the year 1890. I notice you criticize the action of the directors in purchasing the Rising Star, Blue Wing, Midnight, Walkerville, and an undivided one-half interest in the Paymaster mines. As a shareholder in this company I wish to express my approval of the course followed by the directorate in purchasing these properties. The Alice mill represents a large investment, and it is to the benefit of every shareholder that the mill should be provided with an abundance of ore to keep it running to its full capacity.

In securing more ground, and a reserve of ore calculated to supply the mill for many years to come, the directorate certainly followed a very wise and proper course. The ground purchased is very valuable, and will doubtless enable this company to pay its shareholders handsomely on their investment. I consider that the acquisition of these properties has placed this company in a better and more lucrative position than it has ever before held.

BUTTE, Mont., April 16, 1891.

A. H. WETHEY.

#### The Ontario Nickel Mines.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The recent action of the Ontario government in putting a royalty of 3% on all future discoveries of nickel, copper and silver in the province is only another instance of the "capricious stupidity," as Carlyle would call it, of some legislators who ought to have more common sense.

But all mining claims heretofore taken up and patented in Ontario are free from royalties or conditions of any kind, having been sold with an absolute title to everything on and under the ground, except the pine timber. This new act will not, therefore, affect nickel mining here in the least, as nearly all the known nickel properties on the range have already passed out of the hands of the government, which is a fortunate thing for the country.

The great nickel belt of this district is supposed to be 40 miles wide and 70 miles long. But the most of the larger deposits of nickeliferous ore occur on two narrow intrusive tongues of coarse gray diorite that cut all

the other rocks of the district, and run in a northeast and southwest direction, or parallel to the general strike of the ranges. The first is about 30 miles long, extending from Whitson Lake to the Spanish River, and the other is much shorter, and lies some 25 miles farther west on the Onaping River. They vary in width from one to four miles, with a southern loop on the larger one in the township of Denison.

The eight mining companies and syndicates now in the field have secured all the first-class nickel properties on the whole belt, except about two dozen claims, and the prospects are that within the next three months these will also be picked up. It is not the extent of the range, but the extraordinary size and character of the nickel deposits on it—rising in some cases into tremendous hills and ridges above the surface—that have given such world-wide prominence to this district. A. McCHARLES.

SUDBURY, Ont., May 8, 1891.

#### The Lixiviation of Silver Ores.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I was much astonished to read in a recent number of the ENGINEERING AND MINING JOURNAL, that only two silver mills in the United States use the leaching process, and that no further progress has been made in the lixiviation of silver ores. Here in the Sierra Madre Mountains it has been in use for many years, and no mine owner would dream of erecting an amalgamating plant on ores which require roasting, and which have an average good filtration.

At present I am leaching ores from my mines at Los Otates, crushing the ore through a set of Cornish rolls, using a No. 10 screen, roasting the ore in a double-hearth reverberatory furnace made of common adobes. My roasted ore tank is of 10 tons capacity, which I fill as soon as I have sufficient ore roasted to fill it, and 24 hours thereafter I have from 800 to 1,000 ounces silver. My tailings assay from six to nine ounces per ton. The same ore crushed through the same size screen, No. 10, in a battery gives a better result, as the ore is crushed much finer, and tailings then assay from four to five ounces per ton. I use from 3% to 4% of salt for chloridizing the ore, 125 lbs. of sulphur, and 300 lbs. of lime to produce 1,000 ounces silver; no other chemicals.

Taking an impartial view of lixiviation vs. amalgamation, the former has everything in its favor. The cost of plant is insignificant, as the only machinery to be operated is for the crushing of the ore; therefore very little motive power and no extra intelligent labor is required. The crushing of ore is also much cheaper; as for leaching, a ten mesh screen will do very well in a battery, whereas for amalgamation the same ore would require to be crushed through a No. 30 mesh screen; and finally my experience has shown me, without any doubt whatever, that lixiviation produces from 3% to 5% more silver than amalgamation.

I am not *au fait* as regards the Russell process; but when tailings from 100-ounce ore assay but 4 to 5 ounces per ton by the ordinary leaching process, it looks very much like the best policy to let well enough alone.

In conclusion I will state that lixiviation of silver ore is the most economical process which can be used, in every sense of the word, and no failure can possibly occur if ores are properly roasted and have an average good filtration. Earthy ores are tedious to leach, and that is the only drawback to that class of ores. THEO. A. P. BROWN.

JESUS MARIA, Chihuahua, Mex., April 5, 1891.

#### Honduras Mines.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: My attention has been called to a letter published in the Honduras Mining Journal of February 10th, 1891, in which a correspondent signing himself "American Miner" takes exception to my remarks on Honduras mines made in communications published in the ENGINEERING AND MINING JOURNAL of October 11th and December 27th, 1890. The letter is a good one from the writer's point of view, but though he claims that I was in error as to the yield from the Rosario mine (my statement was not given as exact or authentic) he fails to show or even to claim that it was not at that date the only mine in the country that had returned any notable amount to investors, that is, as I said, in recent times.

"American Miner" is in error in saying that I denounced mines I never saw. I denounced no mines, nor expressed an opinion about any, but simply stated a fact which the records of the mines will sustain. I expressly said there were hopes of better results in the then coming year. His argument in favor of the policy of the government in regard to mines makes a good showing for Honduras; I do not perceive that it is specially reassuring to the foreign investor. My remarks on that subject were such as I had heard made by natives of the country, and applied to concessions to natives as well as to foreigners, to agricultural and timber lands as well as to mines. Major Burke told me himself that he was "tied hand and foot, waiting on London." That was a consequence of the war in El Salvador, and I am glad to learn that it is no longer so, as Major Burke deserves success, and will win it if pluck and perseverance count.

As to a few personal remarks indulged in by "American Miner," I hope they amuse him; they do not hurt me, being in fact erroneous as applied to me. I was not suffering from a diseased liver, and I never lost a place as superintendent; neither did I go home disappointed, nor should I have left Central America but for private business.

I think I recognize in this disgruntled miner a gentleman who was making strenuous efforts to exchange a more or less valuable mine for "British gold," and whose long-waiting workmen were fervently praying for his success. If, as his letter would seem to indicate, he is "disappointed," it is bad for the workmen and for the government whose coffers would have been replenished through the medium of "the bar-rooms, tobacco stalls, and groceries," and it is to be feared that he himself may not be able to "go home."

I was much impressed by a remark made in my hearing by one of the two men who did enrich themselves by mining, not by selling mines, in the country. Said he: "I don't want any more mines, especially in Honduras."

After all is said, I think Central America, mines or no mines, offers a fine field for enterprise, especially for strong young men who can rough it and hold their grip morally; but they should not go without money.

A. H., alias C.

#### SCANDINAVIAN IRON-ORE DEPOSITS.

By Our Special Contributor.

The belief in the eruptive character of iron-ore deposits of certain classes held its ground against the newer theories more obstinately, perhaps, than any other part of the old plutonic creed. And the iron ores of Sweden and Norway were the favorite examples of this hypothesis.

A recent report by Prof. A. W. Stelzner, of Freiberg, on the iron-ore field of Naeverhaugen, Norway, contains the following paragraphs, which I translate, as showing how completely the former view has been surrendered by competent investigators. Before quoting Prof. Stelzner's remarks, however, I may observe, in passing, that the report in question is a model of fullness, thoroughness and good judgment. The mining field which it discusses presents a series of variable intercalated ore-bearing zones, carrying mixed specular and magnetic iron, and combining occasionally to form bodies of considerable size and purity; while, on the other hand, successful exploitation on a large scale would undoubtedly involve the extraction of much material requiring concentration.

This operation, it is declared, could be cheaply and efficiently performed by jiggling, as the ore can be easily separated from the quartz and other minerals of the crystalline schists in which it occurs. No doubt the vast supply of iron ores demanded by modern works must be furnished more and more by mining something besides the pure ores furnished in limited quantities by highly favored mines; and it is interesting to notice the recognition of this fact in a region hitherto famous for its deposits of very rich iron ores.

Concerning the origin of the deposits, Prof. Stelzner says:

"In former years the opinion prevailed in Scandinavia that iron-ore deposits of the character described had an eruptive origin. Particularly for Norway, this view found in Kjerulf a very warm defender, and it is therefore not surprising that his pupil, Corneliusen, felt bound to ascribe (1877) to the Naeverhaugen iron ores an eruptive origin.

"Nevertheless, this earlier theory has not maintained itself in the progress of time. On the contrary, it has been more and more distinctly and sharply shown that the actually observed conditions can be explained only when in all these *fahlband*-like deposits *sedimentary* formations are recognized—that is to say, beds laid down at the bottom of the former seas, contemporaneously with the material of the schists and limestones which inclose them, but subjected afterward, together with the inclosing rocks, to more or less alteration.

"That this view is the only tenable one as regards the Swedish iron-ore deposits was shown first, I believe, in 1859, by M. A. Sjögren; and that the Naeverhaugen occurrence also must be included under it has been argued by Gumbel (1875), Göttling and Vogt.

"For my own part, I am obliged, by all my observations on the spot and in the study of the samples of rock and ore collected, to adopt with profound conviction the theory last mentioned."

Prof. Stelzner does not fail to point out that this question of origin has a direct bearing upon economic value and practical plans of work. For if the deposits are sedimentary and contemporaneous with the country-rock, then the common miners' notion of a union in depth to form large masses has no real foundation, and the common advice to sink on this or that unprofitable vein, in the hope of its improvement, must be rejected. He says very wisely, and his words may find wholesome application elsewhere:

"In considering the question of probable development in depth we must rather start from the proposition that our ores were laid down somehow (no matter how) as sediments on a sea-bottom—that is to say, as originally more or less horizontal beds.

"If we distinguish to-day in these *fahlbands*, as in many other tilted layers, the directions of strike and dip, we must always bear in mind that both these two lines were originally horizontal, and that they would have changed roles at once if the tilting (which is totally independent of the formation, nature and distribution of the ore) had taken place from the south or north, instead of the east.

"It follows that, for a comparatively undeveloped deposit like this, in the absence of better evidence, it is justifiable to deduce from a study of the outcrops along the *strike* a picture of that which may be expected from openings on the present *dip*."

"It will, therefore, be well to assume that the more or less sudden alternations between rich and poor spots, with which an examination of the outcrops . . . makes us acquainted, will occur also in deeper workings. We must expect that ore-bodies rich at the surface will in depth—whether at 10 or 50 or 100 meters—grow poor, and *vice versa*, the uninviting outcrops may become richer in depth.

"That concentrated ore-bodies now hidden may here and there be larger and richer than any now exposed, may be conceded as possible; but it is not indicated as specially probable by the exposures made on the surface by prospecting cuts aggregating several kilometers in length."

In a nutshell, the argument is, that, for a deposit originally sedimentary and not owing its essential features to any agency subsequent to its tilting, the accidental section made at the surface by natural erosion is as likely to represent fairly the occurrence of ore as any other. This is simply applying the doctrine of probabilities, which, as all mathematicians know, only comes into play as a measure of our ignorance. If developments have been made on a given deposit or in the neighborhood, throwing some light on the distribution of ore in the original bed—as, for instance, that it was not a uniform sheet, but was in bands, determined by currents—then the evidences of the surface must be construed according to this light. But Professor Stelzner has sufficiently guarded his proposition, and, as he states it, it is true.

If it were more generally kept in mind we should, perhaps, hear less frequently the sanguine prophecies of certain "improvements in depth," which have survived in the usage of experts from a time when they had more foundation in theory than can be claimed for them now. As for general experience, they never had any foundation in that.

R. W. RAYMOND.

**Suez Canal Statistics.**—According to the official report, 3,389 vessels passed through the Suez Canal in 1890; this is 36 fewer than in 1889, but the total tonnage for 1890 was 6,890,014, or 106,676 tons in excess of 1889. The number of British vessels using the Canal last year was 2,522, or nearly 75% of the whole number. Next to Great Britain comes Germany, with 275 vessels; France had 171, and Holland 144. Progress has also been made in the time of transit through the Canal, the average time being 24 hours 6 minutes, or 1 hour 44 minutes less than in 1889. The use of the electric light has increased the facilities for vessels passing through the Canal, the journey by night being accomplished on the average in 22 hours 9 minutes, which is 21 minutes less than the average for 1889. It is now four years since the electric light was used, and the progress has been very great. In 1887 only 395 vessels employed the light, while last year 2,836 vessels used it. Most of the vessels obtain the apparatus from agents at Suez or Port Said, the light being supplied at a uniform rate of £10 to the transit.

PERFORMANCE OF SEVENTY-FIVE TON REFRIGERATING MACHINE OF THE AMMONIA COMPRESSION TYPE.\*

By J. E. Denton, Hoboken, N. J.

The investigation was made with a refrigerating machine 75 tons maximum rated capacity, located at the Knickerbocker Brewery, in Seventeenth Street, New York City, and constructed by the Consolidated Ice-Machine Company, of Chicago, Ill. The machine was of the compressive type, having two single acting compressive cylinders 12 inches diameter  $\times$  30 inches stroke, and one Corliss steam cylinder 18 inches diameter  $\times$  31 inches stroke double-acting.

A cross section of the ammonia cylinder is shown in fig. 1.

Gas from the brine tank is drawn at *e*, and enters to the upper side of the piston *P* through a single poppet valve.

By the long passage connecting *e* with the underside of the piston the latter is constantly in contact with cold gas, and the stuffing-box *s* is thereby protected from any accumulation of pressure by leakage. The compressed gas makes its exit by *f* and the nearest poppet valves, of which there are two. The three valves are held in place simply with the set screws in the yoke *v*, so that by running a set screw back, any valve may be removed in a few moments. The stuffing-box *s* is set up by means of the worm *M* and hand-wheel *T*. The space *J* is filled with water to serve as a jacket for the preservation of joints against overheating, etc.

The principal results obtained are given in table I.

**General Conclusions.**—By the term "ice-refrigerating effect" is meant the production of an amount of cold equivalent in heat units to the amount of heat which would be necessary to melt a certain weight of ice. In speaking of the "capacity" of the machine as being so many tons "ice-refrigerating effect," or "ice effect," or "refrigerating effect," or "ice-melting effect," we mean the production of an amount of cold in 24 hours equivalent in thermal units to the amount of heat necessary to melt so many tons of ice at 32° Fahr. to water at 32° Fahr. Each ton so melted requires 284,000 British thermal units. Similarly, in speaking of the "economy" of the machine as so many pounds of ice-refrigerating effect per pound of coal, or ice effect per pound of coal, or refrigerating effect per pound of coal, we mean that a pound of coal consumed at the boiler for the purpose of generating steam to

given type of engine, where water must be bought at average city prices, is obtained at 28 pounds suction pressure and about 150 pounds condensing pressure. Under these conditions, for a non-condensing steam engine, consuming coal at the rate of 3 pounds per hour per indicated horse power of steam cylinders, 24 pounds of ice refrigerating effect are obtained per pound of coal consumed. For the same condensing pressure, and with 7 pounds suction pressure, which affords temperatures of zero Fahr., the possible economy falls to about 14 pounds of "refrigerating effect" per pound of coal consumed. The condensing pressure is determined by the amount of condensing water supplied to liquefy the ammonia in the condenser. If the latter is about one gallon per minute per ton of refrigerating effect per 24 hours, a condensing pressure of 150 pounds results, if the initial temperature of the water is about 56° Fahr. Twenty-five per cent less water causes the condensing pressure to increase to 190 pounds. The work of compression is thereby increased about 20%, and the resulting "economy" is reduced about 18 pounds of "ice effect" per pound of coal at 28 pounds suction pressure and 11.5 at 7 pounds. If, on the other hand, the supply of water is made three gallons per minute, the condensing pressure may be confined to about 105 pounds. The work of compression is thereby reduced about 25%, and a proportional increase of economy results. Minor alterations of economy depend on the initial temperature of the condensing water and variations of latent heat, but these are confined within about 5% of the gross result, the main element of control being the work of compression, as affected by the back pressure and condensing pressure, or both. If the steam engine supplying the motive power may use a condenser to secure a vacuum, an increase of economy of 25% is available over the above figures, making the pounds of "ice effect" per pound of coal for 150 pounds condensing pressure and 28 pounds suction pressure 30.0, and for 7 pounds suction pressure, 17.5. It is, however, impracticable to use a condenser in cities where water is bought. The latter must be practically free of cost to be available for this purpose. In this case it may be assumed that water will also be available for condensing the ammonia to obtain as low a condensing pressure as about 100 pounds, and the economy of the refrigerating machine becomes, for 28 pounds back pressure, 43.0 pounds of "ice effect" per pound of coal, or for 7 pounds back pressure, and 27.5 pounds of ice effect per pound of coal. If

ECONOMY DEPENDING ON COAL ALONE.

STEAM ENGINE.		Pounds of ice-melting effect.								B. T. U. per pound of steam.				
		150 pounds condensing pressure.				105 pounds condensing pressure.				150 pounds condensing pressure.		105 pounds condensing pressure.		
		28 pounds suction pressure.		7 pounds suction pressure.		Suction pressure, 28 pounds.		Suction pressure, 7 pounds.		Suction pressure.		Suction pressure.		
Type.	Coal per horse power.	Water per horse power.	Per pound of coal.	Per pound of steam.	Per pound of coal.	Per pound of steam.	Per pound of coal.	Per pound of steam.	Per pound of coal.	Per pound of steam.	28 pounds.	7 pounds.	28 pounds.	7 pounds.
Non-condensing.....	3	25	24	2.90	14.0	1.69	34.5	4.16	22.0	2.65	303	240	591	376
Non-compound condensing.....	2.4	20	30	3.61	17.5	2.11	43.0	5.18	27.5	3.31	513	300	725*	470
Compound condensing.....	1.9	16	37.5	4.51	21.5	2.58	54.0	6.50	34.5	4.16	640	366	923	591

The above figures are equivalent to assuming a boiler efficiency of 8.3 pounds of water evaporated per pound of coal under working conditions. This figure corresponds most nearly with the conditions of the Linde machine, the efficiency of which is given in Prof. Schröter's report as 305 calories of refrigeration per kilo of steam. In this trial a condensing engine was used consuming 20.2 pounds of steam per horse power. The condenser was placed in the wheelrace of a turbine in so superabundant a stream of water that the range in the condenser was too little to measure, thus affording a condensing pressure of 90 pounds. The theoretical performance possible under these conditions is 439 calories per kilo of steam. The actual performance was estimated from weighing the ice made, and is equivalent to only 61% of the 725 units in the above table.

work the engine, produces an amount of cold equivalent in thermal units to the amount of heat necessary to melt so many pounds of ice at 32° Fahr. into water at 32° Fahr., each pound so melted requiring 142 British thermal units. The actual ice which a machine will make per pound of coal, or in 24 hours, is always less than the above amounts of refrigerating effect; first, because the water frozen is always at a higher temperature than 32° Fahr., and second, because of the total refrigerating effect produced in a bath of brine, a considerable percentage is dissipated or wasted in manipulating the cans of water to be frozen in and about the freezing tank. Such waste amounts to from 20% to 50% of the refrigerating effect, as defined above, varying according to circumstances not available to measurement. Hence, in stating the performance of a refrigerating machine, the actual pounds of ice which the machine might make cannot be used, and the above fictitious basis is substituted. The following conclusions are derived from the results of the investigation, and such deductions from the latter as will be found throughout the paper.

1. The capacity of the machine is proportional, almost entirely, to the weight of ammonia circulated. This weight depends on the suction pressure and the cubic displacement of the compressor pumps. The practical suction pressures range from seven pounds above the atmosphere, with which a temperature of zero Fahr. can be produced, to 28 pounds above the atmosphere, with which the temperatures of refrigeration are confined to about 28° Fahr. At the lower pressure only about one-half as much weight of ammonia can be circulated as at the upper pressure, the proportion being about in accordance with the ratio of the absolute pressures, 22 and 42 pounds respectively. For each cubic foot of piston displacement per minute a capacity of about one-sixth of a ton of "refrigerating effect" per 24 hours can be produced at the lower pressure, and of about one-third of a ton at the upper pressure. No other elements practically affect the capacity of a machine, provided the cooling surface in the brine tank or other space to be cooled is equal to about 36 square feet per ton of capacity at 28 pounds back-pressure. For example, a difference of 100% in the rate of circulation of brine, while producing a proportional difference in the range of temperature of the latter, made no practical difference in capacity. (See Trials 4-7, Table I.)

2. The economy in coal consumption depends mainly upon both the suction pressures and condensing pressures. Maximum economy, with a

a compound condensing engine can be used, and make the steam consumption per hour per horse power 16 pounds of water, the economy of the refrigerating machine may be 25% higher than the figures last named, making for 28 pounds back pressure a refrigerating effect of 54.0 pounds per pound of coal, and for 7 pounds back pressure a refrigerating effect of 34.0 pounds per pound of coal. The table II. shows the equivalent of the above figures in thermal units produced per pound of steam consumed by the engine, on the assumption that the non-condensing engine, affording a horse power of 3 pounds of coal, consumes 25 pounds of steam per hour per horse power, the non-compound condensing engine 20 pounds of steam, and the compound condensing 16 pounds of steam.

3. If water cost \$1 per 1,000 cubic feet, and coal \$4 per ton, the cost of each of these items per ton of ice produced is equal, being 17 cents, or 34 cents for both together, per ton of refrigerating effect for a suction pressure of 28 pounds, and any condensing pressure between 150 and 215 pounds above the atmosphere. As the condensing pressure increases, the supply of water per ton is reduced; but it happens that the cost of such reduction is almost exactly compensated by the cost of the increased power to operate the machine. As the condensing pressure is reduced, however, the cost of cooling water increases much more rapidly than the cost of power decreases, so that at about 100 pounds condensing pressure the cost of water per ton of capacity is about 50 cents and the cost of power about 10 cents, making a total cost of about one and three-quarters times that for 150 pounds condensing pressure. Similar ratios of cost obtain with lower suction pressures. Thus, for 7 pounds suction pressure and 150 pounds condensing pressure, the total cost per ton for both coal and water is 45 cents, and this remains the same for higher condensing pressures, but increases about 50 per cent. when the condensing pressure becomes about 100 pounds. With coal at \$4 per ton, condensing water must be obtained as cheap as 50 cents per 1,000 cubic feet, in order to make the combined cost of coal and water at about 100 pounds pressure equal to that for 150 pounds or higher condensing pressure. These conclusions apply also to ammonia absorption machines. They will be found discussed at length under the head of "General Principles Controlling the Costs of Coal and Water."

4. An important deduction from the measurements by meter of the quantity of ammonia circulated, compared with the weight of ammonia accounted for by the displacement of the compressors, is that the latter falls about 25% short. From this fact it would appear that a similar phenomenon to that of cylinder condensation in steam engines takes place in the ammonia compression cylinder, due to the action of the metallic surfaces of the latter upon the gaseous ammonia, whereby the lat-

\* Abstract of a paper presented at the Richmond meeting of the American Society of Mechanical Engineers, November, 1890.

† While the machine performed 75 tons of work during the test, it is proper to state that it is rated, and was sold by the masters as a 50 ton machine.

TABLE I.

Figures marked thus \* are obtained by calculation; all other figures are obtained from experimental data; all temperatures are in Fahrenheit degrees.

OBJECT OF TEST.	Maximum capacity and economy at 28 lbs. back pressure. Exact.		Maximum capacity and economy at zero brine, and 3 lbs. b'ck pressure.		Influence of surplus wa- t. r. Not exact for con- densing water.	Influence of reducing quantity of brine cir- culated. Not exact for condensing water.	Maximum capacity and economy at 27.5 lbs. back pressure. Exact for all quantities.	Maximum capacity and economy at 27.5 lbs. back pressure. Exact for all quantities.
	Preliminary Not exact.	Exact for all quantities.	Preliminary Not exact.	Exact for all quantities.				
NUMBER OF TEST.	1	2	3	4	5	6	7	
DURATION OF TEST, HOURS.	24	18	24	11½	13½	18	18	
Av. high ammonia press. above atmos.	151 lbs.	154 lbs.	152 lbs.	124 lbs.	105 lbs.	147 lbs.	161 lbs.	
Av. back ammonia press. above atmos.	28 lbs.	6.75 lbs.	8.2 lbs.	9 lbs.	7.6 lbs.	13 lbs.	27.5 lbs.	
Av. temperature brine inlet.	38.76°	5.28°	6.27°	5.04°	6.4°	14.29°	.....	
Av. temperature brine outlet.	28.86°	-0.85°	2.03°	0.72°	-2.22°	2.29°	28.45°	
Av. range of temperature.	7.9°	4.43°	4.24°	4.32°	8.62°	12.00°	7.91°	
Lbs. of brine circulated per min.	2281.0	2156.0	2173.0	2259.0	1030.0	912.8	2374.0	
Av. temp. condensing water at inlet.	44.65°	56.0°	56.65°	51.0°	46.0°	46.9°	54.00°	
Av. temp. condensing water at outlet.	83.66°	87.75°	85.4°	69.43°	60.22°	85.46°	82.86°	
Av. range of temp.	39.01°	31.75°	28.75°	18.43°	14.22°	38.56°	28.80°	
Lbs. of water circulated per min. thro' condenser.	442.0	248.0	315.0	639.0	703.0	257.0	601.5	
Lbs. of water circulated per min. thro' jackets.	25.0	*17.0°	44.0	35.0	37.0	40.0	14.0	
Range of temp. in jackets.	24.0°	*24.0°	16.2°	19.0°	14.3°	16.4°	29.1°	
Weight of ammon. circulated per min., lbs.	*28.17	15.24	14.68	15.46	14.84	16.67	28.32	
Prob. temp. of liq. ammon. entrance to brine tank.	*71.3°	*69.°	*68.°	*60.5°	*52.5°	*63.7°	76.7°	
Superheating by walls of cyl- inder.	.....	.....	.....	.....	108.°	160.°	66.°	
Temp. of ammon. correspond- ing to av. back press.	+14.0	-13.0	-8.0	-7.0	-11.0	-5.0	14.0	
Av. temp. of gas after leaving brine tanks.	34.2	14.3	14.7	10.1	4.7	3.0	29.2	
Temp. of gas entering com- pressor.	*39.°	25.°	25.°	20.°	15.°	10.13°	34.°	
Av. temp. of gas leaving com- pressor.	213.0°	265.0°	263.0°	218.0°	222.0°	239.0°	221.0°	
Av. temp. of gas entering con- denser.	200.0°	221.0°	218.0°	205.0°	192.0°	209.0°	168.0°	
Temp. due to condensing pressure.	84.5°	85.0°	84.0°	74.5°	66.0°	82.5°	88.0°	
Heat given amm. by brine, B. T. U. per min.	14776	7460	7186	7612	6925	8824	14647	
Heat given amm. by com- press., B. T. U. per min.	2736	2325	2320	2205	2074	2518	3020	
Heat given amm. by atmos., B. T. U. per min.	140	152	147	155	148	167	141	
Total heat rec. by ammonia, B. T. U. per min.	17702	9937	9653	9912	9147	11109	17708	
Heat taken from amm. by condenser, B. T. U. per min.	17242	7874	9056	12330	9907	9910	17359	
Heat taken from amm. by jackets, B. T. U. per min.	608	425	712	665	529	656	406	
Heat taken from amm. by at- mos., B. T. U., per min.	182	330	338	328	222	250	252	
Total heat rejected by amm., B. T. U. per min.	18032	8629	10106	13323	10748	10816	18017	
Dif. of heat rec'd and reject- ed, B. T. U. per min.	330	1308	453	3411	1601	407	3.9	
% work of compression re- moved by jackets.	22%	18%	31%	30%	25%	26%	13%	
Boiler press. above atmos. lbs.	87.0	84.0	83.0	85.	86.	84.	93.	
Av. revolutions per min	58.09	58.28	57.7	57.83	59.2	57.83	58.89	
Mean effect. press. steam cyl., lbs. per sq. in.	32.5	27.4	27.17	25.43	22.866	27.83	32.97	
Mean effect. press. amm. cyl., lbs. per sq. in.	65.9	54.77	53.3	52.45	47.51	59.86	70.54	
Av. H. P. steam cylinder.	85.00	73.0	71.7	67.13	61.79	73.6	88.63	
Av. H. P. ammonia cylinder.	65.7	54.8	54.7	51.97	48.19	59.37	71.20	
Av. H. P. in friction.	19.3	18.2	17.0	15.16	13.6	14.23	17.43	
Friction in per centum of steam H. P.	23.0	25.0	24.0	23.0	22.0	20.0	19.67	
Total cooling water galls. per min. per ton per 24 hours.	0.75	0.81	1.185	2.189	2.527	0.797	0.990	
Jacket water galls. per min. per ton in 24 hours.	0.04	0.02	0.145	0.109	0.127	0.107	0.022	
Condensing water galls. per min. per ton.	0.71	0.79	1.04	2.08	2.40	0.69	0.968	
Tons ice melting cap. per 24 h. Lbs. ice refrig. eff. per lb. coal at 3 lbs. per H. P.	74.8	37.79	36.43	38.59	35.11	44.64	74.56	
Cost coal per ton of ice refrig- erating effect at \$4 per ton.	\$0.168	\$0.283	\$0.283	.....	\$0.245	\$0.231	\$0.170	
Cost water per ton of ice re- frig. eff. at \$1 per 1,000 cu. ft.	\$0.128	\$0.136	\$0.200	.....	\$0.360	\$0.136	\$0.169	
Total cost of one ton of ice, refrig. effect.	\$0.291	\$0.419	\$0.483	.....	\$0.605	\$0.467	\$0.339	

ter is superheated during its entrance so as to produce a rarefaction, which reduces the weight of a cylinder full of the gas upward of 25% below that which corresponds to the density of the gas at the temperature at which it enters the compressor. In steam engines such action induces more steam to enter the cylinder than corresponds to the volume swept through by the piston. In the ammonia cylinder exactly the opposite effect is produced, in that gas is prevented from entering the cylinder. It was shown that a superheating effect equivalent to about 100° Fahr. accounts for the loss of displacement, and that this effect only requires 25° change of temperature per revolution to be undergone by a thickness of the interior surfaces of one-hundredth of an inch. The mechanical efficiency of the compressor was practically perfect. The clearance spaces amounted to but one-third of 1% of the piston displacement. The oil injection used was but an insensible fraction of the clearance volume. But the indicator cards showed no evidence of even the slight loss of displacement due to this very small

clearance, as the heel of the cards was almost exactly a sharp corner. This fact led to a special set of experiments regarding the action of the gas confined in the clearance spaces. The result indicates that such gas does not wait for the retreat of the piston in order to reduce its pressure to the suction limit by expansion, but that such reduction of pressure is produced by a collapse due to cooling while the crank is turning the centers. Thus, instead of the end of the card being a curved line, it is an almost perfectly vertical one, and there is apparently no imperfection in the displacement of the piston due to clearance.

5. The law of compression of the ammonia follows the adiabatic curve for superheated ammonia gas, notwithstanding that water-jackets surrounding the cylinders absorb upward of 25% of the heat due to the work

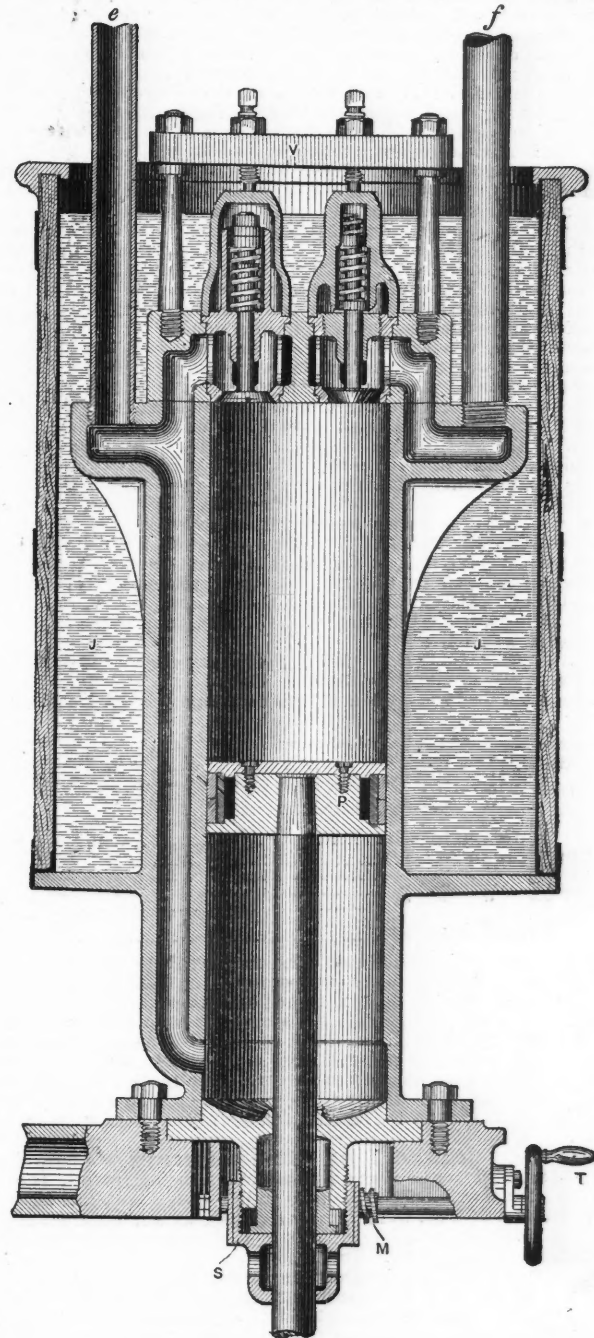


FIG. 1.

of compression. The fact seems to be that the heat is not sensibly absorbed until after the compression is completed, as has been found to be nearly the case with air, even though by water injection the temperature of the air leaving a compressor cylinder is several hundred degrees lower than that due to compression.

6. The latent heat and temperatures of gas produced by compression agree very closely with the results of the accepted thermodynamic formulæ, and the experimental results agree excellently with the theory of refrigerating machines in all its details.

7. The power wasted in friction is the minimum to be expected with such apparatus, and corresponds to a coefficient of friction of 8% in accordance with Morin's laws.

(To be concluded.)

**Cost of Large Guns.**—Some interesting figures, showing the cost of some of the guns used in the British land and sea service, are furnished by a recent Parliamentary return. From this it appears that nine 13½-inch guns were recently issued to the navy at an average cost of \$55,905. The 10-inch guns cost \$28,480 each, and the 5-inch \$2,840.



## PROMINENT MEN IN THE MINING INDUSTRY.

The Late Eugene N. Riotte.

E. N. Riotte, one of the best known mining engineers and metallurgists of the United States, died on the 9th inst., at Thomasville, N. C., whither he had gone to superintend the commencement of operations in the Hering mine, located near that place, in which he was interested. Having inspected the mine workings Saturday morning, he started for the mill half a mile away, riding on a car on the tramway which connects the two places. In crossing a low trestle the car jumped the track and fell to the ground, Mr. Riotte receiving spinal injuries from which he died three hours afterward.

Mr. Riotte was born in Elberfeld, Rhenish Prussia, February 17th, 1843. When five years old he came to the United States with his father, who, having taken an active part in the revolution of 1848, was obliged to flee when that movement proved unsuccessful, and emigrated to Texas, where he purchased a farm in the vicinity of San Antonio. Here Mr. Riotte passed his boyhood days. He received his early education in the public schools and subsequently entered a Jesuit college. Leaving that, he served short apprenticeships in a saddlery shop and in a printing office, until in 1857, when 14 years of age, he was sent to the German-American Institute of Dr. R. Dulong, in New York, from which he graduated in 1860.

Through the kind offices of Mr. Frederick Law Olmsted, the well-known landscape gardener, Mr. Riotte then obtained a position as draughtsman in the Central Park architect's office, where he remained until shortly

health. Returning to San Francisco late in the same year he formed a partnership with Mr. C. A. Luckhardt, entering upon an untried field, that of a metallurgical laboratory on a working scale, in which the purely American processes of gold and silver milling could be tried on ores practically. At the same time, however, he retained his interest in the Stetefeldt furnace and had its technical management, Mr. Stetefeldt being at the time in Europe.

Mr. Riotte spent four years in San Francisco conducting, with Mr. Luckhardt, the Nevada Metallurgical Works, as their establishment was called, and, as consulting mining engineer and metallurgist, working professionally for mining and milling companies from one end of the country to the other. During this time he invented and introduced a quicksilver furnace, the results of which were of importance in the metallurgy of that metal.

From 1875 to 1876, as superintendent and part owner, Mr. Riotte had charge of the Auburn mill, near Reno, Nev., once the largest roasting custom mill in the West. No mill ever had more diversified ore for amalgamation, but it was successfully conducted until the competition of smelting companies of Salt Lake and San Francisco became so severe that it was obliged to close down. The following year, 1877, found Mr. Riotte in San Francisco with no professional engagement, and he was led to become a member of the mining stock board of that city. He was unsuccessful in the venture, however, being clearly unfitted for business of this kind. In 1878 he resumed the practice of his profession, acting as consulting engineer for several mining companies, and the next year, in company with Guido Küstel, again entered the metallurgical experimental field in San Francisco. They erected a complete laboratory, and did busi-



THE LATE EUGENE N. RIOTTE.

after the beginning of the civil war, when his father, an ardent abolitionist, having been driven from Texas, was appointed minister to Costa Rica, and was thus enabled to send him to the school of mines at Freiberg, Saxony. He graduated from Freiberg in 1864, and, after spending a few months in visiting the principal mines and metallurgical establishments of France, Germany, Austria, and England, returned to the United States in December of that year. He found employment almost immediately in a commission to make a geological exploration of parts of Costa Rica for the Panama Railroad Company.

In February, 1865, having finished his work in Costa Rica, Mr. Riotte went to San Francisco, and after a short stay there went to Virginia City, Nev., as assistant to Dr. Adelberg, of the firm of Adelberg & Raymond, who was on a professional visit to the Comstock lode. In the March following, Mr. Riotte obtained employment in a mine in the newly opened Reese River district, of Nevada, and there he concluded to remain. Gradually working his way up, he filled at various times the position of assayer, mill foreman, and superintendent of mines and mills. During the third year of his stay in Austin he became associated with Messrs. Stetefeldt and Boalt, and was one of the original owners of the great invention, the Stetefeldt furnace. During 1867, in conjunction with Mr. Stetefeldt, he assisted in building and started the first smelting furnace at Eureka, Nev., an enterprise which, although unsuccessful in itself, preceding as it did the discovery of the lead carbonates of this district, indirectly led to the uncovering of the famous bonanzas of Eureka and initiated the wonderful development of lead smelting in this country.

In 1869 Mr. Riotte was employed at the Reno mill, especially to manage the roasting in the first Stetefeldt furnace, which had just been erected there, Mr. Stetefeldt having built and started the furnace and gone east on a well-earned vacation. Contracting a fearful salivation, however, during the roasting of several thousand tons of tailings from the raw-running of the former mill, Mr. Riotte was obliged to give up this work early in 1870, and visited the Hot Springs of Arkansas to regain his

ness under the name of Küstel & Riotte. The affairs of the firm prospered, and in 1880 it was decided to open a branch establishment in New York, of which Mr. Riotte was chosen manager. There proved to be a good opening for metallurgical testing works in New York, and the firm was very successful here. In 1881 the establishment was incorporated under the title of the New York Metallurgical Works, of which Mr. Riotte continued to act as manager until the time of his death. The establishment of these experimental works in New York was a great boon to the mining and metallurgical profession, as they have afforded an opportunity for investigations carried out in a comparatively large way, which would otherwise have been impossible.

Mr. Riotte was a man of great energy, quickness of perception and wide metallurgical knowledge in the treatment of gold and silver ores. He was a man of untiring industry and never saved himself when it became a question of carrying on any work which had been intrusted to him. He had a wide circle of friends in the profession, among whom he was noted for his amiability of character.

The first shipment of iron pipe ever made in the South left for Baltimore on May 9th by way of the Richmond & Danville Railroad. It was made by a Bessemer, Ala., firm. A train of 25 cars composed the shipment. It is the first of a 5,000-ton contract.

The Harvey Nickel Steel Armor Plates.—The recent tests of steel armor plates at the government proving grounds at Indian Head, Md., resulted in a substantial victory for the Harvey nickel steel plates. Three kinds of plates were tried—Harvey nickel, nickel and steel, and steel plates. The steel plates were shattered, the nickel and steel perforated, but the Harvey nickel plates withstood the projectiles perfectly, and were not punctured at all. Each plate had twenty-six-pound projectiles fired at it from a Hotchkiss gun at a distance of 35 feet, striking the plates at a velocity of 1,800 feet per second.

## THE MICA INDUSTRY OF THE UNITED STATES.\*

By L. J. Childs.

The production of cut mica in the United States in 1889 amounted to 49,500 pounds, valued at \$50,000. In addition to this, 196 short tons of scrap or waste mica were sold for grinding purposes, with a value of \$2,450. The production in 1880, as given in the tenth census report, was 81,669 pounds of cut mica, valued at \$127,825.

A review of the annual production during the past nine years shows that the industry advanced in importance until 1885. Since then the tendency has been downward, though the fluctuations in the production of the different regions have caused much irregularity in the annual totals. The following table does not include statistics of scrap and waste mica, as there had been no attempt prior to 1889 to determine the amount of this waste which has been utilized:

Years.	Amount lbs.	Value.	Years.	Amount lbs.	Value.
1880.....	81,669	\$127,825	1885.....	92,000	161,000
1881.....	100,000	250,000	1886.....	40,000	70,000
1882.....	100,000	250,000	1887.....	70,000	142,250
1883.....	114,000	285,000	1888.....	48,000	70,000
1884.....	147,410	368,525	1889.....	49,500	50,000

During the years 1883 and 1884, when mica mining was in its most flourishing condition, the manufacturers of stoves consumed probably 95% of the product, and the fancy grades and large sizes of sheet mica which were then used found a ready sale at highly profitable prices. Under this stimulus of large profits many surface deposits or pockets were opened by farmers or other individuals of small means, who worked them occasionally when other business was dull and realized a considerable profit on their production. As long as the demand for large sizes continued this intermittent sort of mining could be carried on with a degree of success, but when the fashion in stove panels changed, and small sheets were used in place of the large ones, the demand for the latter fell off to a great extent. Mica suitable for cutting into large sheets was much less abundant than that available for small sizes; therefore lower rates had always prevailed for the latter, and careful, steady and systematic methods were necessary to produce such grades profitably. When the demand changed from large to small sizes the majority of miners were unprepared through lack of capital or for other reasons to adopt such methods. The result was a great reduction in the number of producing mines, and consumers were compelled either to raise the price of mica or look to foreign sources for their supply. Another factor in increasing importation came into existence with the extended manufacture of dynamos and other electrical apparatus, in which a great deal of mica is used. The foreign article, especially that produced in Canada, was, on account of its superior cleavage, preferred to the domestic for this purpose, but since miners have become more fully acquainted with the qualities desired for electrical uses it has been proved that the United States can produce mica for this purpose equal to any found abroad. The foreign supply, after gaining a foothold in American markets, has more than held its own, and as its tendency has always been toward a reduction in prices, there has been little inducement for the outlay of capital in mica mining.

Only a small number of mines were operated in 1889, and a few of these were worked steadily throughout the year. However, there was a fair amount of development work done in the different mica regions, and it is expected that the introduction of more systematic methods of mining will greatly increase the importance of the industry.

**Occurrence.**—The localities in which mica occurs in an available form are not very numerous, and it is only in New Hampshire and North Carolina that the industry has assumed much importance. In the West the most important deposits are located in the Black Hills, in the neighborhood of Harteville, Wyo., and in the Cribbensville district of New Mexico.

The available deposits of mica occur in bands of coarsely crystalline granite. In these bands the three constituents of the granite (mica, feldspar and quartz) have in a measure crystallized in separate masses, and the mica is found in bunches or pockets irregularly distributed throughout the mass. The deposits are of great interest aside from their commercial importance on account of the number of rare minerals which are nearly always present. Among these are beryl, tourmaline, garnet, columbite and samarskite. In some cases one or more of these minerals are present in sufficient quantity and of such fine quality as to give value to the deposit. Some of the finest tourmalines in the world have been found at Mount Mica, near the town of Paris, Maine, in the mica deposit at that place. Tin ore is also an accompaniment of the mica deposits in the Black Hills region.

**Treatment of the Crude Product.**—Mica is used in two forms, sheet mica and ground mica, and the manner in which it is treated when taken from the mine depends upon the form in which it is to be used. If it is to be sold as scrap for grinding, all that is necessary is to remove the adhering fragments of quartz and feldspar and such parts of the mica as may contain foreign ingredients. If it is to be used in the sheet form the process is much more complicated, the blocks being first split into sheets thin enough to cut easily, then marked with a pattern of the size desired, cut along the lines marked, and the different sizes wrapped in paper, and packed for shipment. There is a great amount of waste about this operation. The amount of sheet mica obtained does not usually exceed from 4% to 8% of the block mica treated.

**Uses.**—The most common and well-known use for mica is in the paneling of stove and furnace doors. For this purpose the mica must be clear, free from spots, and of a uniform color throughout the sheet. The most desirable color is a wine red, and next to this comes white mica, which is nearly as valuable. Another important use is in the manufacture of electrical apparatus, for which purpose its non-conducting properties render it valuable. The qualities required for this use are firmness of texture, toughness, and ready cleavage.

There is a greater range of use for ground mica than for the mineral in sheets, and, though the value of that part of the product made use of in this form is small, the many peculiar properties which ground mica possesses

\* Abstract of a Census report.

render it quite probable that its use will be widely extended. The difficulties to be overcome in grinding mica are considerable, and there are only two or three firms engaged in the business at present. Eight standard grades of ground mica are made. The coarsest of these are used to give frosted and spangled effects to the fancy grades of wall paper. The medium grades are employed in the manufacture of a lubricant for the journals of railway carriages, for heavy bearings generally, and for the axles of road vehicles. The finest grades are used in producing a uniform metallic white surface on wall paper. Scrap mica for grinding must be white and as free from specks or colored matter as possible, since any impurities in the scrap will affect the color and lustre of the product.

**Production.**—The greater part of the product in 1889 was taken from one mine in New Hampshire. Of the North Carolina mines none were in steady operation throughout the year, and the production of that state was the result of irregular and spasmodic efforts. In Virginia the production was confined to one mine, located at Amelia Court House, which was exhausted early in the year. In the Black Hills region, where in 1884 eleven mines were operated, with a production of over 18,000 pounds of mica, only one produced in 1889, and that only a small amount. In New Mexico a good deal of development work was done and a quantity of good mica was reported as taken out; but as none of this was marketed it has not been included in the totals for 1889.

The statistics of the industry in 1889 are shown in the following table:

Distribution.	Production.				Expenses.		Men employed.	Capital invested.
	Cut.		Scrap.		Total.	Wages.		
	Pounds.	Value.	Short tons.	Val.				
New Hampshire.....	40,000	\$40,000	160	\$2,000	\$38,635	\$28,330	70	\$194,750
North Carolina.....	6,700	7,000	...	12,722	7,266	63	438,475	
Virginia.....	(a) 2,800	3,000	(a) 36	450	(b) 4,728	(b) 4,528	26	13,300
South Dakota.....	.....	.....	.....	.....	2,250	2,050	12	14,700
New Mexico.....	.....	.....	.....	.....	.....	.....	11	30,325
Other states.....	.....	.....	.....	.....	.....	.....	.....	.....
Total.....	49,500	50,000	196	\$2,450	\$58,335	\$42,174	185	\$691,550

(a) Combined in order that operations of individual establishments may not be disclosed.

(b) Including Massachusetts, Wyoming and Idaho.

The amount of manufactured mica imported into the United States since 1869 has been as follows:

Year.	Value.	Year.	Value.	Year.	Value.	Year.	Value.
1869.....	\$1,165	1875.....	\$.....	1880.....	\$12,562	1885.....	\$28,085
1870.....	226	1876.....	569	1881.....	5,339	1886.....	56,354
1871.....	1,460	1877.....	13,085	1882.....	5,175	1887.....	49,085
1872.....	1,002	1878.....	7,330	1883.....	9,884	1888.....	57,541
1873.....	498	1879.....	9,274	1884.....	28,284	1889.....	97,351
1874.....	1,204	.....	.....	.....	.....	.....	.....

\* Calendar years from 1886 to 1889; previous years ending June 30.

## THE RUSSIAN IRON AND STEEL INDUSTRY.

From an official report just issued on the Russian iron and steel industry, during the ten years of 1879-88, it appears that in 1888 there were under working in the entire Russian Empire 612 iron mines, and iron ore was further raised from 149 lakes. Of the former, 522 were situated in the government of Ural, and of the latter, 132 in Finland. The total output of ore amounted to 1,381,000 tons, of which 42,000 tons were lake ore. Compared with 1887, there was an increase of 75,500 tons. Naturally the Ural shows the highest output—778,000 tons. The number of foundries producing pig iron was 132, with 200 furnaces, producing 612,000 tons, of which quantity more than three-fourths was smelted with charcoal. Again, the Ural shows the largest output—nearly 400,000 tons. The largest make at one works was 50,000 tons, viz., by the foundries La Nouvelle Russe, in the government of Catherineoslaw, where, by the way, coke is solely used in the smelting. Compared with 1887, the make of pig has increased with 52,000 tons, or nearly 9%. During the period, 1879-88, the manufacture of pig iron in Russia has increased by 230,000 tons, or 54%. Up to 1886 the increase was slow, amounting only to some 90,000 tons, but since there has been a rapid progress. The greatest increase, 41%, occurred in the district of Moscow.

The Russian bar-iron industry shows but slow progress during the period 1879-88, the total increase being only 81,000 tons. In 1888 there were 173 works engaged in it, the make amounting to 350,000 tons, an increase since 1887 of only some 4,000 tons.

Like the bar-iron industry, the Russian steel industry advanced insignificantly in 1888, the manufacture amounting to 211,000 tons, or only 3,000 tons more than in 1887. The production has decreased as much as 37% in Finland, on account of the standing-still of the largest steel works in that country, but increased in other provinces. At the works of the well-known Muta-Bankowa Company the increase of manufacture amounted to 3,500 tons. During the decennial period referred to the manufacture of steel in Russia has fluctuated very much; for instance, 1880 shows a production amounting to 300,000 tons, whereas in 1885 it had declined to 180,000 tons. Of the quantity produced in 1888, 1,100 tons were made by casting, 2,300 tons by puddling, 49,500 tons by the Bessemer, 154,000 tons by the Martin process, and 4,100 tons by the Franche Comté process. The number of steel works in the country was 32. The manufacture of steel rails amounted to 61,000 tons. As regards the relation between the consumption and production of iron in Russia, it appears the country supplied in 1888 90% of the pig iron required, 85% of the bar iron, and nearly 96% of the steel.

**Liability on Unpaid Stock.**—Under the laws of Wisconsin stockholders who have paid less than its par value for their stock are liable to creditors of the corporation for the difference between the amount they have paid and its par value, and a creditor seeking to enforce this liability need not allege ignorance of the fact that the stockholders had procured their stock for less than par, nor that the credit was extended on the faith that par was paid for the stock.—*Gogebic Investment Company v. Iron Chief Mining Company, Supreme Court of Wisconsin, 47 N. W. Rep., 726.*



THE SULLIVAN DIAMOND DRILL OPERATED BY ELECTRICITY.

With the increasing employment of electricity in mining operations many of the standard types of mining machinery are being adapted for use in this manner by combination with electric motors. One of the most recent improvements of this kind is the diamond drill designed to be run by electricity. Such machines manufactured by the Diamond Prospecting Company, of 15 and 17 North Clinton street, Chicago, Ill., have been in practical use for some time. The accompanying engraving represents the lately perfected type of this drill.

As will be seen from the illustration, the machine is simply a new arrangement of the well-known Sullivan drill. The motors used are adapted to any constant potential electric current of sufficiently low voltage for safe use underground, and of sufficient strength to deliver 3-horse power at the brushes. The device for feeding the drill bit forward in this machine is a combination of the ordinary gear feed, with a friction clutch intervening, which not only avoids danger to the diamonds, but also results in the most efficient and economical drilling. All parts of the machine, including motor, drill, pump and hoisting drum, are conveniently arranged on a single frame, which can be mounted on trucks for moving about the mine. Switches, resistance box, etc., are provided for safety and convenience.

INCANDESCENT GAS LIGHTING.\*

By W. Mackean, F.C.S.

The pure atmosphere, the steady, brilliant light maintained where electric light is employed are so much in advance of the unpleasant atmosphere and unsteady flame resulting from the use of coal-gas, that it is not surprising electric light is so much more appreciated; but when

pulled over a model of the desired form, and the flame of a Bunsen burner afterward applied to the upper portion of the mantle, which burns slowly downward, and shrinking considerably in length, the cotton being entirely consumed, leaves only a fine network of the oxides zirconia, thorina, etc., which on being placed over the flame of a Bunsen burner at once becomes incandescent, emitting a bright, steady light.

By altering the nature and composition of the fluid employed the light obtained can be varied from an intense white light to a golden yellow or greenish color, which differ to a certain extent in their diffusive power.

The following compositions will give a fair idea of the changes of light as regards color:

*White Light.*—(I) Zirconium oxide, 40%; lanthanum oxide, 40%; thorium oxide, 20%. (II) Zirconium oxide, 40%; lanthanum oxide, 60%. (III) Yttrium oxide, 20%; thorium oxide, 80%.

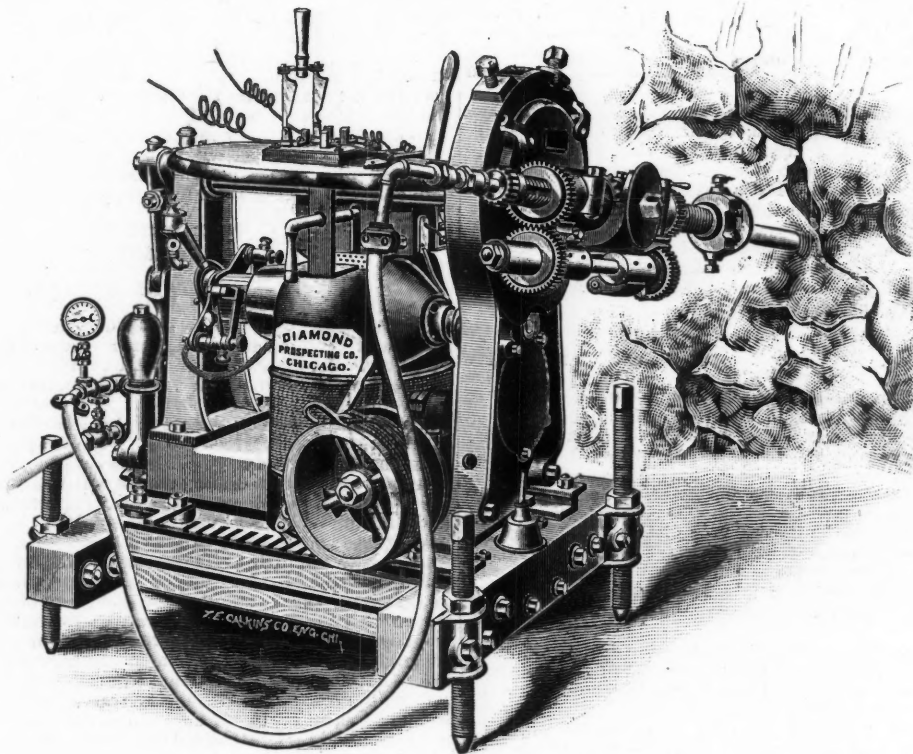
*Yellow Light.*—(I) Lanthanum oxide, 40%; thorium oxide, 28%; zirconium oxide, 30%; cerium oxide, 2%. (II.) Zirconium oxide, 47%; lanthanum oxide, 50%; cerium oxide, 3%.

*Orange Light.*—(I) Lanthanum oxide, 40%; thorium oxide, 30%; zirconium oxide, 27%; didymium oxide, 3%. (II.) Lanthanum oxide, 50%; thorium oxide, 40%; niobium oxide, 10%.

*Green Light.*—Thorium oxide, 50%; lanthanum oxide, 20%; erbium oxide, 30%.

Many other oxides may be employed in the compositions, but the presence of some, such as alumina and magnesia, are very detrimental to the duration of the illuminating power.

Of the many substances which may be employed, cerium oxide is the most satisfactory for the yellow lights, when added in small quantities. Didymium oxide has the effect of causing a rapid diminution in the light, unless a high temperature can be maintained. I find the most effective, as to the duration of light, to be a composition of zirconium oxide, lanthan-



SULLIVAN ELECTRIC DIAMOND DRILL.

we come, however, to consider the cost of electric light compared with that of coal-gas, the high price of the former at once gives coal-gas such an advantage as to almost defy competition for ordinary household illumination.

Nevertheless a demand has sprung up to obtain a higher standard of illumination from coal-gas which shall, as far as possible, possess the many advantages of electric light in point of brilliancy and steadiness, and maintain a comparatively cool atmosphere.

The production of light for illuminating purposes by the incandescence of refractory materials, such as platinum and iridium, or the oxides of zirconium, magnesium, etc., is not entirely new, but their adoption for ordinary household illuminating purposes has only recently been attempted with any degree of success. Several forms of lighting by incandescence have already been brought before the public, among the most important being the Welsbach, Clamond, Lewis, and Sellon.

In the Welsbach system, a hood or "mantle" composed of the oxides of the rare earths, such as zirconia, thorina, yttria, etc., is employed, which is prepared as follows.

A cotton thread is knitted into a cylindrical shape in network form, washed first in dilute ammonia, then in water containing a little hydrochloric acid, finally in distilled water, and dried. The knitting is then cut up into suitable lengths, saturated in a solution of the lighting fluid, composed of the nitrates of zirconium, lanthanum, thorium and cerium, and dried on glass rods at a temperature of 90° F.

A fine platinum wire is then passed through a double thickness of the net, forming the top, by which means the mantle is attached to a stout steel wire or support. The mantle is then drawn into shape by being

um oxide, thorium oxide, and cerium oxide, to which a small quantity of yttrium oxide may also be added, mantles of this kind lasting from 800 to 1,000 hours.

The duration of the illuminating power varies considerably according to the nature of the fluid employed, a curious fact being that the diminution is very gradual as a rule after 500 hours' burning, and the light is then much whiter in color than when first used. Table I shows the loss in the illuminating power of Welsbach mantles during 1,000 hours' burning. In each case 2.5 cubic feet of gas per hour, with one inch pressure was used. In the first four instances the mantles contained lanthanum, zirconium, thorium, and cerium oxides; in the last three, lanthanum, zirconium and cerium oxides.

TABLE I.

Original c. p.	100 Hours.	200.	300	400	500	600.	700.	800.	900.	1,000	Loss in Light.
23.2	22.0	21.4	20.8	17.4	17.0	17.0	16.0	16.0	16.0	16.0	31.0%
21.0	19.4	21.0	19.2	16.5	16.8	16.8	16.5	15.0	14.0	14.0	30.0%
26.0	24.2	22.5	21.0	19.5	17.2	15.5	14.0	13.8	13.8	13.8	47.0%
22.4	20.6	19.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	19.6%
21.4	13.0	13.0	11.4	11.4	10.4	10.0	9.4	8.8	7.4	6.2	71.0%
22.0	13.0	13.2	11.8	11.6	11.4	11.2	10.6	10.0	7.6	6.5	70.7%
21.8	12.5	12.4	11.2	8.8	9.0	5.5	7.0	7.2	6.4	4.4	80.7%

The illuminating power remains more constant when 1% cerium oxide is added to the fluid, but the color of the light is nearly red and unsuitable for ordinary lighting purposes, the temperature of the Bunsen flame being insufficient to heat the cerium oxide to incandescence.

Mantles which give a light of a slightly yellow tint give a much higher

\* Journal of the Society of Chemical Industry, March 31, 1891.

illuminating power than those of a pure white light, and last much longer, as the following table will show:

TABLE II.

Gas, cu. ft.	Orig. pressure.	Orig. c. p.	500 Hours.	1,000 Hours.	Color.
2.5	1.0 inch	17.6	5.4	4.3	White.
2.5	1.0 "	16.8	5.6	4.5	White.
2.5	1.0 "	25.6	18.0	13.7	Yellow.
2.5	1.0 "	27.2	17.6	13.0	Yellow.

The illuminating power of the different oxides varies considerably both in color and intensity, and differ in a large degree to their properties during the manufacture of the mantle. The oxides of thorium, zirconium, yttrium, and aluminum when cold are rather brittle, but when brought to incandescence they become very flexible and easy to work. Lanthanum, cerium, didymium, and magnesium oxides, on the other hand, are very brittle, even when incandescent, and are more difficult to work; but a mixture of the oxides, provided the lanthanum does not exceed 50%, is very flexible when brought to incandescence.

The illuminating power obtained from the pure oxides with 3 cubic feet of gas at one-inch pressure and the color of the light is as follows: Lanthanum oxide, 22.5 candle power, white; zirconium oxide, 12.2 candle power, white; thorium oxide, 25.0 candle power, bluish white; yttrium oxide, 19.8 candle power, yellowish white; cerium oxide, 4.0 candle power, nearly red.

The highest illuminating power I have been able to obtain from a mantle of the ordinary size is made from a mixture of 60% thorium oxide and 30% yttrium oxide, a mantle of this composition giving an illuminating power of 40 candles with three cubic feet of gas at 1.0-inch pressure.

To obtain a good illuminating power it is absolutely necessary to have the salts as free from impurities as possible, and special care has to be taken to get rid of the last trace of iron which affects the illuminating power to a very large extent, the amount of iron usually present in the fluid being from 0.001% to 0.003%.

Perfect combustion of the gas should also be carefully obtained, as, if too much gas is used, causing the flame to smoke, the illuminating power is considerably reduced, and a deposit of carbon takes place inside the mantle, which often increases to such an extent that the mantle is broken and thereby destroyed.

It is necessary that the flame of the Bunsen burner should be inside the mantle, as the presence of air or oxygen is necessary to obtain a good result, as the oxide only gives illuminating power in the oxidizing flame of the Bunsen. This is accomplished by means of the chimney the best form of which is contracted about two inches from the base, which forces the air onto the mantle and keeps the flame in the desired form.

The chimney usually employed is 9 inches in length, 2 inches in diameter at the base, and 1 1/8 inch in diameter at the top. The illuminating power differs according to the height of the chimney employed. With 3 cubic feet of gas at one inch pressure the relation between the height of the chimney and illuminating power is as follows:

Chimney, inches.....	12	9	8	7	6	5
Illuminating power, candles.....	28.2	25.0	24.4	22.0	16.4	16.0

In the Clamond system of incandescent gas lighting a basket or hood of magnesia or zirconia is employed, which is heated to incandescence by an atmospheric burner of peculiar construction, whereby the air and gas are heated before combustion takes place. The hood is prepared by mixing pure magnesia with the solution of magnesium acetate, and forcing the mixture through a suitable disc, from which it issues in a continuous thread, and is wound into shape on a mandrel. The illuminating power obtained with this system is, when at its best, 5 candles per cubic foot, the chief drawback being the short life of the hood, which burns out in about 100 hours.

A number of systems have been shown whereby illuminating power is obtained from the metals platinum and iridium, among them being the Lewis and Sellon.

In the Lewis system a small hood of platinum or alloy of platinum and iridium is used, which is brought to incandescence by the Bunsen burner, perfected by Lewis, in which the air is admitted under pressure, this being a great drawback to its application for domestic purposes. The hood is brought to a high state of incandescence and emits an illuminating power of 200 candles when consuming about 40 cubic feet of gas per hour, being equal to 5 candles per cubic foot. It is a curious fact that when the hood is incandescent the temperature is so great that it may be exposed to rain without being in any way affected. It is well suited for outside purposes or large buildings.

In the Sellon system a cone of metal gauze is employed, heated with a Bunsen burner of the same form as that employed with the Lewis. Another modification is that of a downward light, obtained by suspending a small piece of the refractory material (platinum gauze) between two diaphragms of asbestos; the gas and air are allowed to mix in a small glass bowl, afterward burning at the top of the gauze, which is immediately brought to a high state of incandescence, no flame being perceptible, showing that perfect combustion is obtained. In another modification the air and gas are carried in a small metal cylinder to the top of the outlet of the gases, and are heated in their passage downward before combustion takes place, the illuminating power being about five candles per cubic foot.

The attempts hitherto made with carbureted water-gas have not been so successful as to meet with their general adoption. The system of Fahnehjelm, a Swedish chemist, is being extensively employed. This consists in attaching small pencils of magnesia or a mixture of magnesia and zirconia to a small frame in the form of a comb which is suspended over the flame of a water-gas burner and is immediately brought to a high state of incandescence. The pencils are prepared much in the same way as the Clamond hood or mantle. This system gives a very beautiful, intense, white light and is not at all expensive, one drawback being the duration of the magnesia cone, which lasts only from about 50 to 100 hours; but this is considerably increased when magnesia and zirconia are employed. The magnesia cone costs only about six cents, is easily replaced, and the cost of lighting by this system is much less than that of ordinary gas, and the illuminating power considerably greater.

Before any system of incandescent gas lighting can be considered a suc-

cess, so far as the adoption for ordinary use is concerned, there are many difficulties to be overcome, among them being as follows:

(1) Existing fittings should not be interfered with, except so far as the burner is concerned.

(2) The system ought to give a better and steadier light than the ordinary gas flame.

(3) No separate service pipes must be required, and the arrangement of the system must be as simple as that required for ordinary gas. There should be little or no liability of breakage or derangement.

(4) The duration of the lighting medium must be so great that the cost of renewals should be inappreciable.

(5) The consumption of gas must not be increased, but on the contrary a very marked saving in the consumption, or its equivalent in increased light, must be secured.

(6) The combustion of gas burnt must be more perfect than in the ordinary gas burner, in order to reduce the objectionable and destructive effects of gas consumed in dwellings.

(7) The atmosphere must be comparatively cool, and the light must not greatly deteriorate by the use of the illuminating medium.

As regards the above-named systems shown, notably Clamond, Welsbach and Sellon, the existing fittings are not interfered with, but at the same time a good pressure of gas (not under 1 inch pressure) is essential to obtain satisfactory results. The systems mentioned give a better and steadier light than the ordinary gas flame, being an inducement toward their employment. So far, none of the systems fulfil the conditions of ordinary gas as regards the simple arrangement required, all of them requiring more care and attention than the ordinary gas burner. A higher candle power per cubic foot is obtained, but at the same time, with all the systems there is a gradual decrease in the illuminating power, and renewals of the illuminating medium are necessary to obtain the maximum amount of light. In incandescent gas lighting, the combustion of gas being perfect, the destructive effect on ceilings and paintings is much less than with the ordinary gas burners. That the illuminating medium will remain constant seems impossible so far, as with gas we have a continually renewed service for illumination, while the resistance offered by the illuminating medium employed in incandescent gas lighting to the ignited gas, and air drawn into the chimney, very soon causes an alteration in the lighting power, but which after a time remains fairly constant.

I have no doubt that considerable progress will be made with regard to the systems at present employed, and in the future incandescent gas lighting, provided the present difficulties are overcome, will be a serious competitor to electric light for ordinary domestic use or general illumination.

#### TIN MINES OF BOLIVIA.\*

By John B. Minchin.

Tin ore is met with at intervals along the eastern border of the Bolivian table-land from Lake Titicaca to near the Argentine boundary. In some cases, as in the mines of Potosi and Oruro, it occurs associated with ores of silver, in others it is found alone or merely with an admixture of iron oxide and earthy matter.

Many of the more important silver lodes of the Oruro mines are masses of iron pyrites from 2 feet to 6 feet wide, frequently containing an average of from 5% to 20% of tin. Where richest in silver, the workings on these lodes have attained a depth at some points of from 300 to 350 meters below the surface, tin oxide accompanying the other ores all the way down, and showing no signs as yet of giving out.

When associated as in Oruro with ores of silver, the tin oxide is extracted with but little extra expense. On being hauled from the mines through vertical shafts worked by horse whips or steam winding engines, the ores are usually broken and picked by hand; at this stage it is sometimes advantageous to separate the tin, but it is generally too intimately mixed with the ores of silver to allow of this being done; the picked ores are transported in carts to the amalgamating mills, situated at distances of from 6 to 20 miles, where they are crushed, wet or dry, under stamps worked by steam or water power, and on being calcined and chlorinated are amalgamated in pans; the tailings are then washed for the extraction of the tin oxide. Until lately this operation was performed exclusively by hand in buddles or in curved inclined sluices some 14 inches wide by 6 feet long, the tailings being constantly fed in and continually turned over with a sharp, thin board and scraped up against a gentle flow of water, the lighter impurities being thus gradually carried off. Of late years Frue vanners have been introduced with satisfactory results. In either case the *barilla* or purified product commonly contains from 60% to 70% of metallic tin, in which form it is either exported directly, or else smelted with charcoal in small vertical blast furnaces, and run into slabs of some 50 pounds weight. The loss in smelting in these furnaces is, however, considerable, being not less than 20%.

In the neighborhood of Oruro but a small proportion of the ore is reduced; in Potosi, owing to the greater distance from the coast and the consequent higher freight (at the present time some \$90 per ton) it is all dispatched in the metallic form.

Some of the most important deposits of tin ore in Bolivia, and those worked exclusively for this metal, are situated among the mountain ranges bordering the table-land to the east and northeast of Oruro and Lake Poopo, and are scattered over an area of some 500 square miles, though several rich veins are met with beyond this limit.

The general geological formation is shale, more or less highly inclined and contorted from eruptions of trachytic porphyry; the tin veins occur in this latter.

From the southern extremity of this region the mines of Abicaya, Challa-Apacheta, Huanuni, Morococala and Negro Pabellon form an almost uninterrupted series of metallic deposits; a gap then occurs, the mineral centers of Collquiri and Berenguela being met with to the north and east at distances of some 30 miles.

The conditions under which the tin ore presents itself are by no means uniform, even in any one group of mines; in some cases the oxide forms veins extremely solid and more or less continuous, varying in width from

\* From *Engineering*, April 18, 1891.

1 inch or 2 inches up to 3 feet, when the average contents range from 40% to 50% of metallic tin, occasionally reaching 60% and even 65%.

In other instances, and these are also common, the ore is found in the form of nodules, crystalline masses and minute grains scattered through a soft argillaceous matrix which forms the bulk of the lode, filling up the space between the hard side walls. Such lodes are usually from 1 foot to 4 feet wide, the ore being extracted with comparative ease, and admitting of being concentrated to some 65%, after a rough grinding and washing to separate the earthy matter.

The Challa-Apacheta mine is a remarkable deposit. A lode here crosses two low hills rising some 70 meters above the level of the adjoining ravine; in one of these it is no less than from 8 to 10 meters wide, the particles of tin oxide being thickly distributed through an argillaceous sand; a rough sample taken by the writer from several points of the workings showed the average contents of the lode to be 21% of metallic tin. In the other hill the lode becomes pyritiferous and is some 30 to 50 centimeters wide, containing from 40% to 50% of tin.

Not unfrequently a mixture of clay, silica and iron oxide forms the matrix through which, as before, the tin oxide is more or less uniformly scattered. The Berenguela deposits may be mentioned as instances of this class. The writer has examined lodes there from 3 feet to 8 feet in width, in which the tin ore occurs chiefly in the form of minute grains, necessitating very fine grinding for its extraction. Richer zones are met with, giving from 20% to 25% of tin, but it appeared from the result of many trials that the average contents of the whole mass of the lodes are never less than 7%. These ores are soft and admit of being extracted with a pick without blasting, while on grinding with water some 50% of the earthy matter is almost immediately carried off.

The tin deposits in this country are occasionally superficial, fine ore being met with to a depth of a few meters when the lodes become poor. More usually, however, the tin attains a considerable depth; in the mines of Negro Pabellon and Morococala rich ore is being extracted at the present time from levels of 120 meters, while in the Huanuni district one mine has attained a depth of some 300 meters, being still rich in the bottom. This latter, however, appears to be an exceptional case, as at an earlier stage it is usual to encounter iron pyrites, which, though poorer than the ore above, may frequently be worked to advantage.

The ravines leading from all these mining centers are more or less rich in stream tin of a fine quality, and a few of them have been worked on a small scale of late years.

Adequate machinery, especially for grinding, appears to be the great want in all these enterprises. With the exception of Berenguela and a few other districts, hydraulic power is not available to any extent in the immediate neighborhood of the mines, and the fact of their having been hitherto worked with little or no capital, has prevented their encountering the comparatively heavy outlay attending the application of steam power. The ores are at present tediously ground under rocking stones, worked by hand, or at best by means of edge runners moved by mules or horses, the subsequent washing being commonly carried on by hand with a considerable loss, the want of uniformity in the size of the particles also rendering unsatisfactory the action of mechanical concentrators. Under such circumstances, and considering the heavy cost hitherto of all kinds of materials, it will readily be understood that ores containing less than 9% to 10% tin do not usually pay working expenses.

Undoubtedly many of these difficulties will be obviated on the completion to Oruro of the Autofagasta railway, which is now rapidly approaching, and a great impulse will certainly be given to the tin-mining industry. The production of tin ore from this district at the present time may be estimated at about 250 tons per month.

The total imports of iron ore into Great Britain in 1890 amounted to not less than 4,469,000 tons, being an increase of nearly half a million tons on the quantity imported in 1889, and an increase of nearly a million tons on the imports for 1888.

M. de Swarte has recently read a paper before the *Société Industrielle du Nord de la France* in which he gives an account of the investigations in which he has been engaged for some time, concerning the question whether there is a definite relation between the speed of the piston and the fuel consumption in steam engines. He has reached the conclusion that such a relation exists and that the consumption decreases at an increasing rate when the speed of the piston augments. The geometric expression for the algebraic formula of this law is a hyperbole.

**Densimetrical Determination of Phosphorus in Pig Iron.**—For the determination of phosphorus in pig iron, Mr. E. E. Metz gives, in *Zeitschrift für angewandte Chemie*, May 1, 1891, the following equation for finding densimetricaly the weight of the precipitate:

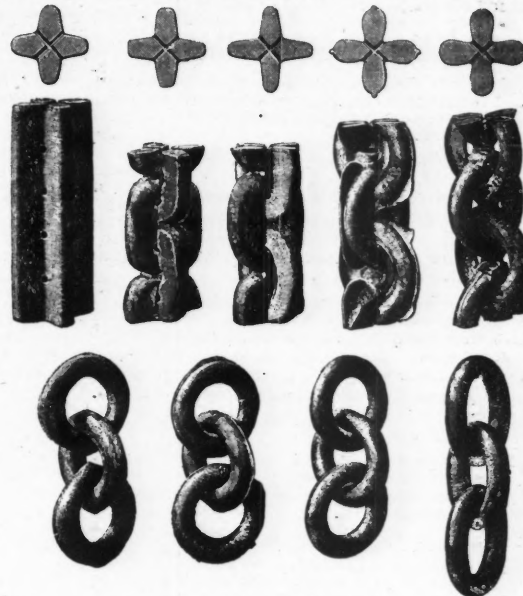
$$x = \frac{S}{S-s} (G-g)$$

in which *S* is the specific gravity of the precipitate in question; *s*, that of the solution in which the precipitate has settled; *G*, the weight of the pycnometer, together with that of the solution and of the precipitate; *g*, the weight of the pycnometer when filled with the solution only; and *x*, the weight to be determined of the precipitate. As the specific gravity of phospho-molybdate of ammonium, the author found as a mean of four determinations, 3.252. Fifty cc. iron solution (corresponding to 0.5 grammes of the sample) is put in an artition-funnel, the divided tube of which is provided with a glass cock; 20 cc. concentrated ammonia, and then, by drops, concentrated nitric acid are added until the precipitate which has formed is redissolved under proper shaking. The temperature of the liquid becomes thus favorable for the rapid precipitation of the phosphorus. Addition of 100 cc. of the usual solution of molybdate of ammonium and thorough shaking bring about the precipitation. It is allowed to settle; a pycnometer of known volume is several times washed with, and then filled with, the fluid above the precipitate, carefully wiped off and weighed, giving *s* and *g*. The pycnometer is then emptied, and, without washing, is refilled by opening the cock, with the precipitate + a sufficient quantity of the solution, carefully dried and weighed, thus giving *G*. These data inserted in the equation give the weight of the precipitate; multiplying this by 1.73 gives the quantity sought, the content of phosphorus.

OURY'S WELDESS STEEL CHAINS.

In the accompanying engraving, for which we are indebted to *Engineering*, is illustrated an ingenious process of manufacturing weldless steel chains, which are now being introduced by Messrs. William Reed & Co., of 112 Fenchurch street, London.

The blank consists of a cross-shaped bar, as shown in Fig. 1, through which at proper intervals, depending on the size of the links, holes are drilled in the fashion shown. The blank is then notched roughly to the shape of the links by suitable machinery, as in Fig. 2, after which it is



flattened to prepare it for hollowing out the links, and stamped to round them up, the results being shown in Figs. 3 and 4. The partially worked blank is now ready for being punched through and parting, as indicated in Fig. 5. The succeeding operations, illustrated by Figs. 6 to 9, consist simply in cleaning and truing up the links to their final form. The makers claim that these new weldless steel chains are for the same strength not more than about two-thirds the weight of the equivalent iron chain. *Engineering* states that they have been tested by the Bureau Veritas with the following results:

Description.	Load.	Nominal stress per sq. in.	Elongation.
Chain stud link, 1 1/2 in. ...	17,127 lbs.	24 tons.	30%
Chain stud link, 1 1/4 in. ...	45,733 "	23.06 "	24%
Chain ordinary link, 1 1/2 in. ...	25,300 "	23 "	29%
	46,479 "	23.5 "	28%

PATENTS GRANTED BY THE UNITED STATES PATENT OFFICE.

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

TUESDAY, MAY 5TH, 1891.

- 451,460. Compressor for Air and Gases. Thomas C. Craven, Newark, N. J.
- 451,462, 451,463. Apparatus for the Manufacture of Peat Fuel. Archibald A. Dickson, Cote St. Antoine, Canada.
- 451,488. Apparatus for Making Coke. Frederick J. Jones, St. Albans, Assignor to the Economic Gas and Coke Company, Limited, London, England.
- 451,531. Process of Neutralizing Sulpho-chlorinated Oils. Adolph Sommer, Berkeley, Cal.
- 451,612. Method of Utilizing Products of Combustion. Emil Biedermann and Earnest W. Harvey, Westminster, England, Assignors to Frederick Siemens and Alexander Siemens, both of same place.
- 451,622. Mechanical Stoker. Philip Rohan, St. Louis, Mo.
- 451,638. Machine for Making Sheet-metal Chains. Frederick Egge, Bridgeport, Conn., Assignor to the Smith & Egge Manufacturing Co., same place.
- 451,660. Process of Refining Hydrocarbons. Edward D. Kendall, Brooklyn, N. Y., Assignor to himself and The International Oil and Refining Company of Michigan.
- 451,673. Rod Mill. Irving A. Kilmer, Newburg, N. Y.
- 451,765. Valve Gear for Ore Stamps. Colin Kendrick, Jr., Nevada City, Cal.
- 451,769. Oil Well Packer. Augustus W. Nowell, Bradford, Pa.
- 451,784. Oil Burner. Andrew S. Up-on, Unionville, Conn., and Frederick A. Smith, Cleveland, O., Assignors to the Upson Nut Company, Farmington, Conn.
- 451,788. Means for Securing Well Boring Drills. James Walp and Charles F. Dauxdater, Lehighton, Pa.
- 451,789. Drill for Boring and Reaming. Julius R. Watts, Springfield, Ill., Assignor to himself and Edwin A. Wilson, same place.
- 451,818. Process of Making Slate Brick. William L. Gregg, Philadelphia, Pa.; Harriet L. Gregg, Executrix of said William L. Gregg, deceased.
- 451,841. Apparatus for Cleaning Boiler Tubes. John Platt and Thomas Thorp, Salford, England.
- 451,900. Method of and Mold for Casting Wheels. William G. Richards, Boston, Mass.

TUESDAY, MAY 12TH, 1891.

- 451,912. Machine for Rolling Tubes. Thomas J. Bray, Warren, O., Assignor of one-half to the Page Tube Company, same place.
- 451,926. Concentrating Apparatus. Ryerson D. Gates, Chicago, Ill., Assignor to the Gates Iron Works, same place.
- 451,934. Rolling Mill. John Jardine, Motherwell, County of Lanark, Scotland.
- 451,938. Wire-drawing Machine. James Jolly and William Jolly, Holyoke, Mass.
- 451,961. Steam Boiler Furnace. Frank Trowbridge, Fond du Lac, Wis., Assignor of one-half to C. E. Dickson, same place.
- 451,977. Smoke Consumer. Frank T. Robinson, Chicago, Ill.
- 451,988. Coal Mining Machine. Isaac Wantling and James T. Johnson, Peoria, Ill.
- 452,030. Process of Manufacturing Sodium and Potassium. Hamilton Y. Castner, London, England.
- 451,031. Process of Toughening Steel. John Coffin, Johnstown, Pa.; Elizabeth F. Coffin (Executrix of said John Coffin, deceased), Assignor to the Cambria Iron Company.
- 452,051, 452,052. Compressed Air Tramway System. Francis H. Richards, Hartford, Conn., Assignor to Eckley B. Cox, Drifton, Pa.
- 452,095. Rolls for Reducing Old Railway Rails. Chas. R. Bryson, Pittsburg, Pa.
- 452,114. Apparatus for Making Pipe. James Simpson, McKeesport, Pa.
- 452,123. Apparatus for Extracting Metals from Their Ores. Werner Von Siemens, Berlin, Germany, Assignor to Siemens & Halske, same place.
- 452,132. Air Compressor. Ebenezer Hill, South Norwalk, Conn.
- 452,177. Amalgamator. John W. Culmer, New Brighton, Pa.
- 452,263. Process of Making White Lead. Ellert W. Dahl, New York, N. Y.
- 452,283. Hydraulic Air Compressor. William R. Phillips, Seattle, Wash.
- 452,314. Oil Burner. Augustus U. Page and Daniel A. Stewart, Cleveland, O., Stewart Assignor to said Page.

## PERSONALS.

Mr. E. M. Johnson has been appointed to a position as aid on the Missouri Geological Survey.

Mr. Samuel G. Artingstall has been chosen chief engineer of the Chicago, Ill., Drainage Commission.

Mr. George Kislighdry, assistant inspector of metalliferous mines for the Third district of Colorado, has resigned his position.

Mr. A. H. Rogers has accepted a position as assayer and chemist with the Commercial Mining Company, of Prescott, Ariz.

Mr. John T. Davis has been elected president, and Mr. Wm. H. Pettit secretary, of the Philadelphia Petroleum and Stock Exchange.

Mr. E. L. Benedict has been appointed superintendent of the Standard Consolidated Mining Company, of Bodie, Cal., vice Arthur Macy, deceased.

Prof. W. P. Blake, who has been making a visit to Salt Lake City, left for Butte, Mont., on the 8th inst. He expects to go back to Salt Lake before returning to the East.

Mr. Paul Johnson, mining engineer, of Sweden, has resigned his position with the Copperfield Mining and Smelting Company, of Vermont, and is about to go to Mexico.

Mr. Samuel Herbert Cox, F. G. S., has been admitted a member of the firm of Bainbridge, Seymour & Co., the well-known consulting mining engineers, of London, England.

Mr. James Hutchinson, inspector of metalliferous mines, of Colorado, has resigned in order to accept a position as manager of the Manhattan Mining Company, at Austin, Nev.

Mr. B. B. Lawrence, of Messrs. Hooker & Lawrence, mining engineers of this city, is going on Monday to Colorado on professional business. His address will be the Denver Club, Denver.

Mr. Charles Dickinson, mining engineer, of Barnsley, England, has been appointed General Manager of the Canada Northwest Coal and Lumber Syndicate of Canmore and Mitford Alberta, Canada.

Col. T. L. Livermore, vice-president and general manager of the Calumet & Hecla Mining Company, sailed for Europe on the 13th inst. It is intimated that his mission abroad means the negotiation of large sales of copper.

Mr. John Heard, Jr., mining engineer, of Boston, was in New York last week, having returned from a three months' sea voyage taken on account of his health. He is now much better, but has not entirely recovered from the severe attack of influenza contracted last winter.

Mr. William H. Burr, recently general manager of the Phoenix Bridge Company, having severed his connection with that company, has purchased an interest in the business of SooySmith & Co., contracting engineers, of New York, and will, after June 1st, 1891, become vice-president of the SooySmith & Company. The business will be continued as heretofore.

The staff of the newly established Geological Commission of Mexico was appointed on the 15th ult. Don Antonio del Castillo was made director; Don José G. Aguilera, sub-director; Baltozar Muñoz, geologist; Don Ezequiel Ordoñez has charge of the lithological department; Don Lambert Cabañas of that of topographic geology; while Don Luis G. Becerril becomes the draughtsman of the commission.

Mr. Fred Bredel, civil engineer, of this city, sole proprietor Kloenne patents for North America, on account of a large increase of business in the middle and western states, has found it necessary to remove his main office to Milwaukee, Wis. The New York office is now in charge of Mr. Julius Buss, engineer, at No. 22 Beaver street. All communications from east of the Alleghany Mountains are to be sent to the New York office; west of these mountains, to the Milwaukee office, No. 118 Farwell avenue, Milwaukee.

A distinguished party of mining men left St. Louis on the 13th inst. for Montana for the purpose of attending the annual meetings of the Bi-Metallic, Granite and Elizabeth Mining Companies, which take place on the 19th, 20th and 21st inst., respectively. The party consisted of President Rumsey, of the Granite Mountain, and President Paul Fusz, of the Bi-Metallic, Messrs. McLure, Ewing and Lionberger. Messrs. Julius Aheles, J. A. Coquard and Max Kotany formed another party who went to attend the meeting.

## OBITUARY.

Major W. J. Wharton, a well-known civil engineer, died in Asheville, N. C., last week.

J. T. Blomfield, chemist of the Newbery-Vantin Gold Extraction Company (Limited), who was sent

to Johannesburg, S. A., on business for the company in January last, was taken ill with typhoid fever almost immediately after his arrival there, and died during the first week of April.

Ex-Senator Peter Ward died on the 10th inst. at Newburg, N. Y., aged 64 years. Since 1853 he has been extensively engaged in building railroads, being at the time of his death engaged in cutting a tunnel through the Shawangunk Mountains for the New York, Ontario & Western Railroad.

Alexandre Edmond Becquerel died this week at Paris. He was the son of the famous physicist, Antoine César Becquerel. After assisting his father in many researches he became assistant naturalist to the Museum and then professor in the Conservatory of Arts and Trades, where he obtained the Chair of Physics in 1853. He succeeded his father as professor at the Museum in 1878, having been already elected a member of the Academy of Sciences in July, 1863. He published many works on scientific topics, gaining special renown by his investigations in relation to the solar spectrum and the constitution of the electric light, as also the electro-chemical decomposition of bodies and certain phenomena of magnetism.

Prof. Julius Erasmus Hilgard, late superintendent of the United States Coast Survey, died in Washington on the 8th inst., after a long and painful illness. Prof. Hilgard, who was the son of Theodore Erasmus Hilgard, an eminent German jurist, was born in Zweibrücken, Bavaria, January 7th, 1825. When ten years of age, he came to this country with his father, and until 1843 resided in Belleville, Ill. In that year he removed to Philadelphia, where he took up the study of civil engineering, and two years later he was invited by Prof. Alexander D. Bache to become one of the latter's assistants on the Coast Survey. His scientific attainments were speedily recognized, resulting in his promotion to the office of assistant in charge of the bureau at Washington, and on the death of the superintendent in 1881 he was appointed to fill the vacancy. He had charge of the construction and verification of the standards of weights and measures, and was for some time engaged in preparing metric standards of great precision for distribution to the several states. His scientific work was chiefly in connection with his practical labors, consisting mainly of researches and the discussion of the results in geodesy and in terrestrial physics, and in perfecting methods and instrumental means connected with the same, and he also rendered great service to scientists throughout the United States by lending to them valuable instruments for original research. In 1885 he was suspended from office and afterward permitted to resign. Prof. Hilgard was one of the original members of the National Academy of Sciences, and served for years as its home secretary. He became president of the American Association for the Advancement of Science in 1874.

## SOCETIES.

The Philadelphia Academy of Natural Sciences will send an expedition to the Arctic Ocean, sailing from New York about June 1st. This expedition is an outgrowth of the expedition to be headed by Lieut. Peary for the inland exploration of Greenland. The programme is to charter a steamer for the summer months. The passengers will consist of Lieut. Peary and his little band of six or eight hardy Northerners for their perilous trip across Greenland, and a party of scientists, appointed by the faculty of the Academy of Natural Sciences, for exploration through the Arctic seas. The latter party will consist of specialists in all branches of natural sciences. Prof. Heilprin, who will probably be in command of the scientific cruise through Arctic waters, says that they would return to Philadelphia some time next autumn.

## INDUSTRIAL NOTES.

The Tin Plate Manufacturers' Association will hold its next meeting in Pittsburg, Pa., on the 20th inst.

Messrs. Cooper & Hewitt's iron furnace at Pequest, N. J., has been shut down owing, it is said, to the dullness of the market.

The Youngstown Rolling Mill Company of the Mahoning Valley, Ohio, has transferred its plant to the Youngstown Iron and Steel Company. Consideration, \$195,000.

The Etna Iron Works, at Ironton, O., have been sold to John S. Clark and John H. Barnes, of Philadelphia, Pa., by Marshal Simmons. The price realized, it is stated, was \$266,667, one-half of the appraised value.

The Elyton Land Company has, it is stated, subscribed \$100,000 towards the steel plant which it is proposed to establish at Ensley City, near Birmingham, Ala. The Tennessee Coal, Iron & Railroad Company will also take a block of the stock.

It is reported that all the Pittsburg, Pa., lodges of the Amalgamated Association of Iron and Steel

Workers have voted in favor of asking an advance of 50 cents a ton in the price of puddling for the next scale year, dating from July 1st. The present rate for the western mills is \$6.50 a ton.

The Gould Manufacturing Company, of Seneca Falls, N. Y., has removed its New York warehouses from 60 Barclay street to 16 Murray street. The new quarters are much larger and more commodious than the old ones, and will afford improved facilities for handling the company's increasing business.

The Vermont Marble Company, of Rutland, Vt., has recently made six marble columns nineteen feet seven inches long and two feet ten inches in diameter. They are each made from one solid piece of marble, turned in a lathe, and are said to be the largest ever turned out in the United States. They are for use in the construction of Whig Hall, Princeton College.

Mr. J. M. Risher, assignee of L. D. Risher, has closed the sale to Robert A. Carter of a manufacturing site at Hays Station, on the Monongahela River, together with valuable lands, which include eight acres of river bottom land and 70 acres of coal land and a coal tippie. A corporation has been formed, with a capital stock of \$100,000, to put up a rolling mill with a finishing department, to give employment to 200 men.

The five largest architectural iron working firms of Chicago, Ill., on the 9th inst. signed the agreement presented to them by the architectural iron workers' union. The terms secured are eight hours, a minimum wage rate of 27½ cents an hour, time and a half for overtime, and double time for Sundays and holidays, and a concession that no workman shall be discharged until due notice has been given to him.

The Tin Plate Makers' Association of South Wales and Monmouthshire, England, has decided that all works shall be closed for four weeks from June 27th. The object of this shut-down is to prevent a demoralization of the business, which has during the past six months been stimulated in an unnatural degree, after the taking effect of the clause of the new American tariff law relating to tin-plate importations.

The Spang Steel and Iron Company, of Pittsburg, Pa., has just completed the specifications for a new department to be devoted to all kinds of heavy government work. The new structure will occupy about two acres of ground at Etna, near Pittsburg, and work on the foundations for six open-hearth melting furnaces and three heating furnaces will soon commence. The cost is estimated at \$250,000, and when completed the entire works will occupy over 12 acres of ground.

The Board of Ordnance and Fortifications has allotted \$4,250,000 for the manufacture of 100 guns by contract—25 8-inch, 50 10-inch and 25 12-inch. This is the first opportunity private gunmakers have had for years for contracts of such proportions. They will not only have a competition among themselves but against the government, for upon the prices submitted depend largely the chances of private firms securing future contracts. The appropriation was made by Congress largely for the purpose of giving the private manufacturers a chance to demonstrate whether or not they can build as good and as cheap guns as those turned out by the government. It is expected that at least four firms will enter the competition: The Midvale Steel Works, the Bethlehem Iron Works, and Carnegie, Phipps & Co., all of Pennsylvania, and the South Boston Iron Works, lately moved to Kentucky.

The Westinghouse Electric and Manufacturing Company's plan of proposed reorganization has been made public. The Messrs. August Belmont & Co., of New York, Lee, Higginson & Co., of Boston, and Mr. Brayton Ives, President of the Western National Bank of New York, are named as comprising a syndicate which has undertaken the reorganization of the company and its associated interests. Those gentlemen, with creditors and others, have agreed to take \$3,000,000 of seven per cent. preferred stock, conditional upon the assent of the stockholders to the plan. There is to be no increase in the company's present capital, which is \$10,000,000. The holders of outstanding common stock, which amounts to about \$7,000,000 are asked to surrender 40 per cent. of their holdings into the treasury of the company. With the \$3,000,000 of stock already in the treasury the stock thus surrendered would make nearly \$6,000,000 of treasury stock. Of this \$6,000,000 of common stock \$4,000,000 will be converted into seven per cent. stock. Three million dollars of the seven per cent. stock is to be used to care for the floating debt and for working capital, and \$500,000 is to be held in the treasury of the company for use when needed. A part of the treasury stock which remains is to be used to purchase additional stock in the United States Electric Light Company and the Consolidated Electric Light Company, both of which are now operated and controlled by the Westinghouse Company. The committee, which is to carry out the proposed plan, said that this plan not only meets with the approval of the directors and the bankers, but has been examined and approved by prominent stockholders and creditors.

**SOUTHERN INDUSTRIAL NOTES.**  
(From our Special Correspondent.)

On the 21st inst. the Mobile Phosphate and Chemical Co., of Mobile, Ala., will hold a meeting to consider the advisability of issuing \$25,000 of bonds to be used for improving its plant, putting in new machinery, etc.

The Grovania Oil and Fertilizer Co. has been incorporated at Grovania, Ga., and will erect a 15-ton cotton-seed oil mill, ginnery, fertilizing works with capacity of 200 tons per day, and a grist mill with a capacity of 150 bushels per day. An electric lighting plant will also be installed. The total plant will cost about \$25,000.

The Wess Weldon Manufacturing Company has been organized at Weldon, N. C., with a capital stock of \$300,000. The officers are: B. L. Duke, president; W. R. Tucker, vice-president, and F. P. Haywood, secretary and treasurer. The company will purchase 1,000 acres of land adjoining Weldon, which it will improve, offer inducements to manufacturers, etc.

The stockholders of the Elyton Land Company held their annual meeting at Birmingham on May 7th, and re-elected the old board of directors. They also voted upon the question of subscribing to the projected steel plant, the result of which was that the directors were authorized to subscribe in such amounts as they might deem best. In consequence of the action of the stockholders, on the following day the directors held a meeting and agreed to subscribe \$100,000 to the establishment of a basic steel works to be located at Birmingham. Mr. T. T. Hillman made the proposition that if the Tennessee Coal, Iron and Railroad Company would subscribe \$400,000, and the Elyton Land Company \$100,000 more, he and his associates would put up \$200,000, making a total of \$1,000,000 with which to establish the enterprise. It is understood that the action of the Elyton Company in subscribing the \$100,000 closes the transaction and will result in final arrangements for the immediate establishment of the plant. At another meeting of the board of directors Dr. H. M. Caldwell was unanimously re-elected president. He immediately tendered his resignation, which, however, was not accepted. It was under his administration that the company made its record of \$3,000,000 in cash dividends.

**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.**
- 2,217. Gold mining machinery, especially concentrators. Alabama.
  - 2,218. Brick machinery. Louisiana.
  - 2,219. A stamp mill complete. Georgia.
  - 2,220. Canning machinery. Georgia.
  - 2,221. Machinery for "floating ochre dry. Georgia.
  - 2,222. Machinery for sugar factory. Tennessee.
  - 2,223. A pair of second-hand assay balances. New York.
  - 2,224. A 15 H. P. boiler and a 20 H. P. engine. Texas.
  - 2,225. Two 60 saw cotton gin stands with condensers and feeders. Texas.
  - 2,226. An elevator for cotton. Texas.
  - 2,227. A 20-inch corn mill. Texas.
  - 2,228. Cotton press and elevator. Alabama.
  - 2,229. A spoke lathe. Arkansas.
  - 2,230. A felloe saw. Arkansas.
  - 2,231. A good second-hand 5 foot boring mill. Ohio.
  - 2,232. A complete outfit of machinery for making bark collars, 1,000 capacity per day. Alabama.
  - 2,234. A 12 or 15 horse power boiler and engine. Virginia.
  - 2,235. Brick machinery to manufacture brick for erection of houses, etc. South Carolina.
  - 2,236. Building and roofing materials. South Carolina.
  - 2,237. Engines, boilers, woodworking machinery and tools for the manufacture of wagons and buggies. South Carolina.
  - 2,238. A 5-ton ice plant. Alabama.
  - 2,239. Spoke, hub and all kinds of handle machinery. Alabama.

2,241. A good second-hand 72x20-inch iron planer. Colorado.

**AMERICAN GOODS WANTED ABROAD.**

- 2,206. A machine with a capacity of 50 tons per day, to treat or disintegrate tailings from a gold mine that have become caked by exposure to air. Machine to be shipped to Brazil. South America.
- 2,207. A mill for the fine grinding of pure pyrites. Give full particulars as to capacity of mill, tons per day, cost, power required to operate, description of process, etc. Mill to be shipped to Brazil. South America.
- 2,212. Mineral wool. Canada.
- 2,213. A ship for towing purposes. Central America.
- 2,233. Machinery for the extraction of the fibres 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.

**GENERAL MINING NEWS.**

**ARIZONA.**

**GILA COUNTY.**

**BUFFALO COPPER COMPANY.**—Operations at the mine and smelter progress most favorably. The output of metal during the month of March was quite large, considering that more attention was given to opening the mine than to increasing the production—and the production for April was at least equal to that of the preceding month. The pigs, it is said, contain 98 3-10% of copper and carry 46 ounces of silver, with a trace of gold. The daily production, with one furnace in blast, has been about six tons. The development work in the mines seems to promise greater ore reserves, especially on the southeast side, where the company has several claims adjoining the Globe mine and the Transfer, which were bonded by the parties interested in the Copper Queen Mining Company. Encouraging indications are said to have been recently found in the latter, and the relative position of the Lizzie and the Mark Twain, one of the Buffalo Company's properties, is the same, while the former promises most favorably. Dr. Alex Trippel is the superintendent of this company. Everything that may cheapen the cost of production will be resorted to as soon as conditions seem to warrant it.

**CALIFORNIA.**

The receipts of quicksilver at San Francisco from California mines in April and for the first four months of the year compare as follows:

	For April.	Jan. 1 to April 30.
1889, flasks.....	878	5,061
1890.....	912	4,271
1891.....	1,035	4,604

The Quicksilver Mining Company, of New Almaden, has not sent a flask to this market in several months. The export demand is very light, only 242 flasks being shipped by water from this port in April, mostly to Mexico. The movement by water carriage for the first four months of the year was as follows:

	Flasks.	Value.
Mexico.....	972	\$46,336
Japan.....	70	3,325
New Zealand.....	20	900
Central America.....	14	656
British Columbia.....	3	149
Totals.....	1,079	\$51,366
In 1890.....	1,441	70,627

**AMADOR COUNTY.**

**HECTOR CONSOLIDATED GOLD MINING COMPANY.**—Mr. C. O. Mitchell has had a large force of men at work on the pipe line which is now ready to convey water to the mill. Under the supervision of Mr. H. G. Murray, the latter has had a thorough overhauling. It is said that the company intends to sink a new shaft about 200 feet south of the old one, and while so doing will run through some of the surface rock.

**HUMBOLDT COUNTY.**

(From our Special Correspondent.)

**MANHATTAN OIL COMPANY.**—O. B. Clark, the expert appointed by this company to examine the oil fields in the southern portion of the county, has made his report. He thinks the oil region is very extensive, and says the indications in the Petrolia district exceed any he ever saw, excepting those in the oil fields of Pennsylvania. Claims have been located and machinery for boring wells has been ordered, and some is already on the way.

**MONO COUNTY.**

(From our Special Correspondent.)

**LAKEVIEW.**—The strike in this mine is turning out as well as expected, and the ore is accumulating on the dump. As soon as superintendent R. T. Pierce returns the Pierce & Butterfield mill will be started up. As this mill, however, is wholly inadequate, improvements will doubtless be made. Mr. Pierce is expected daily.

**STANDARD CONSOLIDATED MINING COMPANY.**—Satisfactory reports are to hand regarding the progress at the mine. A telegram was received on the 6th inst. reporting the shipment of a bar of gold bullion the net value of which is \$20,200.

**SONOMA COUNTY.**

**GREAT EASTERN.**—This quicksilver mine is said to be turning out 160 flasks monthly.

**TUOLUMNE COUNTY.**

(From our Special Correspondent.)

**TUOLUMNE RIVER QUARTZ COMPANY.**—The development of the several properties of this company is to be pushed during the coming season. The mines, which are located on a steep mountain-side, are opened by tunnels, and as there is an ample supply of water for power on the property, work is very economically conducted. There is already a 10-stamp mill at the mines, working on ore which has been yielding about \$30 per ton. Contracts have been let for additions to the mill, which will be necessary as other mines belonging to the company are opened.

**COLORADO.**

Mineral surveys approved by the United States Surveyor-General of Colorado, during the two weeks ending May 9th, 1891: Survey No., 6713; land district, Durango; name of claim, Golden Queen; 6889, Garfield, Little Prince; 6652, Durango, Mabell.

**DOLORES COUNTY.**

**ASPEN.**—The shaft sinking on this property reached the contact vein which underlies Dolores Mountain last week, and cut 18 inches of rich ore of the same character as that produced by the Enterprise mine.

**ENTERPRISE.**—One of the most important sales of mining property ever made has just been consummated at Rico. A group of 20 claims, located on Newman Hill, one mile from the town, comprising about 130 acres, and including the famous Enterprise mine, has been purchased by an English syndicate for \$2,000,000. The sale was effected by Messrs. Crawford & Posey, who sold the Yankee Girl, Guston and American Belle mines; and it is understood that the syndicate which has just secured the Enterprise is principally composed of shareholders of these companies. We are informed that a new company is to be organized to take over the Enterprise mine, on a basis of 500,000 shares of \$1 each. The Enterprise mine was discovered by David Swickheimer in November, 1887, and at once became one of the prominent producers of the San Juan country. The ore produced has always been of high grade, the entire shipments having averaged over \$350 per ton, from net smelter returns. The property is well opened and is said to have large ore reserves in sight, only a limited amount of stoping having been done hitherto. Mr. John B. Farish, M. E., of Denver, examined the property, and we understand that it was upon his report that it was purchased, his being the only examination made pending the sale.

**GILPIN COUNTY.**

**GETTYSBURG MINING COMPANY.**—The output of this company in April was \$628.45. Work was mostly confined during the month to clearing old workings of two years' accumulations of debris. The working force is to be increased this month, and drifting and sinking commenced.

**NEW CALIFORNIA MINING COMPANY, LIMITED.**—The output of this company for March was 860 tons of ore yielding 430 ounces gold, valued at \$7,550. Expenses were \$4,900. The sum of \$2,150 was expended on the new claims, Governor Adams and Rhode Island, and in general development work.

**GUNNISON COUNTY.**

**TYCOON.**—A rich strike has been made in this property, located in Blaine basin, between the Fairview and Nest Egg mines. A body of sulphide ore, 3 feet thick, has been found in the lime porphyry contact, in which there is a streak from 16 to 24 inches wide which assays over 300 ounces silver per ton. The Tycoon claim was located in August, 1889. It is now being worked under lease and bond by G. W. Griffey.

**LAKE COUNTY.**

**MIKE & STARR GOLD AND SILVER MINING COMPANY.**—Shipments of ore have been commenced by the lessees of this property, who have been engaged mainly in development work for the past year and a half. The mine is said to be looking excellent.

**PARK COUNTY.**

**BLACK FLAG.**—The tunnels being driven in this property are showing a strong and continuous vein from two to four feet wide, which is improving in quantity and quality as depth is gained. The ore is free milling, fully 90% of the gold being recovered, according to reports. The Black Flag property is located not far from the famous London mine.

**PITKIN COUNTY.**

**J. C. JOHNSON MINING COMPANY.**—Judge Hallett, of the United States District Court, Denver, denied the application of this company for an injunction against the Della S. Mining Company on the 5th inst. The suit to decide the ownership of the apex of the vein will now come up at the next regular term of the United States District Court.

**LITTLE ANNIE MINING COMPANY.**—The stock of this company will probably be called on the Denver Exchange some time next week, the listing committee having reported favorably upon it. All reports agree that the mine is a wonderful bonanza—second only to the Mollie Gibson. A large train of jacks is at present engaged in carrying ore to the railway, and it is said that the company will certainly pay its first dividend in June.

## SAN JUAN COUNTY.

**PANDORA.**—This group, comprising the Pandora, Little Tod and Honest Bill claims, has been sold to a New York syndicate for \$100,000, of which 10% has been paid, and the balance becomes due July 1. Preparations are already being made by the new owners for active operations.

## SAN MIGUEL COUNTY.

**SMUGGLER MINING COMPANY.**—The lease of Messrs. Tresize and Mansfield, under which the property of this company has been operated, expired on the 1st of May. On that date the company consolidated with the Union Consolidated Mining, Hon. John A. Porter, of Denver, becoming president and general manager of the new company. Mr. N. T. Mansfield will be the resident manager and R. M. Tresize superintendent of mines. The Smuggler mine has hitherto employed about 100 men, and the Union 50. Both properties are located on the great Sheridan-Mendota vein. The new company will increase the working force and thoroughly develop the mines. The company has purchased of John Fallon, for \$75,000, his one-half interest in the Seventy-six and Emerald mines, and the whole of the Ansborough. The Seventy-six is a fractional claim on the Sheridan vein. The Emerald has a vein crossing the Sheridan, and the Ansborough adjoins the Revenue, which adjoins the Smuggler. The consolidated Smuggler-Union Company now owns the Smuggler, Union, Revenue and Ansborough mines, three-fourths of the Emerald and Seventy-six, and an interest in the Bullion, and is negotiating for the balance of interests in the last named properties.

## GEORGIA.

## CATOOSA COUNTY.

(From our Special Correspondent.)

On the 1st inst. work was resumed at the Duacan Silver Mine, near Ringo, but, so far, considerable trouble has been experienced in getting laborers. The Catoosa Mining and Manufacturing Company is also pushing its operations.

## FLOYD COUNTY.

(From our Special Correspondent.)

**ROME IRON COMPANY.**—The new iron furnace of this company, at Rome, was blown in on the 9th inst. The superintendent, Maj. J. W. Courtney, states that it has about 11,000 tons of ore on hand. The ore is obtained from the Dirt Cellar ore bank belonging to the company. It is understood that two new furnaces will soon be erected.

## ILLINOIS.

The coal miners of this State have decided to demand last year's prices. They will strike, if necessary.

From the reports of the State Inspectors of Mining, just issued, the statistics of coal production in this state for the year ending July 1st, 1890, are found to be as follows: Number of counties in which coal has been mined, 57; number of mines and openings of all kinds, 936; number of tons (2,000 pounds) of lump coal mined, 12,638,364; number of employees of all kinds, 28,574; number of miners, 20,106; average number of days of active operations, 203.5; aggregate home value of products, \$12,832,936; average value per ton, \$1.02; average price per ton paid for hand mining, \$0.683; number of tons of lump coal mined by hand, 9,736,381; number of mining machines in use, 206; number of tons of lump coal mined by machines, 2,881,983; number of men killed, 53; number of wives made widows, 33; number of new mines opened, including old mines reopened, 176; number of mines closed and abandoned, 94.

## KANSAS.

A special report shows that during the week ending May 9th the output of ore from the mining districts of Galena and Empire City was: Rough ore, pounds milled, 1,660,560; zinc ore, pounds sold, 855,450; lead ore, pounds sold, 280,000; sales aggregated a total value of \$16,900.

## MICHIGAN.

The first Lake ore shipments of the season were made last week from Marquette. The steamer La Salle took out 1,963 tons and the steamer Joliet 1,980 tons.

## COPPER.

**QUINCY MINING COMPANY.**—A Lake exchange publishes the following: Captain Whittle, of this company, says that a much longer time will be necessary to get things in running shape at the Peewab mine than is generally supposed; that work will go on some two years without much return in the way of copper.

**PENINSULA MINING COMPANY.**—This company's output for April was 80 tons of mineral. It is reported that extensive explorations are soon to be carried on the property.

The Calumet Conglomerate give data concerning the explorations of this company east of the Allouez lode, the one on which its mine is located, which are interesting inasmuch as the territory passed through, up to the time of the Peninsula's operations, was comparatively unexplored. The crosscut was started at the 400-foot level at a point north of No. 2 shaft. After driving 1,040 feet, a diamond drill was made to penetrate a further distance of 540 feet. The "country rock" is trap. Running through this are numerous conglomerate

and amygdaloid lodes. The following table shows their respective location to one another and to the point of starting:

At	feet	from	point of starting	feet	thick
At 168 feet	an amygdaloid	.....	.....	4	feet thick
" 347	"	.....	.....	5	"
" 463	" conglomerate	.....	.....	6	"
" 506	"	.....	.....	27	"
" 749	" amygdaloid	.....	.....	10	"
" 814	"	.....	.....	19	"
" 1,040	" began drill hole	.....	.....	.....	.....
" 1,175	" epidote	.....	.....	5	"
" 1,180	" amygd. trap	.....	.....	10	"
" 1,360	"	.....	.....	10	"
" 1,299	" amygdaloid	.....	.....	3	"
" 1,310	"	.....	.....	6	"
" 1,397	" flucan	.....	.....	5	"
" 1,402	" Cal. Conglom.	.....	.....	6	"
" 1,410	" amygdaloid	.....	.....	3	"
" 1,420	"	.....	.....	16	"
" 1,440	"	.....	.....	9	"
" 1,560	" end of drill hole	.....	.....	.....	.....

Nearly all of these lodes carry more or less copper. The Calumet conglomerate although but six feet wide carried considerable very fine copper. The management will, some time in the future, do more exploratory work on this lode. Several amygdaloid lodes were, it is said, sufficiently rich at the point of intersection to warrant working.

A pit was next sunk on the outcrop of the Calumet conglomerate. About twenty feet back of the vein a diamond drill was started in, at an angle of about 80 degrees and across the formation. At 95 feet was encountered an amygdaloid 13 feet wide (measured on the angle), at 210 an amygdaloid 12 feet thick, at 222 an amygdaloid trap 24 feet, at 266 another amygdaloid trap 40 feet thick, at 360 an amygdaloid 18 feet thick, and at 465 feet the drill was still in trap.

To prove up its property west of the Conglomerate in which the mine is located a diamond drill was put down horizontally 435 feet or to a distance 554.5 feet from the surface on the dip of the lode. After passing through 35 feet of alluvial an amygdaloid was found and in order, a blue trap, poor amygdaloid, amygdaloid trap, poor amygdaloid, common trap, at 140 feet an amygdaloid trap, at 220 feet amygdaloid trap, copper-bearing trap, at 320 feet poor amygdaloid, coarse trap, dense trap, at 425 the Peewab lode, which at this point was said to be "very good."

**TAMARACK MINING COMPANY.**—This company is soon to start operations upon the Osceola Amygdaloid, which was cut about a year ago by a short cross-cut east from the 12th level of No. 1 shaft. In his last annual report Capt. Daniell made the following reference to the nature of the deposit: "Most of the copper we found (in cutting the flat) is in the shape of small barrel-work, and this not far below the hanging wall of the bed. The lode is of full width, looks quite promising, and will require examination from us."

**TAMARACK, JR., MINING COMPANY.**—The total assessments paid on this company's stock aggregate \$10. An additional assessment of \$6 per share (\$240,000), it is said, will be called to cover the cost of a hoisting plant, rockhouse, and other buildings. Captain Daniell writes as follows concerning the mine: "I think the crosscut is nearing the hanging wall of the lode. The width then would be about ten feet. I am very pleased to say that the whole width of the lode carries copper, and I think the quality of all the rock broken here will compare favorably with the average of the Tamarack mine. Some of it is very rich, and the lode is of the most promising character. Compared with the first level this is one-half better. We shall drive a short distance north and south on the conglomerate, and then cut flat and be ready to resume the shaft to the third level."

**WENDIGO COPPER COMPANY.**—This Company's steamer left Portage Lake last week for Isle Royale. Supt. S. S. Robinson and a gang of 60 men have been on the island since the closing of navigation last fall.

## IRON—MENOMINEE RANGE.

Two of the largest mining companies of Cleveland have decided to consolidate, and will soon be doing business under a West Virginia charter. They will be known as the Cleveland Cliffs Iron Company, instead of the Cleveland Iron Mining Company, and Iron Cliffs Company as now. The Cleveland company shipped the first load of ore from the Menominee Range, and was controlled by Cleveland capital. The Iron Cliffs Company was organized in New York, S. J. Tilden and W. H. Barnum having been among its presidents. Its stock is now held by a Cleveland syndicate and by the Tilden and Ogden estates of New York. The properties of the two companies at Ishpeming, Mich., adjoin, and are all within a radius of three miles. Last year the output of the two was 640,000 tons of ore. The new company will have \$5,000,000 capital stock, \$4,500,000 of which will be used to acquire the stock of the old companies, and the rest be in the treasury.

**CHAPIN MINING COMPANY.**—A and A1 shafts are closed. The 1,000 tons which are being hoisted daily come from B and C shafts. The sinking at D shaft has progressed as far as the seventh level. Two thousand tons are now being shipped daily to the Escanaba ore docks.

**PENN IRON COMPANY.**—At West Vulcan mine the new shaft is about 600 feet deep. The drift has been connected with the crosscut at the sixth

level, and after some necessary preparatory work has been done it is probable that some ore will be mined from the north vein in the vicinity of No. 4. Connection will be made with the south vein also, but it will be some time before any ore can come from there. The pumps will shortly begin operations lowering the water in No. 2 shaft below the sixth level.

## MISSOURI.

## MARION COUNTY.

**SHONEY ZINC AND LEAD COMPANY.**—The 50-ton concentrator erected by this company, it is stated, is now completed and will immediately start up on ore from the mine.

## JASPER COUNTY.

(From our Special Correspondent.)

## JOPLIN, May 11.

The output of the zinc mines for the past week was very large and the sales heavy. The average price paid for ore was \$21 per ton.

Lead held its own throughout the week at \$23.75 per thousand.

Following is given the sales of ores as far as reported:

Joplin mines, 1,440,750 pounds zinc ore and 193,940 lead; value, \$19,401.

Webb City mines, 1,267,230 pounds zinc ore and 93,300 lead; value \$15,521.50.

Cartersville mines, 1,470,510 pounds zinc ore and 57,250 lead; value, \$16,853.50.

Zincite mines, 253,320 pounds zinc ore and 10,470 lead; value, \$3,176.25.

Oronogo mines, 56,470 pounds zinc ore and 4,540 lead; value, \$705.

Lehigh mines, 3,520 pounds zinc ore; value, \$42.

Galena, Kans., mines, 855,000 pounds zinc ore and 280,000 lead; value, \$16,900.

Districts, total value, \$72,602.25. Aurora Lawrence County Mines, 72,000 pounds silicate, 80,000 pounds zinc ore, and 270,000 lead; value \$11,780.

Lead and zinc belts, total value, \$84,382.25.

Pittsburg and Wier City, Kan., spelter output; R. Lanyon & Co., 187,900 pounds; S. H. Lanyon & Bro., 96,800 pounds; Granby M. & S. Company, 97,000 pounds; W. & J. Lanyon, 96,700 pounds; Wier City Zinc Company, 165,500 pounds. Total for the week, 643,900 pounds.

Vivian & Sons, of Swansea, Wales, were in the ore market last week purchasing of the Snyder Bros. 1,120 tons of zinc ore for shipment to Europe. The price paid is said to be an advance over the local market price. The firm commenced to-day to sack its purchase. This sale proves that the raw zinc ores of this district can be exported at a profit to the operators. It is a known fact that this district for some months past has been producing more ore than the present smelting capacity of the United States can handle. Consequently a European market is very desirable.

Col. J. F. Vinal, of Washington City, D. C., has purchased, through Lea D. Bell & Co., of Neosho, 1,267 acres of mineral land near Granby, Newton county, Mo., for \$17,000 cash. The purchaser will commence active development at once.

Dr. E. C. Read and certain Chicago parties have secured a lease on what is known as the 40-acre Holden tract of land at Zincite. It is well developed and has been a steady producer for the past four years. The lessees will put in additional machinery and make other needed improvements.

Dr. A. J. King and Mr. A. Middleberg, of St. Louis, are in the district examining their numerous mining properties. Chief among their interests is the Middleberg Lead and Zinc Company, operating on the Oswego land, which last week produced 73,190 pounds zinc ore and 9,230 lead. The miners, at a depth of 80 feet, are cutting on an ore body 75 feet wide by 20 feet thick.

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## MONTANA.

## BEAVERHEAD COUNTY.

**GOLDEN LEAF, LIMITED.**—This company, of Bannack, is erecting a mill which, it is said, will be one of the largest in southern Montana. It will be five stories high. Superintendent Henry Longmaid is employing over 60 men just now, and intends to work a much larger force during the summer.

## JEFFERSON COUNTY.

**RUBY CONSOLIDATED MINING COMPANY.**—President J. S. Heltman and other Deer Lodge stockholders of this company held a meeting recently to consider matters relevant to their property. Work has been suspended for some time past, but it is said to be simply a temporary suspension. Ore was found in the 100 foot level and in the 200, and although so far none has been found in the 300, the owners are confident that it is there, and that but a little more development will find it. A resolution was passed allowing stockholders who forfeited their stock on account of delinquent sale in February to redeem their stock by paying amount of assessment and costs. A new board of trustees was elected, and it will hold its first meeting in St. Paul in a few days and fix the date for the redemption of stock.

## LEWIS AND CLARKE COUNTY.

**BALD BUTTE MINING COMPANY.**—This company is reported to have recently contracted with Fraser & Chalmers for the erection of a twenty-stamp mill on its property near Marysville. The plant will enable the company to reduce the ores of its mine to the best possible advantage, and it is

anticipated everything will be in running order by July 1st. On the 200-foot level of the mine another rich chute of free-milling gold ore was recently encountered. A steam hoist is now being erected at the mine, and underground work has been discontinued until this machinery is put in place.

**MONTANA COMPANY, LIMITED.**—The official report for April shows that the total weight of ore crushed during the month was 6,210 tons; yield from the mills, \$70,000; working expenses for the month, \$52,800; the estimated number of ounces contained in returns by assay being: gold, 2,607; silver, 12,480. Mr. R. T. Bayliss cables that the changes intimated by him at the general meeting, viz., in the management and pan treatment of the ores, are now (May) in operation, and that the working expenses will in consequence be materially reduced.

**NON-SUCH.**—One of the most important strikes, so far as Helena is directly concerned, was made recently in this mine, near Unionville. The mill on the property had just been started on ore, enough being on the dump to make a good run. Work on the shaft was continued, and at a depth of 150 feet a body of wire gold 30 inches wide was encountered. This ore lies between two well-developed walls, and has every indication of being part of some large continuous body. The rock is of a brownish color, with the wire gold, plainly visible to the naked eye, running all through it. The ore is of the same kind as the richest taken out of the famous Whitlach Union, which may be spoken of as the patriarch of this district.

**MISSOULA COUNTY.**

**IRON MOUNTAIN MINING COMPANY.**—President R. S. Hale, of this company, returned recently from a visit to the mine. He went for the purpose of examining the new strike mentioned in our issue of April 11th, 1891, and determining the advisability of putting in a concentrator. There are now five tunnels, crosscutting the country rock, all of which have been extended to or into the vein. The lower tunnel, about 600 feet vertically below the upper tunnel, is the one in which the strike has been made. At a distance of 776 feet the wall of the vein was encountered, with 16 inches of good galena ore close to it. For 50 feet more the tunnel runs through low-grade concentrating ore, and in 826 feet, its present face, 30 inches of high grade galena has been uncovered. Drifting has been started on this new find, and the prospects are improving. In the face of the next tunnel, 300 feet above, the shaft was sunk, and now has a depth of over 200 feet. It is said to be on a different streak or chimney of ore than the one just uncovered in the lower tunnel.

**SILVER BOW COUNTY.**

**BLACK ROCK.**—This mine, which is located in the vicinity of the Elm Orlu and Jersey Blue, about half a mile east of Walkerville, is fast becoming one of the largest silver producers in the camp. Sinking on the property has been in progress about seven weeks, and the shaft is now down over 450 feet. A station is being cut at the 450-foot level, and a cross cut which will strike the north vein within thirty feet from the shaft will soon be started. The average daily output of the property at present is about 100 tons of good ore, the larger portion of which comes from the 400-foot level. The vein at this depth is strong and rich, and it is thought that it will be the same at the 450-foot level.

**BUTTE & BOSTON MINING COMPANY.**—The Rarus and Snohomish claims, on which this company had a \$300,000 bond, reverted to their owners recently, as the company failed to lift the bond. The property was originally bonded by Thomas Couch, general manager of the Boston & Montana Copper Company. Later, however, it was turned over to the Butte & Boston Company, and as further time was refused the bond was allowed to forfeit. The Rarus has considerable ore in sight. It is developed to a depth of 600 feet, and large bodies of good ore have been exposed in all the levels below the 300. A peculiarity of the deposit is the fact that it lies so very flat, being a marked exception in this particular to the veins in the surrounding property. It is even a matter of doubt whether the vein, from which considerable ore has been taken, crops within the side lines of claim. The Snohomish adjoins the Rarus on the east. With reference to the deal, it has been said that the company has not the funds with which to purchase and that for this reason the bond on the Tramway at Meaderville which the company held last year was allowed to lapse. This, doubtless, has some foundation in fact. The company has already a bonded indebtedness of \$1,000,000, and a very large portion of its stock is involved in the difficulties attending the settlement of R. J. Davis' estate. Combine with this the present very unsatisfactory condition of the copper market and the comparative tightness of money in the different money centers, and it is but natural to suppose that the company is unable to raise the necessary funds. Its production of both copper matte and silver bullion is most satisfactory to stockholders, and best shown by the following figures: In January 710,000 pounds of copper were shipped; in February, 1,050,000; in March, 1,100,000, and in April, 1,600,000 pounds, while the two last shipments of silver bullion were made on April 17th and May 2d, and amounted respectively to 34,880 ounces and 41,150 ounces.

**PARROT SILVER AND COPPER COMPANY.**—The new hoisting works at this mine are fast nearing completion. The new building is considerably higher than the old structure, and located as it is on the hill—will present an imposing appearance. The Parrot mine is in splendid condition, while the Champion, at Burlington, which also belongs to the Parrot company, has been closed for the present, the pumps having been taken out recently.

**SHONBAR MINING COMPANY.**—Another payment of \$14,000 was recently made on the Shonbar deal. Mr. Wiggan, who, with B. J. Fine, is pushing this sale, returned from Boston, and says the bond will be taken up before long. The consideration is \$30,000 of which \$20,000 is for the West Shonbar and \$10,000 for the East Shonbar. The property is owned by Judge Barret, General Warren, G. W. Stapleton and others. B. J. Fine secured the bond, formed a company capitalized at \$1,500,000, divided into shares of \$5 each, and went East to place the stock. It is said he has thus far sold \$60,000 worth of the stock, but it is not all payable at once.

**NEVADA.**

**ELKO COUNTY.**

(From our Special Correspondent.)

**NORTH COMMONWEALTH MINING COMPANY.**—A telegram received from Tuscarora on the 6th inst. reported the battery assay of ore now being worked by the Union Mill for this company at \$240 per ton; 94% of the assay value is being saved, and about 25 tons per day are treated.

**LYON COUNTY.**

**BI-METALLIC MINING COMPANY.**—This company's mine near Wellington has a good ledge of \$15 free milling gold rock, but lack of water has prevented successful operations in crushing. Recently in one of the tunnels a large amount of water has been struck and it is now thought a five-stamp mill will be erected.

**STOREY COUNTY—COMSTOCK LODE.**

(From our Special Correspondent.)

The following is the weekly statement, showing the ore tonnage from Comstock mines, with the battery assays for last week:

Mines.	Tons.	Assay Value.	
		May 2.	April 25.
Con. California & Virginia....	1,510	33.30	33.10
Chollar.....	542	19.22	19.22
Gould & Curry.....	250	22.00	22.22
Ophir.....	157	22.75	22.75
Overman.....	598	13.14	*15.48
Savage.....	490	17.30	17.50

\* Car samples.

**ALTA MINING COMPANY.**—Work has now been resumed in the mine. The company has over \$20,000 on hand, and work will be vigorously prosecuted.

**CONSOLIDATED CALIFORNIA & VIRGINIA.**—The blower station started in the south drift from the shaft, 1,100 level, has been completed, and the blower and driving engine are in place. Work will be resumed in the face of the drift most probably on the 8th inst. On the 1,300, 1,500, 1,600 and 1,650 good ore is being moved. On the 1,750 level a raise started near the face of the southwest drift from the northwest drift from C. & C. shaft has been carried up 13 feet on good ore streak. To date the total amount of bullion shipped on April account was \$114,412.40, with another shipment to hear from. On May 1 the company had \$108,049.37 on hand. The Eureka mill is crushing 225 tons of ore daily, and when the Morgan mill starts up on Monday—it being stated positively that it will do so—it will crush 150 tons monthly.

**CONSOLIDATED IMPERIAL MINING COMPANY.**—Small streaks of ore are being followed on the upper levels, and prospecting is being done in and around the old stopes where some fillings and lumps of good ore have been found. This is being shipped to the Vivian mill.

**CROWN POINT MINING COMPANY.**—Last week an influx of water from the Belcher incline and stopes delayed the pumping operations. The surface of the water in the Belcher mine has now been lowered 11 feet, but there is no change in the Crown Point.

**JUSTICE MINING COMPANY.**—At the annual meeting of this company, held this week, 92,255 shares of stock were voted. The following officers and trustees were elected: President, Thomas Anderson; Vice-President, Joseph Marks; P. Amiraux, M. Heeflich and J. O'Connell, directors. R. E. Kelly was reappointed secretary, and C. Lyon superintendent of the mine. The financial statement submitted showed that the company had an indebtedness on May 1 of \$3,809.50. The ore stored in the mine has been shipped to the Morgan mill, the stamps of which have been dropping on Ophir ore throughout the week.

**NEW MEXICO.**

**GRANT COUNTY.**

(From our Special Correspondent.)

**ANSON S. COPPER FURNACE.**—This furnace at Hanover Gulch was started recently, and is now running steadily, turning out 800 pounds of copper per day. In the mine the main incline is being sunk, and will be continued to a depth of 350 feet,

when drifts will be run to connect with the ore bodies on either side.

**FLAGLER REDUCTION WORKS.**—Preparations are being made to start these works again, and it is said to be the intention of the management to run a larger sampling mill in connection with the smelter.

**GRAPHIC.**—Developments in this property are most encouraging. The main shaft is down some 400 feet, and tunnels are run in all directions. There are some large bodies of high grade lead discovered on the 300-foot level. The ore runs from 30% to 50% lead, and from 25 to 50 ounces in silver.

**SANTA FE COUNTY.**

**SANTA FE COPPER COMPANY.**—The new concentrator is at work. The amount of matte produced from March 15th to April 30th is reported to have amounted to 437,000 pounds. The directors of the company, at a meeting held in Boston, Mass., on the 14th inst., voted to issue \$42,000 10% five-year scrip with which to take up the coupons on the \$300,000 7% mortgage bonds matured in June and December, 1890, and to mature in the same months of 1891. Holders of over three-quarters of the bonds have consented to accept the scrip. The next coupon due for payment in cash will be that of June, 1892. This will give the company a full year in which to demonstrate its earning capacity.

**NORTH CAROLINA.**

**GASTON COUNTY.**

(From our Special Correspondent.)

**CATAWBA.**—The erection of the new 20-stamp mill by the Mecklenburg Iron Works, of Charlotte, N. C., is progressing rapidly, and it is understood that the stamps will be dropping by the 1st or 15th of June. A concentration plant is also in course of construction with the mill. Recent tests of the concentrates by the Thies chlorination process have resulted so favorably that chlorination works will be erected at once and an addition of 20 stamps added to the mill.

**PENNSYLVANIA.**

**COAL.**

Work has been resumed in the Schuylkill coal fields at the Middle Creek, which has been idle for over a year, and at the Preston No. 3, North Ashland, North Franklin, Bear Valley, and Richardson collieries. These latter mines have been idle for several months. Over 3,000 miners were given employment.

The bill to provide for the health and safety of persons employed in and about the anthracite coal mines, and for the protection and preservation of property connected therewith, after being amended so as to make eligible to an inspectorship any person experienced in mine workings, passed the House of Representatives on the 12th inst. by a vote of 149 to 1.

Adjutant-General McClelland has made his report to Governor Pattison concerning charges that men in the coke regions were kept prisoners and obliged to work against their will. The report states that the statement that the men were imprisoned in shaft "A," at Morewood, was untrue; also that the men at Tari's (another alleged place of imprisonment) were contented, and only wanted affairs to settle down so that they could send for their families.

**CRESSON & CLEARFIELD COAL AND COKE COMPANY.**—At the office of this company, No. 1 Broadway, an ENGINEERING AND MINING JOURNAL reporter learned that four of its Frugality mines were tied up by a strike of 600 men from May 1st to May 10th. The alleged grievances were local, and consisted in "yardage" and "housage" differences. On the latter date the men returned to work on the company's terms.

**PHILADELPHIA & READING COAL AND IRON COMPANY.**—This company has abandoned its tunnel colliery, it having been worked out. At one time it was an important shipper and was numbered among the best paying collieries in the region. It was established 40 years ago.

**OIL.**

The Chief of the Bureau of Statistics reports the total values of the exports of mineral oils from the United States for the month of April, 1891, and during the ten months ending April 30th, 1891, as compared with similar exports during the corresponding periods of the preceding year, as follows: April, 1891, \$3,808,250; April, 1890, \$3,716,263; ten months ending April 30th, 1891, \$43,691,905; ten months ending April 30th, 1890, \$42,047,325.

The daily production of the Allegheny county oil fields at present is about 12,000 barrels. Two-thirds of this comes from the Wildwood pool and the balance can be credited to Chartiers, Crafton, McCurdy, Jack's Run, Westview, Noblestown, and the Moon district. They are all on the decline, and unless a new pool is opened old operators predict that before long the production will be down to 7,000 or 8,000 barrels. Since the first of the year there has practically been no new drilling. A number of the fagging wells has been drilled deeper and hundreds shot.

**SOUTH DAKOTA.**

**LAWRENCE COUNTY.**

**SEABURY.**—CALKINS CONSOLIDATED MINING COMPANY.—A committee was recently appointed

by the directors of this company to make arrangements with the Deadwood & Delaware Smelting Company for treating part of the mine's product. Negotiations with the railroad as to ore rates from Bald Mountain to Deadwood are also pending. The distance from the mine to the railroad is about four miles.

**SCOTIA MINING COMPANY.**—John Cassels, superintendent of this company, reports a recent important strike. The ore is said to be similar to that of the old Fraction mine. The company owns two patented mining claims, the Flora Bell and Scotia.

**RETRIEVER MINING COMPANY.**—This company has just declared its second dividend of two cents per share, aggregating \$5,000. Mr. Benj. Baer, the superintendent, reports most favorably on the property. A contract for the shipment of 2,000 tons of ore running from \$30 to \$40 per ton has just been closed with the Globe Smelting Works, of Denver. The cost of shipment and treatment, it is said, will not amount to more than \$11, as the ore is a very good one for smelting purposes and contains a large basic excess.

UTAH.

JUAB COUNTY.

Mr. J. H. Hedges reports that he has discovered a large deposit of saltpetre in Goshen Cañon, about 15 miles southeast of Eureka, and 5 miles northwest of Mono. The saltpetre deposits are found as incrustations, lining large caves which occur in a mountain of limestone.

**ALEX.**—A good vein of ore has been opened in this mine at Carr's Fork. The vein, which is nearly five feet wide, has a galena pay streak of 14 inches, assaying 36% lead, and 25 ounces silver per ton.

**BULLION, BECK & CHAMPION MINING COMPANY.**—The shaft which is being sunk to open the 800-foot level, is now down 780 feet. A new strike of ore is reported in the north drift of the 500-foot level, which is regarded as important, as most of the ore has hitherto been found in the southern portion of the mine; another strike has been made in the south drift of the 400-foot level.

**CAROLINE.**—The strike recently made in this mine is reported to be one of the richest ever made in the Tintic district. A stope 27 feet wide in ore assaying from 100 to 1,600 ounces silver has already been opened. Caroline ore has, hitherto, carried lead, but the present strike is silicious ore carrying horn silver.

**MAMMOTH MINING COMPANY.**—The miners employed by this company have presented a statement of complaints to the directors of this company against the boarding house and store system which is still enforced by this company, demanding that they be allowed to board and trade where they please. The directors have deferred consideration of the matter until their meeting of the 20th inst. The Eureka Miners' Union is determined to break up the system, and the Mammoth is the only company now following it, the Eureka Hill and Bullion, Beck & Champion mining companies having yielded to the demand of the union.

PIUTE COUNTY.

**SEVIER.**—This property, comprising four claims in the Gold Hill mining district, has been sold by W. L. Rath and others to Messrs. John Beck, A. E. Hyde, George A. Rice, and A. Miner, of Salt Lake City, for \$65,000 cash. In this property there exists a vein of rich gold ore, of which the outcrop has been traced for several hundred feet. On the surface the vein is eight feet wide; it has been cut by a tunnel at a depth of 100 feet, and a drift, driven for a short distance on the vein, shows a pay streak from 3 1/2 to 8 feet wide. The ore is free milling. The new owners will drive a tunnel to cut the lode at greater depth, and will at once erect a stamp mill. This property is located less than two miles above the placers of the Salina Gold and Silver Mining Company, and it is thought that it is the mother lode whence their gold came.

SALT LAKE COUNTY.

**EMMA MINING COMPANY, LIMITED.**—Considerable good ore has been obtained from the Emma mine by the past winter's work, some of it assaying as high as 50% lead and 125 ounces silver per ton. The ore streaks have been very irregular, however, sometimes having a width of 2 feet and then suddenly pinching out altogether. Shipments will be commenced in a few days now, the roads being in condition. The Cottonwood concentrator will commence running on low-grade ore from the Emma in the course of a week.

**FLAGSTAFF, LIMITED.**—Official advices from the mine are to the effect that a body of first class ore, 4 feet wide and 3 feet high, was struck in the sixth level on the 30th ult. This is the first good mineral found at this depth in this particular section of the mine, being 160 feet northwest from the nearest workings from which ore has been taken hitherto.

SUMMIT COUNTY.

**DALY MINING COMPANY.**—The output of this company in April was: Sulphides, \$100,920.24; ore sales, \$17,719.50; since January 1st., sulphides, \$183,891.82; ore sales, \$43,163.84.

**ONTARIO MINING COMPANY.**—The output of this company in April was: Silver bullion, 74,912.68 ounces; ore sales, \$16,487.54; since Jan. 1, silver bullion, 311,382.33 ounces; ore sales, \$193,154.73.

TOOELE COUNTY.

**BULLION.**—A body of galena ore assaying from 37% to 52% lead, and from 15 to 20 ounces silver per ton, has been uncovered in this mine, located near Stockton, in driving west from the shaft at a depth of 180 feet. Several shipments have already been made. The property, which is owned by parties in Cleveland, O., is being worked under lease by Frailey Bros. & Kelley.

**BUNKER HILL.**—It is reported that a strike of 5 feet of galena ore, assaying 50% lead and 25 ounces silver per ton, has been made in this mine at a depth of 65 feet.

WEST VIRGINIA.

The sale of a large and valuable tract of oil property has been negotiated between the Mountain State Oil Company and the South Penn Oil Company. The Mountain State, which is composed of George Hukill, Captain Munhall and James Scott, sold to the latter through their representative, N. F. Clark, 1,800 acres of territory in Monongalia county, Peddler's run district, between Mount Morris and Fairview. On this property there are eight completed wells having a daily production of 450 barrels, and two wells are being drilled. The consideration is said to be between \$250,000 and \$275,000.

HARRISON COUNTY.

(From our Special Correspondent.)

**OCEAN.**—A terrific explosion of gas occurred at the Ocean coal mines, northeast of Clarksburg, owned by Wilson, Black & Sheridan, on the 7th inst. Forty-one men had descended into the mines, and about 40 more were waiting to descend when the accident took place. Great clouds of smoke belched forth from the two entrances to the mine, located about 1,000 feet apart, and there was no hope that any of the men would be rescued alive. However, a party started immediately after the explosion, and 37 of the men were saved, they having been in a remote part of the mine from the chamber in which the gas ignited. The other four were instantly killed.

MEETINGS.

American Zinc Lead Company, at the office of the company, in Portland, Me., May 18th, at 2 P. M.  
Coalburgh Land and Mining Company, at the office of the company, No. 69 Wall street, Room 56, New York City, June 8th, at 1 P. M.

Himalaya Mining Company, at the office of the company, No. 267 Main street, Salt Lake City, Utah, May 27th, at 7 P. M.

Piedmont Gold & Silver Mining Company, at the office of the company, Room 19, No. 329 Sansome street, San Francisco, May 21, at 1 P. M.

Rossie Iron Works, at the office of the company, Room 84, Drexel Building, New York City, June 3d, at 12 o'clock, noon.

St. Joseph Lead Company, at the office of the company, No. 55 Liberty street, New York City, May 21st, at 11 A. M.

Wood River Mining and Milling Company, at the office of the company, Room 101, No. 36 and 38 West Second South street, Salt Lake City, Utah, May 25th, at 8 P. M.

ASSESSMENTS.

COMPANY.	No.	When levied.	D't'nd't in office.	Day of sale.	Amn't per share.
Alliance, Utah.....	13	Apr. 21	May 26	June 15	.10
Andes, Nev.....	37	Apr. 4	May 8	May 28	.30
Caledonia Silver.....					
Chollar, Nev.....	44	May 2	June 4	June 25	.15
Centennial Gravel, Cal.....	29	Apr. 6	May 12	June 2	.50
Consol. Imperial, Nev.....	41	Mar. 25	Apr. 27	May 27	.03
East Sierra Nevada, Nev.....	31	May 6	June 11	July 1	.05
Idlewild, Cal.....	2	Apr. 14	May 22	June 15	.05
Kentuck, Nev.....	2	May 1	June 1	June 20	.10
Live Oak Drift Gravel, Cal.....	1	Mar. 31	May 5	May 26	.20
Peerless, Ariz.....	13	Apr. 15	June 2	June 22	.02 1/2
Scorpion, Nev.....	16	Apr. 24	May 29	June 18	.10
Scorpion Silver, Nev.....	2	Apr. 14	May 22	June 15	.0
Teresa, Mex.....	26	Apr. 14	May 22	June 15	.15
Utah, Nev.....	23	Apr. 23	May 28	June 18	.20
Yellow Jacket, Nev.....	3	Mar. 28	May 1	May 19	.10
	12	May 6	June 12	June 20	.25
	45	Apr. 14	May 16	June 20	.50

DIVIDENDS.

Homestake Mining Company, dividend No. 154, of 10 cents per share \$12,500 payable May 25th at the office of Messrs. Lounshery & Co., Mills Building, No. 15 Broad street, New York City. Transfer books close May 20 and reopen May 20th.

Mollie Gibson Consolidated Mining and Milling Company, dividend No. 4 of five cents per share, \$50,000 payable May 25th at the office of the company, in Colorado Springs, Colo.

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 599 and 600.

FRIDAY EVENING, May 15.

He who would venture to report the local mining stock market as being in a state other than one of absolute and abject apathy, would be a bold man indeed. From a week of fair activity it dropped into a state which is on a par with the career which it has led the greater portion of the year. One reason assigned for this slump, and a very plausible one, is the continued gold exports which have so greatly bothered the Wall Street bulls during the past fortnight. However, while other securities have rallied, mining stocks have had to contend with additional adverse conditions. To the student of the market it is plain that there are very few stocks in the East. The movement toward the West, extending over a considerable period, has about cleaned out loose Eastern holdings. Those few lots of individual stocks which remain are being gradually absorbed by Western capital. This has an effect on the mining stock market similar to that which would be produced on the general market by continuous and heavy gold exports. In the one case there would be an absence of money with which to trade; in the other there is a lack of stock in which to deal. Any one who will study the bids and offers on the daily calls will readily see that there are four bids to one offer, a fact which proves that there is very little stock offering at any price, while the demand, although at low rates, is active. To be sure, these securities can be brought back, but not until the easterner "bids the price." This he will not do until he believes there will be a permanency in the investment. In the face of the oscillating movement of the San Francisco Exchange, stability as a market condition will be the last thing he will think of. Aside from western orders, there has been a little eastern buying, but only in a certain few stocks, notably those which have always led a speculative career. The active stocks of the week could be enumerated on the finger tips. Most of the transactions took place early in the week. Later, on receipt of unfavorable western news, even the speculative element of the market pulled in its horns.

As will be seen by the detailed report given following, but few of the stocks received more than one or two quotations, hardly enough to mark their course. Those which carried on 'change, with but few exceptions, "went into a decline" on prices. The market closed weak and uncertain. We do not look for a revival of activity during the coming week.

The sales for the week aggregated 46,015, of which number 12,865 were of dividend paying stocks. The sales for the corresponding week last year were 118,700 shares.

At the Real Estate Exchange on the 14th inst. the following securities were sold at auction: 242 shares Delaware & Hudson Canal Company at 134 1/4; \$6,000 D. & H. C. Co.'s 7% registered bonds, due 1894, 106% @ 107 1/4; \$5,000 D. & H. C. Co.'s 7% registered bonds, due 1917, at 141 1/4; 300 shares Consolidated Gas Company at 98 1/2 @ 98%; 1,000 shares South Yuba Water & Mining Company at 22c; 100 shares Jocuistita Mining Company at 11c; 1,110 shares Horn Silver Mining Company at \$3.61; 300 shares Deadwood Terra Mining Company at \$1.25; 500 shares Father De Smet Consolidated Gold Mining Company at 25c.

Of the Comstocks, Commonwealth, which sold at 79c. March 18th, received one sale on Saturday of 200 shares at \$1. Consolidated California and Virginia, the barometer of the San Francisco Exchange, led a varied career in the West during the week. It was only sufficiently quoted in the local market to give Eastern holders an idea of the beat of its pulse. It will be remembered that it closed strong last Friday at \$19. At the time there were floating about the Exchange all sorts of rumors about a 25c. a month dividend, etc. On Monday a few shares were put on the board at \$17.75. Tuesday a few more shares sold at \$17. Yesterday a small lot brought \$14. There were no sales to-day. The San Francisco quotation at this morning's opening, as will be seen in another column, was \$16.75. "More manipulation" is assigned as the cause of its downward career. One hundred and twenty shares was the aggregate number sold in the local market. Crown Point did not enter the market until to-day when it sold 100 shares at \$2.50 against the closing of \$3.10. Gould & Curry sold 100 shares on Saturday at \$3.80 against the closing at \$3.50. It did not make a second appearance in the market. Hale & Norcross on Tuesday sold 100 shares at \$3.50 against the closing at \$3.45. This was its only appearance for the week. Ophir led a career much similar to that of Comstock. From a closing of \$9.25 it sold a small lot on Saturday at \$8.87, from which point it sold down to and closed at \$7.50 on Wednesday. The sales amounted to 200 shares. Sierra Nevada was hardly in the market. From a closing of \$4.35 it disposed of a 100 share lot at \$4.10 on Monday. Yellow Jacket like its neighbors was very quiet. It opened Monday at \$2.05, dropped 35c., and, rallying, closed to day at \$3. Alta led quite a steady career up to yesterday at \$1.25, it then



dropped to and closed at \$1.20. Best & Belcher, from a closing of \$7.88 May 1st, sold a few shares on Saturday at \$8.25. In sympathy with San Francisco quotations it dropped to \$6.75 on Wednesday. Chollar, which sold last on April 29th at \$2.29, made a sale of 100 shares on Saturday at \$3.85. It did not make a second appearance. Comstock Tunnel was the active stock of the week. It ranged at about 22c., going as high as 24c. on Wednesday, the day of its last sales; 14,300 shares changed hands. Cons. Imperial sold on Tuesday and Saturday at 30c. to the extent of 2,000 shares. The owners of Mexican disposed of two lots on Saturday and Monday at \$5.12, as against the last previous quotation May 1st of \$4.50. It did not appear in the market during the balance of the week. Potosi parted with 100 shares on Saturday at \$1.95. Its last previous quotation was on April 27th at \$3.30. Seg. Belcher sold 100 shares to-day at \$1.70. Utah on Saturday and Wednesday disposed of 400 shares at \$1.40, against the closing of \$1.20.

Colorado stocks, comparatively speaking, were fairly active. A lot of Aspen, consisting of 400 shares, sold Saturday at \$4. against the last quotation, April 17th, of \$5. There is no particular reason for this decline in its value other than general market conditions. Bassick sold 300 shares to-day at 6c. @ 7c. Freeland was very active, and at values which declined steadily during the week, from a closing of 15c. opened at 16c., and sold down to and closed at 12c., on sales of 7,600 shares.

Leadville Consolidated sold 800 shares in the middle of the week at 11, a loss of 1c. when compared with previous week quotation. Little Chief disposed of 100 shares on Wednesday at 31c. Its closing last week was 24c. Lacrosse sold 100 shares Saturday at 6.

Of the California stocks, Plymouth sold at \$1.25 @ \$2. against an average of \$2 last week. Brunswick was steady during the week at 10c., but was remarkably quiet, only 300 shares being exchanged. Middle Bar struck a 2c. gait on Saturday, which it maintained during the week on sales of 6,000 shares. Belmont developed considerable strength, was very active and closed strong at 55c. Its sales amounted to 2,450 shares. Astoria pursued the even tenor of its way at the one quotation of 1c. Its sales aggregated 4,500 shares.

Horn Silver was the favorite investment of the week, and was bought in small lots to the extent of 770 shares. From a closing of \$3.60 it opened Monday at \$3.75, sold down to \$3.55 on Tuesday, and closed yesterday strong at \$3.65. Ontario disposed of 175 shares, a greater amount than it appeared on the board in any one week for several months. It sold at \$39.50 and \$39.25, the latter being the closing.

Phoenix, of Arizona, opened the week on light sale at 35c. On Tuesday and Wednesday it reached and maintained the quotation of 40c.; the sales aggregated 700 shares.

El Cristo sold on Monday at 35c. and 50c. to the extent of 300, against last week's closing of 5c. Mutual Smelting and Mining from a closing of \$1.35 opened at \$1.40, rose to and closed this week at \$1.45; sales aggregated 700 shares.

Iron Hill sold 200 shares at 2c. on Wednesday. This is to be compared with a closing of 35c. on May 6th.

Deadwood Terra, quoted last on April 18th at \$1.35, sold at \$1.10 and \$1.20, the latter being the closing.

Barcelona, quoted on May 8th at 11c., entered the market on Wednesday at 9c. and 10c. It closed the week on Thursday at 9c.

Mt. Diablo sold 200 shares on Saturday at \$2.40, against the quotation of \$21.35 April 24th.

**Boston.** May 14.

(From our Special Correspondent.)

The principal feature of the market for copper stocks was the more active trading in Boston & Montana, which opened at \$41 $\frac{1}{2}$ , and under the pressure to sell stock declined to \$39 $\frac{1}{2}$ , with a sale, seller's option 60 days, at \$39. To-day there was a rally to \$41. There was also a little more doing in Osceola, which seemed to be pressed for sale rather freely, resulting in a decline from \$35 $\frac{1}{2}$  to \$34. Outside of these two stocks the business was very light, and there appear to be no present indications of any improvement.

The announcement of a \$5 dividend on Calumet & Hecla had the effect of causing a decline in the stock from \$260 to \$255, at which price it holds steady with small sales.

Franklin holds steady at \$17 $\frac{1}{2}$ , with a sale during the week at \$18. The stockholders are anxiously awaiting the announcement of the expected dividend.

Kearsarge declined to \$13, after selling at \$13 $\frac{1}{2}$  in the early dealings.

Centennial sold at \$15 $\frac{1}{2}$ , same as last week. The reports from the mine of late have been rather encouraging.

Butte & Boston declined to \$15 $\frac{1}{2}$ , but recovered on later sales to \$15 $\frac{1}{2}$ .

Quincy sold at \$10 $\frac{1}{2}$ , a decline of \$1 per share.

Tamarack lost \$5 this week, selling down to \$145.

Allouez sold at \$3 $\frac{1}{2}$ , and National at \$2 $\frac{1}{2}$ . Arnold sold at 75c., same as last week.

Santa Fe sold at 60c., and declined to 55c. on small sales.

In silver stocks there is nothing doing.

3 P. M.—The market was a little stronger this afternoon. Boston & Montana sold up to 41 $\frac{1}{2}$ , and Butte & Boston to 16 $\frac{1}{2}$ . Osceola touched \$36.

By Telegraph.—Calumet & Hecla, \$255; Boston & Montana, \$41 $\frac{1}{2}$ ; Osceola, \$35 $\frac{1}{2}$ ; Butte & Boston, \$16 $\frac{1}{2}$ ; Centennial, \$18, bid.

**Denver.**

Prices and sales for the week ending May 9th, 1891:

Company.	Open- ing.	H.	L.	Clos- ing.	Sales.
Mines.					
Alleghany	20a				14,200
Amity	84	04 $\frac{1}{2}$	04	04 $\frac{1}{2}$	3,000
Bangkok-C-B.	00 $\frac{1}{2}$ b	08 $\frac{1}{2}$	07 $\frac{1}{2}$	07 $\frac{1}{2}$	400
Bates Hunter	70a	70	70	69	
Brownlow	05 $\frac{1}{2}$ b			05 $\frac{1}{2}$	
Calliope	17b			17 $\frac{1}{2}$	
Cash	11b			11	
Clay County	109b	110	109	108	1,500
Gettysburg	20 $\frac{1}{2}$ b	21 $\frac{1}{2}$	21	21	2,400
Leavenworth	17 $\frac{1}{2}$ b			17 $\frac{1}{2}$	
Little Rule	108b	*111	109	111	1,500
Matchless	285b			285	
May-Mazzeppa	122a	122	120	122	1,200
Oro					
Pay Rock	03b	03 $\frac{1}{2}$	03	03	2,300
Puzzler	06 $\frac{1}{2}$	08 $\frac{1}{2}$	06 $\frac{1}{2}$	07 $\frac{1}{2}$	24,400
Red National	56b			57	
Rialto	92b	95	92	90	1,400
Running Lode	25b	25	24 $\frac{1}{2}$	25	1,700
Whale					
Bal. Snuggler	100a	90	89	89	200
Prospects.					
Argonaut	15b			15	
Big Indian	08b				
Big Six	14b	14 $\frac{1}{2}$	14	13 $\frac{1}{2}$	500
Century	30a	*34	26	*34	4,200
Claudia J.	06 $\frac{1}{2}$ b	*12	07	10	39,200
Nat. G. & Oil Co.	17b	17 $\frac{1}{2}$	10	12 $\frac{1}{2}$	16,500
Diamond B.	06 $\frac{1}{2}$	*07	06 $\frac{1}{2}$	06 $\frac{1}{2}$	38,300
Emmons	45	49	45	47 $\frac{1}{2}$	18,800
Golden Treas.	31 $\frac{1}{2}$ b	35	32	32 $\frac{1}{2}$	2,500
Ironclad	03 $\frac{1}{2}$ b	*04 $\frac{1}{2}$	03 $\frac{1}{2}$	03 $\frac{1}{2}$	14,600
John Jay	07	108	06 $\frac{1}{2}$	08	4,600
Justice	12 $\frac{1}{2}$ b	13	12 $\frac{1}{2}$	12	300
Legal Tender	03 $\frac{1}{2}$ b	05	04	04 $\frac{1}{2}$	17,300
Morning Glim.	44b			40	
Park Consolidated	*21	*22	20	20	1,800
Potosi	07b	07	06	06	4,800
Total					218,000

Buyer 30. †Buyer 60. a Asked. b Bid.

**San Francisco.** May 7.

(From our Special Correspondent.)

The chipping element that virtually controlled the market a little over a week ago has been replaced this week by more legitimate traders, and, as a consequence, business has been active at advanced prices. Consolidated California & Virginia, while fluctuating widely enough to allow shippers to make a profit, has tended steadily upward until in the informal session on Tuesday \$21 was reached. This is the highest figure attained by any stock for five years, and as Consolidated California & Virginia was the last stock to sell at that price, so it is the first to again reach it. The ruling figure during the week has been \$20, with moderate sales.

An encouraging feature of the market is the healthier tone that prevails, and that tends to prevent interest centering in the Bonanza stock to the exclusion of all others. For a time the North-enders monopolized attention, Mexican ruing at \$5.37 $\frac{1}{2}$ , Ophir at \$9.62 $\frac{1}{2}$ , and Union at \$5. Andes, that a week ago was in poor demand at \$1.60, has been selling this week at \$2.55, and is quoted to-day at \$3.55, with large sales. The report has been circulated that the western extension of Consolidated California & Virginia ore is in Andes ground, and the effect has been to boom the stock.

On Monday the middle group of stocks began to move, led by Best & Belcher, the only one that has shown any activity for a long time. A week ago Best & Belcher sold for \$7.75 and is ruling this week at \$9.37 $\frac{1}{2}$ . Potosi has been rather heavy at \$4.40, but reached \$5 yesterday, Savage also advancing and reaching \$3.95.

The Gold Hill & South End stocks seemed to be running in a groove from which they could not be moved, but on Tuesday the demand for them became more brisk, and yesterday an advance along the line took place. Bullion sold to \$3.05, an advance during the week of 60 cents. Overman is quoted this morning at \$4.40, an advance during the same period of 70 cents. The smaller priced stocks have advanced generally from 5 to 10 cents per share.

With one or two exceptions prices have ruled a point lower to day, but the decline has all the appearance of being a mere fluctuation, for the market is decidedly bullish, and prices are bound to reach higher figures, and, that too, in all probability, in the near future.

By Telegraph.—The quotations at 10 A. M. Friday, the 15th inst., were as follows: Alta, \$1.10; Best & Belcher, \$7.25; Belle Isle, 60c.; Brodie, \$1.15; Bulwer, 40c.; California & Virginia, \$1.625; Chollar, \$3.30; Crown Point, \$2.50; Commonwealth, 90c.; Gould & Curry, \$3.40; Hale & Norcross, \$3.25; Mexican, \$4.70; Mono, 60c.; Navajo, 30c.; North Belle Isle, 75c.; Nevada Queen, 40c.; Ophir, \$7.50; Potosi, \$4.15; Savage, \$3.45; Sierra Nevada, \$3.50; Union Consolidated, \$4.00; Utah, \$1.35; Yellow Jacket, \$3.40.

**St. Louis.** May 13.

(From our Special Correspondent.)

The mining market has been dull all the week, and the amount of business small. The prices on nearly all stocks fell off several degrees; this was

notably the case with Elizabeth and Mickey Breen while Silver Age also experienced a decided decline.

Elizabeth opened this week at \$2.40, but soon fell to \$2.22 $\frac{1}{2}$ . The following day the market was as low as \$2.05. On Saturday an encouraging report was received from the mine, and the market assumed a stronger tone, opening on call at 15c. above Friday's quotation, and closing at \$2.17 $\frac{1}{2}$ . To-day the stock is very firm at \$2.15, at one time going as high as \$2.20. Sales amounted to 1,750 shares, of which some 1,200 shares went at above \$2.20.

Yuma opened very strong at 82 $\frac{1}{2}$ ¢, fell later to 78 $\frac{1}{2}$ ¢, at which figure it remained the greater part of the week, closing to-day at 80c. The amount of business transacted was much above the ordinary and had a very good effect on the stock. Sales amounted to 1,400 shares.

Montrose was again in the market and several good sales were made. The opening sale was 100 shares at 61 $\frac{1}{2}$ ¢, but the market quickly weakened and shortly afterward 500 shares brought only 58 $\frac{1}{2}$ ¢; the following day the stock was bid at 55c. On Monday the market strengthened and 60c. was bid, Tuesday the stock "slumped" and 1,200 shares sold at 58 $\frac{1}{2}$ ¢ down to 52 $\frac{1}{2}$ ¢, at which figure the market closes.

Mickey Breen opened at \$1.02 $\frac{1}{2}$ , fell to \$1, and then to 97 $\frac{1}{2}$ ¢. Friday 90c. was bid with \$1 asked. The stock is now down to 75c., with prospects of its going lower. Transactions amounted to 500 shares, of which 150 shares sold at 82 $\frac{1}{2}$ ¢, 100 shares at 80c. and 100 shares at 85c. At a meeting of the stockholders, the whole old board of directors was re-elected except Mr. A. Bevis, whose place has been filled by Mr. B. F. Hobart. It was unanimously voted that if necessary the property should be bonded for \$125,000, and the directors were instructed to so act if they saw fit.

Aztec was on the market; 100 shares were sold at 13 $\frac{1}{2}$ ¢. The stock is now quoted at 7c.

Granite Mountain was traded in this week. The market opened at \$25, advanced the following day to \$26.25, when a sale of 10 shares was made; fell the next day to \$26 on a sale of 20 shares. On Monday 40 shares sold at \$25.75 @ \$26. To-day the stock is firm at \$25.50. The weekly shipments from the mine amounted to 47 bars, containing 65,616 ounces of silver and 97 ounces of gold.

Bimetallic was also in strong demand, and the stock was held very firmly at a good figure. A sale of 50 shares was made at \$33.50. The stock has since fallen to its old point, \$32.50.

American & Nettie was very strong this week, and advanced considerably over the opening bid. The stock started at 22 $\frac{1}{2}$ ¢, and on Monday 200 shares sold at 25c., closing at 23 $\frac{1}{2}$ ¢. Tuesday 300 shares sold at 25c., at which figure the market closed.

Silver Age fell from \$2.20 to \$1.97 $\frac{1}{2}$ . On Tuesday 400 shares sold at \$2.10 @ \$2.00.

**Lake Superior Iron Stocks.**

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

IRON STOCKS.		
Ashland	\$52.50	Vermillion P. I. & L. Co. \$2.25
Aurora	9.00	Lake Superior 110.00
Anvil	3.50	Milwaukee Iron Co. 5.00
Brotherton	2.75	Sheridan 5.00
Germania	9.00	East New York 147.00
Goshic Iron Syndicate	.27	Pittsburg & Lake Republic 27.50
Bessemer Consol		Illinois Steel Co. 2.25
Bonds		River Side 2.00
Inter Ocean		Lincoln 37.50
Great Northern Iron & Steel Co.	1.00	Chandler 35.00
Iron Belt	1.75	Chicago & Minnesota Ore Co. 108.00
Montreal	1.00	Minnesota Iron Co. 74.00
Metropolitan	57.00	Vermillion 15.00
Northern Chief	35.00	Ropes Gold and Silver Mining Co. 1.50
Odanah	14.00	Michigan Gold Mining Co. .40
Pence	1.75	Badger Silver Mining Co. .40
Clingstone	.43	
Ryan	15.00	
Sec. 33	78.00	
Champion	.60	
*Wisconsin Iron and Steel Co.	2.00	
American	16.50	
Cleveland	10.50	
Commonwealth		

\*Formerly Pence & Snider Co.

**Salt Lake City.**

PRICES AND SALES FOR THE WEEK ENDING MAY 9, 1891.

Name and Location of Company.	Open- ing.	High- est.	Low- est.	Clos- ing.	Sales.
Alice, Mont	1.60	1.65	1.55	1.60	
Alliance, Utah	1.00	1.00	1.00	1.00	
Anchor, Utah	6.00	6.80	6.00	6.50	
Apex, Utah	.12 $\frac{1}{2}$	.15	.11	.14	30,000
Barnes Sulphur, Utah	.01	.01	.01	.01	
Big Hole Placer, Mont.	.08	.08 $\frac{1}{2}$	.05	.08 $\frac{1}{2}$	7,000
Centen'l Eureka, Utah					
Congo, Utah	.16	.17	.14	.15	13,000
Crescent, Utah	.32	.35	.32	.35	4,000
Daly, Utah	18.50	19.00	18.50	19.00	
Glencoe, Utah	2.30	2.50	2.50	2.50	
Horn Silver, Utah	3.30	3.60	3.25	3.50	100
Malad Con., Idaho	.02 $\frac{1}{2}$	.02 $\frac{1}{2}$	.02	.02	40,000
Mammoth, Utah	3.50	3.55	3.00	3.10	
Northern Spy, Utah					
Ontario, Utah					
Stanley, Utah	.18	.19	.13	.13	10,100
Utah L. & C. Co.					
Utah Oil Co., Utah					
Woodside, Utah					
Total shares sold					104,200

**PIPE LINE CERTIFICATES.**

The oil market this week has tended toward lower prices, notwithstanding the falling off in a new district, which of late has been quite prolific. European and Asiatic ports are said to be full of petroleum, Russia competing successfully at many places with our product.

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
May 9.....	72 1/4	72 1/4	72	72	3,000
11.....	71 1/4	72	71 1/4	71 1/4	9,000
12.....	70 1/4	70 1/4	70 1/4	70 1/4	2,000
13.....	70 1/4	70 1/4	70 1/4	70 1/4	13,000
14.....	70 1/4	70 1/4	70 1/4	70 1/4	10,000
15.....	70 1/4	70 1/4	68	68	61,000
Total sales in barrels.....					98,000

NEW YORK STOCK EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
May 9.....	71 1/4	71 1/4	71 1/4	71 1/4	5,000
11.....	72	72	72	72	5,000
12.....	70 1/4	71	70 1/4	71	1,000
13.....	70 1/4	71	70 1/4	71	.....
14.....	70 1/4	71	70 1/4	71	.....
15.....	70 1/4	71	70 1/4	71	.....
Total sales in barrels.....					11,000

**COAL TRADE REVIEW.**

NEW YORK, Friday Evening, May 15.  
STATEMENT of shipments of anthracite coal (approximate) for the week ending May 9th, 1891, compared with corresponding period last year.

Regions.	May 9, 1891.	May 10, 1890.	Difference.
Wyoming Region, Tons	389,723	385,698	Inc. 4,115
Lehigh Region .. "	140,927	150,609	Dec. 9,682
Schuylkill Region .. "	216,385	208,516	Inc. 7,869
Total..... Tons	747,025	744,733	Inc. 2,302
Total for year to date Tons	11,826,949	9,898,875	Inc. 1,928,074

STATEMENT of anthracite coal shipments for month of April, 1891, compared with the corresponding period last year. Compiled from returns furnished by the mine operators:

Regions.	April, 1891.	April, 1890.	Difference.
Wyoming Region, Tons	1,452,520	1,299,657	Inc. 152,863
Lehigh Region .. "	488,778	485,363	Inc. 3,415
Schuylkill Region .. "	872,395	794,327	Inc. 78,068
Total..... "	2,813,693	2,579,347	Inc. 234,346

Regions.	For year 1891.	For year 1890.	Difference.
Wyoming Region, Tons	5,672,258	4,392,200	Inc. 1,280,058
Lehigh Region .. "	1,762,307	1,781,795	Dec. 19,488
Schuylkill Region .. "	3,410,750	2,649,843	Inc. 760,907
Total..... "	10,845,315	8,823,838	Inc. 2,021,477

The stock of coal on hand at tide-water shipping points, April 30th, 1891, was 711,571 tons; on March 31st, 1891, 724,587 tons; decrease, 73,016 tons.

PRODUCTION OF BITUMINOUS COAL for week ending May 9th, and year from January 1st:

EASTERN AND NORTHERN SHIPMENTS.

	1891.	1890.
	Week.	Year.
Phila. & Erie R.R.....	478	42,365
Cumberland, Md.....	96,012	1,451,855
Broad Top, Pa.....	23,435	62,391
Clearfield, Pa.....	11,171	207,652
Allegheny, Pa.....	74,642	1,572,199
Beach Creek, Pa.....	21,085	502,182
Pocahontas Flat Top.....	41,263	814,478
Kanawha, W. Va.....	45,941	862,451
Total.....	341,260	6,328,734

\* Estimated  
Week ending April 18th.

WESTERN SHIPMENTS.

Pittsburg, Pa.....	22,556	396,887	336,462
Westmoreland, Pa.....	28,829	704,048	653,472
Monongahela, Pa.....	4,049	198,826	102,884
Total .....	55,434	1,299,761	1,102,818

PRODUCTION OF COKE on line of Pennsylvania R. R. for the week ending May 9th, 1891, and year from January 1st, in tons of 2,000 lbs.: Week, 49,319 tons; year, 1,020,886 tons; to corresponding date in 1890—2,000,170.

**Anthracite.**

The tables of anthracite production published in this column make a comparative showing which is as interesting as it is gratifying. The output for the month of April was 2,579,347.01 tons, which is an increase over the corresponding month of last year of 579,347.01 tons. The output for the year to May 1st was 10,845,316.11 tons, an increase over a similar period in 1890 of 2,021,477.01 tons. It will be remembered that in last week's

report we published a statement showing the stocks at tide-water on March 31st. to have been 784,587 tons or 207,722 tons less than they were a year previous. In connection therewith we predicted that the returns for the month of April would show a further reduction in these stocks. That we were correct in this, the attached tables show. On April 30th the stock at tide-water was 711,571 tons, a decrease of 73,016 tons in the month. A marked reduction in stocks at tide-water in the face of a 2,021,477.01-ton increase in production, is the most conclusive evidence that the output, while being comparatively excessive, has not only gone into consumption, but that there is a demand that is absorbing additional tonnage.

The production for the week ending May 2d showed an increase of 177,705 tons. For the week ending May 9th the figures show that production has been so restricted that the excess is but 2,302 tons.

The sales agents held a meeting to-day at which they reviewed the tonnage situation and considered the question of advancing prices. It was decided to make an advance on June 1st. The rates will be determined at a meeting to be held in about ten days. They will be conditioned upon the state of the trade, and will be either 15c. or 25c. The understanding reached was that every effort should be made to keep the month's tonnage within the 2,500,000-ton limit.

The trade is in a very satisfactory condition, one which would seem to insure a good business year. The present restriction policy has caused an actual shortage of stock in some quarters. One large producer states that it is accepting only those orders which are conditioned upon its ability to ship this month. From numerous other sources we hear of a shortage in free-burning steam sizes. Lehigh coals are still very scarce.

**Bituminous.**

The soft coal trade has settled down to the enjoyment of a good substantial contract business. From all quarters we learn that most of the yearly contracts have been closed, and that the few remaining open are under negotiation. Among the last and largest to be consummated was that of the New York, New Haven & Hartford Railroad for 270,000 tons. It was placed equally between the Berwind-White and Castner & Curren companies, and is said to be at a rate 15 cents higher than the price paid last year.

From authentic sources we learn that the contracted tonnage bids fair to surpass that of the previous year by a considerable amount. At the present time there are large quantities of coal moving, most of which is going to meet these obligations. There are very few spot transactions, except in the line trade. In this latter direction business is reported fairly good.

The turn which the trade has taken in buying ahead in large quantities has caused the producers to regard the future a little curiously. Many are of the opinion that there will be more than the usual fall shortage of stocks. A few of the producers are already considering the probabilities of increasing, by mutual consent, the year's allotment of tonnage fixed by the Seaboard Association. These prevalent conditions, backed by the good and steady prices which are ruling, go to show that the trade is in a healthy condition.

The reader will perhaps remember that at the time the railroads raised freight rates there existed in the trade a feeling of great uncertainty as to whether the new schedule would be maintained. This feeling was a potent factor in delaying purchases. The fact that Wm. H. Joyce, general freight agent of the Pennsylvania Railroad, sailed for Europe on the 13th inst. for a several months' stay, strengthened by his statement made just before leaving that rates were to be maintained, ought to be sufficient to set the most skeptical mind at rest. Local prices are rigid, and range according to the grade from \$3.05@ \$3.20 f. o. b. Amboys.

Vessels at the lower ports are plentiful. Freight rates are quoted as follows: Baltimore to Sound ports, 80c.; to Eastern ports, 85c.; Philadelphia to Sound ports, 70c.; to Eastern ports, 75c. Norfolk to New York 63c.; to Boston and Portland, 85c. to 90c.; to Bangor 95c. to \$1.00.

**NOTES OF THE WEEK.**

The Delaware and Hudson Canal Company, at its annual meeting, held in this city on the 12th inst., elected these managers: Le Grand B. Cannon, Robert M. Olyphant, Benjamin H. Bristow, John A. Stewart, R. Suydam Grant, William H. Tillinghast, Johnston Livingston, Alfred Van Santvoord, George C. Clark, William W. Astor, James A. Roosevelt and Samuel Keyser.

The Brooklyn Retail Coal Exchange has elected the following board of officers: President, Joseph Greason; vice-president, A. P. Day; treasurer, W. H. S. Nelson; secretary, F. T. Ostrom; trustees, F. H. Marston, F. Treese, W. H. Keesey, A. P. Day, R. C. Hinman, C. H. Reynolds, W. H. Meserole, Joseph Greason, J. H. Colyer, Thos. Taylor, N. Davids. Treasurer W. H. S. Nelson reported \$235.99 cash on hand. The sale of Exchange seats and interest on same netted \$317.13. Of the \$1,925 subscribed for the weighing fund, \$724.90 has been expended, leaving a balance of \$1,200.10.

The *Rheinisch-Westphalische Zeitung*, the organ of the colliery owners in the Rheinisch and West-

phalian districts, says concerning the import of American coal into Germany: "American coal, which is used by the large steamship companies in Philadelphia and Baltimore, is exceedingly good fuel for boiler-heating purposes, and experience up to the present shows that it is superior to Westphalian coal. The large export trade in German sugar to America and the lack of return freight will permit of American coal being brought over so as to seriously compete with German producers." The same paper goes on to say that if Westphalian coal owners do not look after their prices, American coal will become more extensively used in Germany. As an instance it cites the case of the import of petroleum, and concludes that the import of American coal deserves the serious consideration of German colliery owners.

The annual election of the Hocking Coal and Iron Ccompany will be held in Columbus, Ohio, on the 20th inst. There is a hot contest between two factions for control. The ticket that will be presented at the annual meeting in behalf of the present management is as follows: Henry H. Adams, John H. Davis, Jay O. Moss, Matthew Griffin, James McCutcheon, W. E. C. Coxe, W. J. Reddington and H. H. Mitchell. The opposition ticket which will be presented is made up as follows: W. E. Coxe, vice-president of the company; John H. Davis, Jay O. Moss and A. O. Beebe, old directors; E. B. Thomas, first vice-president of the New York Lake Erie & Western; George H. Vaillant, second vice-president of the Erie; James W. Quintard and Charles H. Rops, who represent the Villard interests. The ticket will be completed, it is said, by the addition of Mr. Hutchins, who is believed to command a Standard Oil support, or Mr. Ferguson, of the Pennsylvania Coal Company.

Boston. May 14.

(From our Special Correspondent.)

The anthracite coal market continues to have a firm tone. Matters are running along smoothly, and the situation presents little that is new from last week. The demand for immediate delivery is small, while offerings are correspondingly large. Buyers do not want to trade in the market unless they can purchase for future delivery at the present prices. Orders for delivery next month have been offered in several quarters, but were only accepted conditionally. Agents appear to have great faith in the strength of the market, and hope in a few weeks to be able to do considerably better as regards prices. Buyers regard the future of the market as very uncertain, but prefer to buy at the present figure rather than wait longer. The effect of the curtailment is evident in all quarters. It has had a very salutary effect upon the tone of the market, and if the figures agreed upon at the last meeting are held to, this good effect will be lasting. Spot offerings are fairly large, with the exception of broken sizes, which are scarce.

Bituminous coal continues quiet and unchanged. The demand is small and is hardly a factor in the market. Most of all of the companies are working on the new orders recently taken and hope to get them straightened out before any new business appears. Prices continue to hold steady, the full \$2.50 f. o. b. prevailing.

Freights are acting in harmony with the market and therefore display but little new. Vessels are plentiful at quotations. From New York 55@65c., and from Philadelphia 80@90c., and from Baltimore \$1@1.10.

The retail demand is small. The market tone is healthy and prices are holding firm. None of the dealers have more stock than they are willing to carry under the circumstances. The outlook is promising and the coming season is expected to be a satisfactory one.

The receipts of coal at this port for the week ending May 9th were 44,479 tons of anthracite and 22,120 tons of bituminous, against 29,375 tons of anthracite and 8,591 tons of bituminous for the corresponding week last year. The total receipts thus far this year have been 489,359 tons of anthracite and 462,917 tons of bituminous, against 413,020 tons of anthracite and 324,554 tons of bituminous for the same time last year.

Chicago. May 14.

(From our Special Correspondent.)

There is little, if any, change in the situation so far as anthracite is concerned. Steam sizes are in fair demand, but others are more or less quiet. This latter, however, is not unexpected at this season of the year. There is, however, a strong undertone in the market, as stocks are low, and the amount which will be required for the coming season will greatly exceed that of any previous year, not only for the natural growth, but that hard coal is coming into greater favor for steam and heating purposes in all our larger cities. The smoke ordinance, too, in this city is not without its effect, as the so-called smoke-consumers do not consume the carbon of bituminous coal. Hence we may look for a steady, even market at fair values. The demand for soft coal for mercantile and industrial purposes continues good. The men in the Brazil Block district in Indiana and some of the Illinois miners are still out, with little prospect of an early settlement of the points in dispute, as operators refuse to make any concessions.

Coke is in very brisk demand, with but meager supplies. Dealers endeavor to fill the more pressing orders for foundry grades, but many of them are compelled to work short time. Ninety-day

contracts could be made with West Virginia producers, but they refuse to accept anything under six, and some require twelve-month contracts. We are credibly informed that the whole product of the H. C. Frick Company's ovens is shipped to the Carnegie plants at Pittsburg. Ordinary West Virginia is quoted at \$4.50@\$.55.

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 block, \$2.35@\$.2.50; Illinois block, \$2@\$.2.20.

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

**Pittsburg. May 14.**

**Coal.**—There is a firm and active market. On account of the low stage of water in the Ohio there have been no shipments to the lower ports for some weeks. Davis Island dam was raised since my last letter, which makes 6 to 6½ feet water in the harbor, which enables the coal men to tow their loaded barges and boats to the lower landings ready to leave on the first rise. The situation in the pools is as follows: Pool No. 1—1,200 men employed; price of coal at the tippie, \$5.50 per 100 bushels. Pool No. 2—2,000 men at work; price of coal the same as in first pool. Pool 3—1,800 men at work; price of coal at the tippie, \$5 per 100 bushels. Pool 4—2,500 men employed; price of coal at the tippie, \$4.25 per 100 bushels. Amount of coal in pools and in harbor (Pittsburg), 12,500,000 bushels.

Coal shipments by Ohio River for first four months in 1890 were: Cincinnati, 16,259,000 bushels; Louisville, 31,723,000 bushels; total, 47,982,000 bushels. 1891—Cincinnati, 5,648,000 bushels; Louisville, 12,728,000 bushels; total, 18,376,000 bushels.

**Connellsville Coke.**—The output of coke continues to increase rapidly. Unless the old workmen go to work soon their places will all be filled. The labor leaders will not be able to keep the men from going to work much longer; under no consideration will the coke men have anything to do with the leaders. They say: "We are through with running our business in partnership with a master workman from Ohio, or a vice-president from Indiana, or a walking delegate from somewhere else. If our men have any grievances we are willing to talk with them, or with a committee of them, but we are through with those imported labor agitators who want to run our business for us." Production for the week was 37,460 tons, against 35,480 in the previous week; the number of ovens increased from 3,841 to 4,311; weekly shipments to Pittsburg, 809 cars; West, 815; East, 211; total, 1,835 cars.

There is no fixed value for coke, prices being guessed altogether by circumstances; in many cases fancy prices are being paid.

**FREIGHTS.**

From Philadelphia to: Alexandria, \$5c.; Bath, Me., 85c.; Boston, 85c.@\$.1.05; Charleston, S. C., 70c.@.75c.; Gloucester, Mass., 85c.; Marblehead, 90c.; Naponset, Mass., 90c.; New York, 90c.; Norfolk, 90c.; Portsmouth, 85c.; Quincy Point, Mass., 75c.; Rockport, Mass., \$1; Saco, Me., \$1.00;

\* And discharging.  
† Alongside.

**METAL MARKET.**

NEW YORK, Friday Evening, May 15, 1891.  
Prices of Silver Per Ounce Troy.

May	Sterling Exch'ge.	London Price.	N. Y. Cts.	May	Sterling Exch'ge.	London Price.	N. Y. Cts.
9	4.87½	44½	97½	13	4.87½	44½	97½
11	4.87½	44½	97½	14	4.87½	44½	97½
12	4.87½	44½	97½	15	4.87½	44½	97½

The market is without feature. The stock of silver in hands of dealers is firmly held, owing to the belief that considerable will be wanted on foreign accounts. Purchases have been made for this destination, it is believed, but the shipment has been withheld for reasons that are not obvious.

The United States Assay Office at New York reports total receipts of silver for the week to be 74,000 ounces.

**Domestic and Foreign Coin.**

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

	Bid.	Asked.
Trade dollars.....	.76	.77
Mexican dollars.....	.76	.77
Peruvian soles and Chilean pesos.....	.73½	.75
English silver.....	4.86	4.88
Five franc.....	.94	.95
Victoria sovereigns.....	4.87	4.89
Twenty francs.....	3.87	3.88
Twenty marks.....	4.75	4.78
Spanish doubloons.....	15.55	15.70
Spanish 25 pesetas.....	4.80	4.85
Mexican doubloons.....	15.55	15.70
Mexican 20 pesos.....	19.50	19.90
Ten guilders.....	3.96	4.00
Bar silver.....	.98½	.98¾

**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 11.....	839,500	593,500	.9621
13.....	434,000	144,000	.9798

WASHINGTON, D. C., May 15.—(By Telegraph).—The Treasury Department purchased 54,800 ounces of silver to-day at prices ranging from 98 to 98½ cents per ounce.

**Silver Bullion Certificates.**

	H.	L.	Sales.
May 9.....	98	98	45,000
May 11.....	98½	97¾	141,600
May 12.....	98	97¾	264,000
May 13.....	98	97¾	100,000
May 14.....	97¾	97¾	50,000
May 15.....	98	97¾	75,000

Total sales..... 675,000

**Copper.**—No new features have turned up, and the market continues as lifeless as before. Reports that several large purchases have been made by some of the manufacturers have been going around, but they lack confirmation. It is to be taken for granted that, should they have been concluded, there is no doubt an ironclad guarantee against a decline connected with them, which is just the thing that has on former occasions proved not to be of a strengthening nature, and will also probably have the same effect now. The Anaconda, according to latest reports, remains shut down, and that it will probably continue so for a few more weeks to come is more confidently believed. As to price ruling for Lake copper, it would seem rather hazardous to say what it is. It seems to be a fact, however, that no more can be placed at 13½c., and if the above mentioned reports of several sales having been made should be correct, it is more than likely that the basis has been 13c. Arizona copper is also somewhat easier and the ingot can be bought at 12½c., while casting copper is not in quite as good demand at prices varying from 11c. to 11½c.

The English market has shown renewed firmness, which, however, has so far been entirely restricted to the speculative dealings in G. M. B.'s. This, after closing last week at \$51 5s. @ \$51 15s. respectively, opened Monday at \$51 @ \$51 12s. 6d., closing to-day at \$51 12s. 6d. @ \$52 10s.

The feature of this week was a sale of 5,000 tons Anaconda matte, in store at Liverpool, at a price which is either 9s. 6d. or 9s. 7½d., no authentic information being obtainable yet. The market for other kinds continues quiet.

We quote English tough, \$54 @ \$54 10s.; best selected, \$55 10s. @ \$56; strong sheets, \$58 15s. @ \$59; India sheets, \$57 @ \$57 10s.; yellow metal sheets, 5½d.

The exports of copper during the past week were as follows:

	Copper Matte.	Lbs.	
To Liverpool.....	2,295 bags.	240,507	\$15,000
By S. S. Nevada.....	3,551 "	366,488	25,000
" Alaska.....	6,324 "	703,544	50,000
" City of Chicago.....	3,479 "	362,690	26,000
To Hamburg.....	Copper.		
By S. S. Bulgaria.....	394 pigs.	110,772	\$12,000
To Rotterdam.....	Copper.		
By S. S. Amsterdam.....	180 casks.	225,000	\$29,250

**Tin.**—The downward reaction which had set in at the end of last week was followed early this week by an upward movement, the London market leading off. We understand that the buying, both in London and this market, is attributed to the same interest, and to judge from former operations in this metal, engineered by the same parties, it would not seem improbable that prices may be put up much more before the article is finally left to itself. It must be said in favor of the present movement that the statistical position of the metal is very much in favor of a rise; shipments from the East are very light, stocks in London the same, and consumption goes on at a very satisfactory rate. Shipments for the first half of this month are reported to be about 500 tons to both England and the United States.

We quote to-day for spot, 20'55c.; May, 20'55c.; June, 20'60c.; July, 20'55c.; August, 20'50c.

The London market opened at £90 for both spot and futures and closes at £92 10s. @ £91 15s., against last week's closing prices of £90 12s. 6d. @ £90 2s. 6d.

**Lead.**—There is hardly anything to be said about this metal; the market is very dull, and but a few hundred tons have changed hands at about 4½c., and at this price more is being offered without finding buyers.

London's quotations for Spanish are £12 12s. 6d., and English £12 15s.

**St. Louis Lead Market.**—John Wahl Commission Company telegraphs us as follows: "We have had a firm but quiet 4c. market since our last report. Probably 500 tons changed hands at 4c., and the market closes with 4c. asked and no buyers."

Spelter also continues very dull, demand not having improved at all, and we quote spot and near delivery 4'90c.

In the English market specials are quoted £23 5s., and ordinaries £23 5s.

Antimony is still on its downward course. Cookson's, 15½c.; L. X., 15c.; Hallett's, 14½c.

**Quicksilver.**—No new feature of any consequence has developed during the week. The production last month was materially greater than in the two or three preceding ones, and, as a consequence, prices were considerably weakened. We give in another column the receipts in San Francisco for the first four months of the year. According to reports, production has now been somewhat curtailed, and, while the demand has not shown any signs of increasing, merchants generally have been marking up, so that we quote \$43@\$44 for the local market, with a pronounced lack of inclination to shade these figures, though a sharp buyer might possibly do so. The London quotation remains the same, £8, with no great demand, but seller waiting and unwilling to offer greater inducements.

**IRON MARKET REVIEW.**

NEW YORK, Friday Evening, May 15.

The week just passed has been the dulllest in the local iron market of any since January 1st. In almost all lines business has been practically at a standstill, which of course was mainly due to the strike among the housemiths and iron molders of New York and Brooklyn. Steel rails and rail fastenings continued dull from the same causes which have obtained for so many months, inability of the railways to make cash purchases, and disinclination of the rolling-mills to give time. Altogether the outlook in the local iron trade is not encouraging. The strikers have now been out since the first of the month and show no signs of weakening.

As for the iron market in general, there does not appear to have been any material change during the week. Reports from inland cities are variable, some indicating a slightly better demand, others an unchanged condition of affairs. On the whole it seems that there has been no substantial improvement in the market since our last report, although it is clear that things are no worse.

The production of pig iron during April showed a slight increase over March, but not enough to be of any importance, amounting only to a little more than 8,000 tons. Stocks, also, have increased somewhat during the month, so that it is apparent that consumption is proceeding at the same low rate.

**American Pig Iron.**—Business is at a standstill. Comparatively few foundrymen are now at work, by far the greater number having been obliged to suspend operations on account of the strike of the molders. The demand for iron is, consequently, almost nil, and many selling agents have sent word to their furnaces to stop shipments. The market, although dull, continues steady, and we hear of no cheap lots of iron offering. We quote prices: Northern, No. 1 X., \$17.50@\$.18; No. 2 X., \$16.50@\$.17; Southern, No. 1 X., \$17.50@\$.18; No. 2 X., \$16.50@\$.17.

**Spiegeleisen and Ferro-Manganese.**—There is no inquiry for either spiegeleisen or ferro-manganese, and apparently no interest in the market. We quote, nominally: 20% spiegeleisen, \$27.50@\$.28.50; 80% ferro-manganese, \$64@\$.65.

**Steel Rails.**—We hear of no transactions during the week, and the market is absolutely flat. Prices remain unchanged at \$30 at mills and \$30.75 at tidewater. We hear of railroads which contracted for rails before the increase in prices, now transferring their orders to other roads at the advance. It is indicative of the financial straits in which many companies are at present. They simply have not the money to buy rails for new work, and even repair work has to be neglected.

**Rail Fastenings.**—With no rails moving, there is naturally no demand for track material. We quote prices: Spikes, 1'90@1'95c.; 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.

**Tubes and Pipe.**—The market remains unchanged. We quote 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 contract for the iron work in the approaches of the Brooklyn Bridge, amounting to a little over 2,000 tons, was awarded during the week to the Phoenix Iron Company. Bidding on this contract was exceedingly close. Current business in structural materials is almost at a standstill on account of the strike. We quote prices: Universal plates, \$2.25; bridge plates, \$2.10; angles, \$2.20; beams, \$3.10.

**Merchant Steel.**—The market shows no new features. We continue to quote: Best English tool, 15c., net; American tool steel, 7@8c.; special grades, 13@20c.; crucible machinery steel, 5c.; crucible spring, 3½c.; open-hearth 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.**—The market is lifeless. Prices are, if anything, a little weaker. We quote \$21.50 @ \$22.50 for tees and \$25 for doubles.

**Wrought Iron Scrap.**—There is nothing doing. We quote, nominally, \$21@\$.22 at yards.

Chicago. May 14.

(From our Special Correspondent.)

The general improvement noted in our report last week continues, and is particularly noticeable in Lake Superior charcoal and coke grades of pig

iron. On the latter, some consumers were of opinion that they were relatively higher than charcoal, and prices ought to come down, but furnace agents are firm, and some large deals have been made. Prices, too, have appreciated for manufactured iron, and the demand is now quite good. Most of the Western and Northwestern railroads are still withholding orders for supplies until the crops are assured. While nearly all branches and classes of iron and steel are steadily improving in demand, the market for old material and scrap continues dull and neglected.

**Pig Iron.**—There are inquiries in this market for about 8,000 tons of Lake Superior charcoal pig iron for certain malleable-iron men, which will be closed this week, but not at the low prices which have been ruling. Furnaces are now firm at \$17.50, and some demand \$18 for their product. Demand is excellent for foundry coke iron and Southern soft, and agents are becoming more independent. Some furnaces are now entering orders for scattered deliveries for the remainder of the season at slight advances on current rates. Silveries and softeners are in very good demand, and the latter continue quite scarce.

Quotations per gross ton f. o. b. Chicago are: Lake Superior charcoal, \$17.50@18.50; Lake Superior coke, No. 1, \$15.50@16; No. 2, \$15@15.50; No. 3, \$14.50@15; Lake Superior Bessemer, \$17; Lake Superior Scotch, \$16.50@17; 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.**—Two additional large structures are now being figured on, the aggregate tonnage of which is 2,400 tons. There is yet quite a good deal of work to come forward entirely outside of the World's Fair. Demand for small lots from store is quite large. 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, \$2.40@2.50; beams and channels, \$3.20.

**Plates.**—Mill prices are perhaps a little stiffer, accounted for by some heavy orders recently placed. Dealers here have also been buying for stock. There is a better inquiry and some large business is coming in from the upper Lake region. Iron pipe has been advanced, but tubes are unchanged. 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@5.50; flange steel, \$3.25@3.40; boiler rivets, \$4.25; boiler tubes, 2½ inches and smaller 55%, larger than 2½ inch 60%.

**Merchant Steel.**—Quite a good business is reported in car lots, and several large contracts for crucible and soft steels will be placed very soon for season's supplies, consumers being evidently tempted by the prevailing low prices. A large contract was placed by a mill near here for Southern steel billets at less prices than would be named by local makers. Prices remain unchanged: Tool steel, \$8.75@9; 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.**—Business continues fair only for small lots of standard weight rails, though light sections are in good demand. Eastern mills secured two large contracts of 5,000 tons each for Peninsula railroads at \$30 at mill. Several more large inquiries are in the market, and the outlook is decidedly encouraging for a large tonnage to be placed in the near future. Track supplies, other than rails, are in moderate demand. Quotations remain unchanged at \$31@32.50 per ton f. o. b. Chicago. Splice bars at \$1.95@2 for steel and \$1.85@1.95 for iron, and spikes at \$2@2.10 per 100 pounds.

**Galvanized Sheet Iron.**—Mill and warehouse business is very good, with prospects for an early advance in price. Quantity orders are now quite a feature. Discounts are unchanged, but not very firm, at 67% off on Juniata and 65% and 5% off on charcoal.

**Black Sheet Iron.**—The aggregation of business placed last week will exhibit a large tonnage. Mills are getting rapidly filled up for all they want to take at current prices, and one order for 600 tons was refused at 2.85c. for No. 27 common at mill. Sheet steel is also in good request. Quotations, according to quality, are now 2.90@3c. for No. 27 f. o. b. Chicago for car lots.

**Bar Iron.**—Quite a good demand obtains from manufacturing consumers, some of whom have already placed contracts for season's supplies, the prevailing low rates proving a great inducement to stock up and make arrangements for forward delivery. Railroads as yet are purchasing very sparingly. Quotations are much firmer at 1.65c. for local mills and valley mills, 1.55c., half extras at mill. Out of store prices are 1.55@2c., according to quantity and quality, and trade fair.

**Nails.**—Some large orders for steel cut have been entered by agents from local jobbers, but prices were very low; better figures are obtained east and west of here. Mill quotation is \$1.55 on regular specification. Wire nails are rather quieter,

though store demand continues fair. Store price is \$2.25, and \$1.75 for cut in small lots.

**Scrap.**—There is some little demand for best grades of wrought scrap, but the movement is slow, and quotations are for the most part nominal. Quotations per net ton f. o. b. Chicago are: No. 1 railroad, \$18.50; No. 1 forge, \$18; No. 1 mill, \$14; fish-plates, \$21; axles, \$23.50; horseshoes, \$18; pipes and flues, \$13; cast borings, \$8; wrought turnings, \$11; axle turnings, \$13; machinery castings, \$11.50; stove plates, \$8; mixed steel, \$11; coil steel, \$15.50; leaf steel, \$15.50; tires, \$17.

**Old Rails and Wheels.**—Sales of iron rails are reported: 500 tons at \$22.50, 500 tons at \$23.25, and 500 tons offered at \$22.75 were refused as being 25c. too high. It will be seen that prices are a trifle irregular. Steel rails, mixed lengths, are now \$14, and selected, long, \$16@16.50. No movement in old wheels at \$16.50.

Cleveland. May 14.

(From our Special Correspondent.)

The fine dry weather in this section, for the past few weeks caused a number of furnaces to order shipments of ore forward from docks at Ohio ports, and a consequent activity was manifest at these ports, but the strike of the ore handlers inaugurated last week at a majority of the docks has put a stop for the time being to any further shipments. Though a large portion of the lake carriers are afloat it will be useless for them to load with ore at upper Lake ports because of the uncertainty as to when they could be discharged at the ore docks.

Many of the boats which went up coal-laden are loading with grain down, though at ruinous rates. It is reported that some of the vessels have been ordered to return here and tie up until the strike of the ore handlers has been settled. But few season charters from either Escanaba or Marquette have been made.

The furnaces in the Mahoning and Shenango Valleys, with a very few exceptions, still remain idle. Even were there a disposition to "blow in," the unsettled condition of affairs in the coke regions would prevent it, because of the uncertainty of obtaining a supply of coke.

Some sales of ore continue to be made in the Eastern market. A few large sales have been made this week to Western coke furnaces, and some of the Michigan charcoal furnaces have made purchases. Buying, however, has not commenced in the full sense of the term, and it is possible that anything like activity may be deferred some weeks yet.

Quotations remain unchanged from last week:

Special and Magnetic Ores.	
Bessemer.....	66@69.....\$5.50@6.00
Non-Bessemer.....	60@64.....4.25@5.00
".....	66@69.....4.50@5.00
".....	62@65.....4.00@4.50
".....	57@60.....3.50@4.00
Soft Hematites Dried at 212°.	
Bessemer.....	62@65.....\$4.25@4.75
Non-Bessemer.....	55@63.....4.00@4.25

Above prices are for deliveries on docks at Lake Erie ports.

Louisville. May 9.

(Special Report by Hall Bros. & Co.)

A review of the market for the past week discloses no changes of importance from what has been reported for the past two weeks. Sales continue in light quantities, though some inquiries for round lots have been out; the latter, however, have not developed into sales of quantities inquired for. While the trade realize that prices are low, yet they are unwilling to make extensive purchases until they have larger orders on hand themselves, or until the prospective demand for their finished product is more apparent. Orders that have been offered outright for iron of all grades, except some of irregular make, have been promptly met at about figures that have been ruling, though in some instances prices have been shaded somewhat. 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@20.00; Southern, other brands, \$17.50@18. Lake Superior, \$20.50@21.50.

Philadelphia. May 14.

(From our Special Correspondent.)

**Pig Iron.**—Some brokers and makers of crude iron claim there is a marked difference in trade conditions this week as against a week or two ago, a fact which is true in some individual cases. Quotations have not been marked up in any direction; demand is a trifle stronger; standard and special brands continue in favor. Inferior brands are not abundant, and large buyers are still trying to depress prices for them before placing heavy orders. The condition of things has improved somewhat in a general way. There are a number of inquiries in to day for forge iron, and the brokers think that a good business is very close at hand. Quotations range all the way from \$14 for inferior

stuff, up to \$15.25 for the best. Medium No. 2 is quoted from \$16 to \$16.50, and best No. 2 at \$17. No. 1 foundry at \$17.50 to \$18, as usual. Cold blast charcoal is selling moderately at \$25.50 to \$26, and Bessemer at \$19 to \$20 for the better brands.

**Foreign Material.**—10% Spiegel is quoted at \$23, and 80% Ferro-manganese at \$64.50.

**Steel Billets.**—The quoted delivery prices to-day are \$23; no large transactions have been closed since Monday. It is not likely that over \$27.50 would be paid for a large lot.

**Muck Bars.**—Muck bars would sell at \$26.50, but not much more.

**Merchant Iron.**—Some people talk of better prices and a better demand, but a mill here and there may be doing more business. Large buyers are able to get good iron at \$1.65 to \$1.70, and it is very little iron that sells above that price.

**Skelp Iron.**—A few orders for grooved skelp were placed this week at \$1.70; prices are not likely to move up.

**Wrought Iron Pipe.**—Sharp competition is interfering with the attempt to advance prices. All mills are anxious for business.

**Sheet Iron.**—Several large buyers have disappeared from the market without ordering; there seems to be an impression that prices for all kinds of sheets are bound to decline a little. The mill men confess to some little disappointment at this week's business.

**Plate and Tank Iron.**—Very little can be said concerning trade; it seems that a number of large buyers will be forced by circumstances to act very soon and place their orders. It is difficult to see what motive can exist for postponing the placing of business for so long. Refined steel plates are quoted at about 2¢@2.10c.; iron shell has been selling at 2.25@2.32c.; ordinary tank, 2c.

**Structural Iron.**—A good many small orders are coming in from builders of large structures, and the statement is given out that an improvement in demand has set in. Angles are \$2@2.10; tees, \$2.50; beams and channels, \$3.10.

**Steel Rails.**—The only business that rail makers admit they are doing is in small lots at about \$30.50.

**Old Rails.**—Quotations are \$22.50 at tide water; there are more inquiries than can be taken care of.

Pittsburg. May 14.

(From our Special Correspondent.)

**Raw Iron and Steel.**—The volume of trade has not shown up as large as for some weeks past; still taken as a whole we see no particular reason for complaint. Confidence is being restored, and when that is fully accomplished an improvement in trade and values may be expected. Respecting prices we have few changes to record. Buyers for some weeks have confined their purchases to limited amounts for immediate wants; of course these supplies will soon be used, when they will again be obliged to enter the market. The market at present may be termed a waiting one, with no visible advantage on either side. Leading dealers, however, say that the situation is more favorable.

In the iron ore market buyers are still inclined to hold off a while longer. No further transactions are reported. No large orders for steel rails have been taken this week. Prices remain firm at \$30 per ton at the mills. The situation may be summed up as follows: Bessemer pig not so firm, owing to limited supplies; holders refuse to shade prices. Grey Forge: Sales restricted, but prices are maintained, except for Southern brands. Steel slabs and billets not so firm; sales show a slight decline. Muck Bar: Sales show no change in values. Bloom, rail and beam ends show a slight advance. Steel wire rods declined 50 cents per ton. Spiegel firm and advancing. Skelp iron, sheared, unchanged; narrow and wide grooved, lower. Scrap material weaker, but not notably lower. Old iron rails offered at a decline.

**Coke Smelted Lake and Native Ores.**

2,000 Tons Bessemer.....	\$17.25 cash.
1,500 Tons Grey Forge.....	14.25 cash.
1,000 Tons Grey Forge.....	14.00 cash.
1,000 Tons Grey Forge, at valley furnace.....	14.00 cash.
1,000 Tons Grey Forge, at city furnace.....	14.25 cash.
1,000 Tons Grey Forge.....	14.00 cash.
1,000 Tons Bessemer.....	17.00 cash.
1,000 Tons Grey Forge, at city furnace.....	14.35 cash.
700 Tons Grey Forge.....	14.00 cash.
500 Tons Grey Forge.....	14.00 cash.
500 Tons Grey Forge, at city furnace.....	14.00 cash.
300 Tons Grey Forge, Southern.....	13.75 cash.
250 Tons No 2 Foundry, at city furnace.....	16.25 cash.
100 Tons Southern Mill.....	13.75 cash.
100 Tons No 2 Foundry, all ore.....	16.00 cash.
100 Tons No 2 Foundry.....	16.00 cash.
100 Tons Bessemer.....	17.40 cash.
50 Tons No 1 Foundry.....	16.50 cash.
50 Tons Mill Iron.....	14.25 cash.
50 Tons No 3 Foundry.....	14.25 cash.
50 Tons No 2 Foundry.....	16.00 cash.

Steel Slabs and Billets.	
2,000 Tons Billets, May and June.....	26.00 cash.
1,500 Tons Billets and Slabs.....	26.00 cash.
1,000 Tons Billets.....	25.75 cash.
750 Tons Billets and Slabs.....	26.00 cash.
500 Tons Billets.....	25.65 cash.
300 Tons Billets.....	26.00 cash.

Muck Iron.	
1,000 Tons Neutral.....	26.40 cash.
700 Tons Neutral, June.....	26.50 cash.
500 Tons Neutral.....	26.50 cash.
500 Tons Neutral.....	26.25 cash.

Skelp Iron.	
500 Tons Sheared.....	1.85 4 m.
350 Tons Narrow Grooved.....	1.60 4 m.
300 Tons Wide Grooved.....	1.62 4 m.
Steel Wire Rods.	
500 Tons American fines, Pittsburg.....	36.50 cash.
Old Iron and Steel Rails.	
500 Tons American T's.....	23.75 cash.
300 Tons American T's.....	23.00 cash.
300 Tons Old Steel Rails.....	17.00 cash.
Kerro Manganese.	
300 Tons 80%, Pittsburg.....	66.50 cash.
120 Tons 80%, Baltimore.....	64.50 cash.
50 Tons 80%, New York.....	65.00 cash.
Bloom and Rail Ends.	
1,250 Tons Bloom Ends.....	17.50 cash.
500 Tons Rail and Beam Ends.....	17.75 cash.
Scrap Material.	
300 Tons Cast Scrap, Gross.....	\$14.00 cash.
200 Tons Old Car Wheels, Gross.....	16.00 cash.
200 Tons No. 1 W. Scrap, Net.....	20.50 cash.
200 Tons Crop Ends, Gross.....	18.00 cash.
200 Tons No. 1 W. Scrap, Net.....	20.00 cash.
200 Tons No. 2 W. Scrap, Net.....	18.50 cash.
150 Tons O. H. Steel, Gross.....	17.50 cash.
150 Tons Cast Borings, Gross.....	11.00 cash.
100 Tons Crop End, Gross.....	17.75 cash.
75 Tons Iron Axles, Extra Hammered, Net.....	28.00 cash.

**CHEMICALS AND MINERALS.**

NEW YORK, Friday Evening, May 15.

The general tone of this market is far from satisfactory. The demand for the past few months, almost without exception, has been such that buyers were virtually able to have their own way; and now that the glass factories have about decided to close a month earlier than usual, things are looking very black indeed. In a few chemicals business has been done in a limited way, but the hand-to-mouth policy pursued by most of the manufacturers has become a sad reality, and influences the whole line.

Caustic Soda, 70@74%, came in quite extensively, and the performances of previous weeks have been the order of the day. Bidding went down so low that in one case it is said 2'00c. was offered and rejected. Sal soda is decidedly firmer with a slight change in prices. The excessively heavy stocks that only a few weeks ago threatened the market have nearly all gone into second hands, and the chemical has commenced to recover its former position. Brimstone continues to be held quite high and nothing but a jobbing demand of almost the smallest description seems the order of the day. The idea that pyrites acid cannot be used indiscriminately is daily losing supporters.

The recent price of brimstone forced quite a number to use pyrites, and, curiously enough, few have felt any great inclination to return to the more expensive acid now that the lower prices of crude sulphur tend to equalize values a little more. More nitrate of soda has come in from Liverpool, but the market does not seem to have been materially affected by these arrivals. Values have gone up slightly, and at the close rather more was being asked than at this time last week.

Canstic Soda, 60%.—Contracts for shipment have been made rather more extensively, but below our last quotations, 3'25@3'30c. being asked for May and June. The spot market, while not heavily loaded, is still rather ahead of the demand, so that no healthier tone has had any opportunity to develop. 70@74%.—The tendency to bear this market has recently become quite freely developed, and reports of sales at very low figures and offers at still lower ones have not infrequently been made, but some of the more conservative merchants are far from being satisfied with 2'95c., or from thinking an offer of 2'00c. worthy of consideration. Under the pressure of large arrivals some dealers may have made sales at these figures. We quote 3'05@3'07 1/2 c. 77%. The demand for this chemical has been fair, and inquiry has resulted in contracts for shipment at 3'07 1/2 @ 3'12 1/2 c., according to quantity and date. Arrivals as they come in go immediately into second hands.

Alkali, 48%.—This market has been dull, the demand was small throughout the week, and on large arrivals dealers were forced to shade their prices; but even this did not result in sales of any consequence. Some small contracts for future shipment are all we note. Values are fairly steady at 1'55@1'60c.

The arrivals of high test B. M. have been extensive, and as a slack demand has also been a prominent feature here, stocks have increased. Contracts for shipment have been extensively made at 1'45@1'50c. Other makes have also come in, but not in sufficient quantities to lessen values.

Caustic Soda Ash 48%.—Our quotation of some months back is still good; what little demand there is, is supplied at 1'55@1'60c. This is doubtless the duldest chemical on the list.

Sal Soda.—An upward tendency in values has recently been developing. The excessive stocks have now been pretty well placed and no great trouble was experienced in getting rid of more recent arrivals, so that this market closes firm at 1'02 1/2 @ 1'05c. with a further rise not improbable. Domestic makers have about all they can do to fill orders at from 1 to 1'05c. less discount for cash, etc.

Bleaching Powder.—The tone of this market is not as good as it was. Stocks here have become slightly oppressive again, and reports from abroad would indicate a very bad condition of affairs. As a consequence, sales have been made at as low as 1'70c.

**Acids.**—The situation in this market continues to seriously puzzle outsiders. A meeting of acid manufacturers in Philadelphia, an organization called the National Society of Sulphuric Acid Makers of the United States, Mr. Thomas Harrison was chosen president and Mr. Henry Bower, secretary and treasurer. It was doubtless one of the largest and most representative meetings of the kind ever held in the United States. The main object of the meeting was evidently to effect an agreement upon some basis of valuation for either product or plant. We are informed, at all events, by one in a position to know, that this is now under advisement by a committee appointed at the meeting, and there will probably be another meeting of the association before long, at which the report of this committee will be discussed.

The demand for acid throughout the week has been fair, and quite a little business has been done at what some claim to be an advance in prices. Acetic acid met with a small demand, and muriatic and nitric are going slowly into consumers' hands. 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 quantity, etc.; nitric, 42°, \$5 @ \$5.25; sulphuric, 60°, 80c. @ \$1.05; sulphuric, 66°, 85c. @ \$1.25.

**Fertilizers.**—The demand throughout the week has been fair, though business has not been extensive, as stocks generally are rather small. South Carolina phosphate continues in fair demand. Dealers are quoting for phosphate rock \$6.50 and \$7.50 f. o. b. vessels and cars at mines, wet and dry respectively. For ground rock they are asking \$11 in New York, bags returnable.

We are indebted to Mr. P. C. Trenholm for the following comparative statement of shipments of phosphate rock from Charleston during the month of April of the last three years:

	1889.		1890.		1891.	
	Crude.	Ground.	Crude.	Ground.	Crude.	Ground.
Domestic.....	16,800	.....	19,134	.....	19,684	.....
Foreign.....	.....	.....	6,305	.....	.....	.....
Total.....	16,800	.....	25,439	.....	19,684	.....

Sulphate of ammonia, made from gas liquor, is a little easier abroad, and, as a consequence, contracts for shipment could not be made at less than our last quotations; 3'17 1/2 @ 3'20c. has been the basis for some business. Spot lots are rather scarce, and are held from 3'20 to 3'25c. Bone sulphate of ammonia is in somewhat greater stock, and could now probably be obtained at from 3'10 to 3'12 1/2 c. for spot. High-grade dried blood has become a little scarcer; the supply for some time to come seems pretty well sold and probably no better than 2@2'05c. could now be done. For low-grade blood 1'90@1'95c. is being asked. Azotine continues to be in pretty light stock, but values have not been materially affected. We quote 2c. per unit. Bone black remains in much the same position that it has been in for some time. The spot supply is almost nil, the merchants controlling the spent black taking almost all that is offered for their own use, so that very little has had a chance to get on the market. We quote nominally \$19.50@20. Doubtless an offer a little more advantageous to seller would bring out small lots. For dissolved bone black the quotation is still \$1 per unit. Bone meal is held at \$22.50@23.50 for steamed; for raw \$24@28 is being asked, according to quality. Sulphate of potash is in good demand, arrivals going immediately into second hands on the basis of syndicate prices. Double manure salt is quite scarce, and the demand continues satisfactory to dealers. Basis, 45%, 1'10 @ \$1.15c. is being asked, and for 90% to 95% nothing better than 2'10c.; basis 90%, foreign invoice weights and test.

Muriate of Potash.—Notwithstanding the fact that the spring season is over, the sales for later delivery have been quite extensive, amounting to about 300 tons. During the week the arrivals at all ports aggregated 750 tons, all of which had been previously contracted for, so that there is practically no stock in sight. All sales have been made on basis established by syndicate's agents.

Brimstone.—The arrivals amounted to about 3,000 tons but have not materially affected the tone of the market. \$32 is being asked for spot and from that up according to quantity. The policy generally pursued by the dealers in materially curtailing transactions in the hope of doing better next time does not allow much to go off to the market at once. Almost all buyers have been very careful how they allowed much to accumulate on their hands which would indicate a distrust in the continuance of present values. Merchants complain too that the more extended use of pyrites in the manufacture of acids is materially curtailing consumption. Arrivals for May and June are selling at \$29.50 for best unmixed seconds, and thirds are held at about 75c. less.

Nitrate of Soda.—Statistically the position of this chemical is not so strong as it was a short time since. After the recent arrivals from the west coast had been taken care of, the trade was astonished by a shipment from Liverpool of 1,000 tons. Fortunately this had all been placed previous to

arrival, so that it was not felt much in the open market. Report has it now that both the "Lottie Moore" and "Nevane" are near due, and will soon be in port with a cargo of nitrate. Spot is selling at 2'10@2'20c.

Messrs. Mortimer & Wesner make the following report:

	1891.	1890.	1889.
	Bags.	Bags.	Bags.
Imports, January 1st-May 1st,			
From West coast, S. A.....	263,013	262,234	134,492
From Europe.....	7,100	.....	.....
	270,113	262,234	134,492
Visible supply to September 1st,			
1891.....	168,035	.....	.....
Additional charters.....	220,000	507,100	289,900
Total supply when shipped.....	388,035	565,863	342,129
Stock on hand January 1st, 1891.	36,454	22,069	87,043
Deliveries past month.....	126,284	48,043	59,264
Deliveries since January 1st to date.....	253,132	224,880	169,306
Total yearly deliveries.....	673,679	546,589	.....
Prices current May 1st, 1891.	\$2 15@2.20	\$1.70@1.72 1/2	\$2.05

Liverpool. May 6.

(Special Correspondence by J. P. Brunner & Co.)  
Trade in heavy chemicals is anything but lively, but at the same time there is little offering from second hands, and as a consequence prices are well maintained. Soda ash is in moderate request, while quotations remain unchanged, minimum figures being: Caustic Ash, 48%, £5 2s. 6d.; 58%, £6 4s. net cash. Carb Ash, 48%, £5 7s. 6d.; 58%, \$6 10s. net cash. For special brands a premium on above is demanded.

Soda crystals are in small compass, and held for £3 7s. 6d. @ £3 10s. per ton, net cash.

Caustic soda is only wanted to a limited extent, and second-hand parcels are still to be had at about 1s. 3d. @ 2s. 6d. per ton under Union quotations. Nearest spot values range as follows: 60%, £9 10s. @ £9 15s.; 70%, £10 15s. @ £11 per ton; 74%, £11 15s. @ £12; 76%, £13 upwards, per ton, according to quantity and delivery, all net cash.

Bleaching powder quiet, but at the same time not offered so freely by resellers, and it is difficult to pick up anything under Union figures of £7 per ton net cash. There has been rather more inquiry for this article during the last few days, although not much actual business is passing.

Chlorate of potash is in limited request at 5 1/2 @ 5 1/2 c. per pound less 5%.

Bicarb soda is selling at £6 15s. @ £7 per ton, less 2 1/2% for one-hundredweight kegs, according to brand and quantity, with usual allowances for larger packages.

Sulphate of ammonia remains stationary, and not much business is passing, buyers' and sellers' views being widely different. We quote £11 @ £11 2s. 6d. per ton for good gray 24% in single bags, and £11 12s. 6d. per ton for 25% in double bags, f. o. b. here.

**BUILDING MATERIAL MARKET.**

NEW YORK, Friday Evening, May 15.

The deadlock in building circles continues practically unbroken, and as a consequence the demand for materials has been very limited throughout the week. Producers in all sections have made arrangements accordingly, and so the arrivals of perishable products particularly have been very limited. Operators generally are quite hopeful of a quick settlement of the difficulty, and think the demand will then immediately assume much greater proportions than it has at any period during the year. At the same time there is comparatively little talk of concessions to the strikers, and if the sentiments prevalent at present continue, there is probably little hope of the working-men getting what they are holding out for.

**Bricks.**—No change of any consequence is to be noted for the current week. Bricks continue to come in, but on all hands great care is shown not to allow more to accumulate than is required for immediate wants. Values remain pretty steady as last stated, and have comparatively little to do with present consumption. Contractors and investors are both equally loath to undertake any work under present conditions, and a good deal of building which had been started previous to the present labor difficulties has had to be temporarily suspended. Haverstraws and Up-rivers are getting fairly good prices when needed. They are changing hands at from \$5.25 to \$6 per M., and first-class lots are rather scarce. Poorer qualities are selling at \$4.50. Pale is in very large stock and could probably easily be bought at \$2.25.

**Lime.**—Production has been very materially curtailed, and as there is little here and not over much on the way dealers view the present condition of the labor market with comparative equanimity. For Rockland finishing \$1 is still being asked, and for common nothing better than 90c. could probably be done.

**Cement.**—The condition of this market is wretched. Cutting among dealers has reduced things to such a pass that it would be difficult to say on what terms a good buyer willing to bide his time could not get cement. The conservative houses are holding back, hoping that the near future will materially change the competition which they will have to meet.

DIVIDEND-PAYING MINES.

NON-DIVIDEND PAYING MINES.

Main table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES (No., Par), ASSESSMENTS (Total levied, Date and amount of last), DIVIDENDS (Total paid, Date & amount of last), NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES (No., Par), ASSESSMENTS (Total levied, Date and am't of last).

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 Dead wood 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 1890. ††† This company acquired the property of the Raymond & Ely Company, which had paid \$3,075,000 in dividends.

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

Main table of New York Mining Stocks Quotations, divided into Dividend-paying and Non-dividend-paying mines. Columns include Name and Location of Company, dates from May 9 to May 15, High/Low prices, and Sales.

\*Ex dividend. †Dealt at in the New York Stock Ex. Unlisted securities. ‡Assessment paid. §Assessment unpaid. Dividend shares sold, 12,865. Non-dividend shares sold, 33,150. Total New York, 45,015.

BOSTON MINING STOCK QUOTATIONS.

Table of Boston Mining Stock Quotations. Columns include Name of Company, dates from May 8 to May 14, High/Low prices, and Sales.

Boston: Dividend shares sold, 6,416. Non-dividend shares sold, 1,869. Total Boston, 8,285.

COAL STOCKS.

Table of Coal Stocks. Columns include Name of Company, Par value of shares, dates from May 9 to May 15, High/Low prices, and Sales.

\*Sales in New York, 8,520; in Philadelphia, 14,461. Total sales, 92,626.

San Francisco Mining Stock Quotations.

Table of San Francisco Mining Stock Quotations. Columns include Company, dates from May 8 to May 14, and Closing Quotations.

STOCK MARKET QUOTATIONS.

Table with columns: COMPANY, Bid, Asked, H. L. H. for Baltimore, Md. Includes Atlantic Coal, Balt. & N. C., Big Vein Coal, etc.

Table with columns: COMPANY, Bid, Asked, H. L. H. for Birmingham, Ala. Includes Ala. Coal & I. Co., Ala. Conn. C. & C. Co., etc.

Table with columns: COMPANY, Bid, Asked, H. L. H. for Pittsburgh, Pa. Includes Allegheny Gas Co., Bridge Water Gas Co., etc.

Table with columns: COMPANY, Bid, Asked, H. L. H. for St. Louis. Includes Adams, Colo., American & Nettie, etc.

Trust Receipts. Sales at the New York Stock Exchange week ending May 15: American Cotton Oil... 3,908 25 1/4 23 1/4

National Lead... 23,068 18 1/2 18. Trust receipts. Trust Stocks. May 15. The following closing quotations are reported to-day by C. I. Hudson & Co., members of New York Stock Exchange:

Table with columns: COMPANY, Highest, Lowest, May 1. Includes Almada, Mex., Amador, Cal., Appalachian, N. C., etc.

Table with columns: Paris, April 30. Includes Belmez, Spain, Callao, Venez., East Oregon, Ore., etc.

CURRENT PRICES. Those quotations are for wholesale lots in New York.

Table with columns: Chemicals and Minerals. Includes Acid-Acetic, No. 8, pure, 1,040, Carb. liquefied, Chromic, ch. pure, etc.

Table with columns: Chloride, commercial, Iodide, Nitrate, Sulphate, Barytes, Beeswax, Benzole, Bichromate of Potash, Borax, Bromine, Cadmium Bromide, Chalk, China Clay, Chlorine Water, Chrome Yellow, Chromalum, Cobalt, Copper, Feldspar, Flint, Fluorspar, Fuller's Earth, Gypsum, Iron, Kaolin, Lead, Lime, Litharge, Marble Dust, Mercuric Chloride, Metallic Paint, Mineral Wool, Naphtha, Nitre Cake, Ochre, Oil, Mineral, Phosphorus, Plumbago, Potassium.

Table with columns: Bromide, Chlorate, Carb., Caustic, Iodide, Muriate, Nitrates, Potassium, Pyrites, Quartz, Strontium, Sylvinit, Tale, Soda, Potassium, Tin, Vermillion, Zinc Oxide, etc.

THE RARE METALS.

Table with columns: Aluminum, Arsenic, Barium, Bismuth, Cadmium, Cerium, Chromium, Cobalt, Didymium, Erbium, Gallium, Glucinum, Iridium, Lanthanum, Lithium, Magnesium, Manganese, Molybdenum, Niobium, Osmium, Palladium, Platinum, Potassium, Rhenium, Rubidium, Selenium, Sodium, Strontium, Tantalum, Tellurium, Thallium, Titanium, Thorium, Tungsten, Uranium, Vanadium, Yttrium, Zirconium.

BUILDING MATERIAL.

Table with columns: Bricks, Portland Cement, Building Stone, etc. Includes Bricks-Fronts, nominal, 1,000, Portland Cement-Rosendale, etc.