

# THE ENGINEERING AND MINING JOURNAL



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

Vol. LIII. APRIL 16. No. 16.

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THE SCIENTIFIC PUBLISHING CO., Publishers.

### SUBSCRIPTION PRICE:

Weekly Edition (which includes the Export Edition), for the United States, Mexico and Canada, \$4 per annum; \$2.25 for six months; all other countries in the Postal Union, \$7.

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

### THE SCIENTIFIC PUBLISHING COMPANY.

OFFICERS: R. P. ROTHWELL, Pres. & Gen'l Mang. / P. O. Box 1833.  
SOPHIA BRAEUNLICH, Sec'y & Treas. / 27 Park Place, New York.  
Cable Address: "Rothwell, New York." Use A. B. C. Code, Fourth Edition

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WE continue, this week, the discussion of the propriety of the Government undertaking a series of tests on the strength and properties of timber, which we opened in our issue of February 27th. We have several other communications on this subject, which we are unable to insert in this issue, but which will be published at an early date. Our correspondents who have, in previous issues, argued in opposition to us that it is proper that the Government should undertake work of this kind, have confined themselves to pointing out the great benefits to be derived from such an investigation, and the great benefits which have resulted from similar investigations in the past, none of which are denied.

OUR advices from the Mesaba iron range of Minnesota agree that its ores are low grade, and will probably average, in cargo lots from 57 to 58 per cent. iron, and about 0.065 phosphorus. The reports of analyses showing 61 per cent. and over and less than 0.05 per cent. phosphorus are certainly obtained from selected samples, which do not represent a fair average of the ore. The Mesaba ore is not, consequently, a Bessemer ore; but the bed opened in some of the mines is undoubtedly large, lies at a very low angle and can be uncovered and mined very cheaply, so that the ore can be sold at a price which will find for it a ready market and leave a fair profit. The ENGINEERING AND MINING JOURNAL has already counseled investors not to forget the costly experience of the Gogebic "boom," when promoters are telling seductive tales of the millions to be made on the Mesaba range. There are some good, some very good, properties already opened there, and prudent investors may make fortunes out of them, but there is already an abundant supply of "wild cats" offering, and great caution should be exercised in making investments.

THE well-known report on "The Statistics on Wages," which was compiled by Mr. JOSEPH D. WEEKS, of Pittsburg, for the Tenth Census, forming Vol. XX. of that series, covered the rates of wages of persons in different employments in the permanent industries of the United States for each year for quite long periods, in many cases 30 years, in others 40, 50, 60 and even 70 years. In addition to these rates of wages the question of extra earnings, regularity of employment, methods of payment, labor costs, influence of machinery, etc., were discussed. It is now proposed to continue this investigation, and a bill is at present before Congress making provision for such work. The plan is to bring the statistics prepared in 1890 down to date, and also to extend the scope of the investigation somewhat. The value of these statistics is unquestioned, and has been acknowledged by many of the most eminent economists of the United States. Mr. WEEKS is an able statistician, who has done much important work in this field, and the proposed investigation, if intrusted to him, will certainly be in competent hands. This appears to us to be a work which the general government can properly undertake, for it affects the whole people, and is not one which the citizen can be expected to carry out in a comprehensive manner.

IN another column we give an account of some experiments recently undertaken by Dr. ROESING at the Friedrichshütte in Upper Silesia, Germany, upon the application of the basic Bessemer process to the metallurgy of lead. The new process which has been devised by him is yet in an experimental stage, as will be seen, but the results which have been obtained with it so far are certainly very interesting. The improvements in the metallurgy of lead within the past twenty years or so have been mainly in minor details of the furnaces and in methods of operation. The process which Dr. ROESING has devised is as revolutionary as is the Manhés process as applied to copper smelting.

The article which we reprint does not give enough details for us to form a definite opinion as to the merits of the new process. We doubt, however, if in its present condition it is suitable for anything further than the softening of base bullion and the refining of desilverized lead. It seems to be a mistake to attempt to remove the lead from the silver in base bullion instead of the silver from the lead. In the experiments which have been described very pure lead seems to have been used, and the silver contents of the concentrated bullion are no higher than the silver contents of our base bullion in this country. The idea is beautiful, but will it succeed in practice? However, Dr. ROESING is an earnest investigator, and the results of his further experiments will be awaited with interest.

### THE REJUVENATION OF A MINE.

THE Poorman mine, one of the famous old mines of the West, and at one time the largest producer in Idaho, which was subsequently allowed to lie idle, or was worked in but a desultory manner, for many years, is again being operated at a profit. This mine has had a very romantic history. Situated on War Eagle Mountain, in Owyhee County, Idaho, the vein was discovered in the summer of 1865, about 1,000 ft. north of the rich chimney of ore from which so large an output was subsequently made.

While the discoverers were prospecting at the original point of location a prospector, named PECK, found rich float rock about 1,000 ft. south of their shaft, and following it reached the vein, which he carefully covered

again with earth. Gathering up and secreting every rich piece of float that he could find he endeavored to purchase that portion of the claim from the original locators. Being unable to come to an agreement with them, however, he went away for a few days in the hope that the owners would come down in their price, but before he returned another company of prospectors had discovered the cap of the rich chimney ore in the same place where PECK himself had uncovered it.

Litigation naturally followed, but after a while arrangements were made for working the property and a large output was immediately made. In three months, from July 23d to October 23d, 1866, according to the records of the New York & Owyhee Gold and Silver Mining Company, which then controlled the property, an outturn of \$606,000 was made, and the total production of the Poorman vein is estimated at many millions. Some of the ore was remarkably rich. About 100 ft. from the surface, according to the report of J. ROSS BROWNE in the "Mineral Resources of the States and Territories West of the Rocky Mountains for 1868," a mass of ore showing partially the planes and angles of a crystal of ruby silver, which weighed over 500 lbs., was found. A piece of this enormous crystal was exhibited at the Paris Exposition of 1869. Silver chloride was also found in pure masses, with crystals of extraordinary size and beauty. It is said that sheets of this mineral, more than a foot square and one-sixteenth of an inch in thickness, were found, some of them weighing many pounds.

By 1870, however, the Poorman vein had been practically exhausted, as it was thought, and then for many years the mine was worked at intervals only, making but a small output. In September, 1890, a company was organized in England under the title "Poorman Mines, Limited" to take over the property, and it is this company which has since been carrying on the work. Last summer ore was encountered in the new tunnel within 4 ft., it is said, of the old north shaft which was sunk for the purpose of continuing work in the bonanza chute of ore, but was left with the bottom in barren ground. The recent strike proved good, and the English company has already paid two dividends, declaring the second during the present month.

#### WHAT NEXT FOR SILVER?

The fall in the price of silver is without doubt largely, if not wholly due to the increased extent and the reduced expense of its production. This cause has been abundantly proved and explained in the columns of the ENGINEERING AND MINING JOURNAL. But less attention has been given to a co-operating cause, namely, the comparatively small increase in the production of gold. Apart from all questions of currency legislation, and apart from the gradual effect which may result from a wider use of silver in the arts, there are only two ways in which the former balance between the two metals can be, if not restored, at least made to return some distance toward its old position; namely, a decreased production of silver, on the one hand, and an increased production of gold, on the other.

The former process has begun by the closing of mines from which silver cannot be produced at present prices without too great sacrifice. How far it will go remains to be seen. As to the latter process, the question may be asked: "How can we increase the production of gold, unless we have the good luck to find new and rich fields? Are men not already mining for gold wherever it is known to exist in profitable quantity?"

It is not at all impossible, or even improbable, that the development of the resources of interior Africa may bring to light new sources of large gold supply. The treasures hid in the back country, which have fed for centuries the "Guinea Coast," may yet be disclosed so as to justify afresh that metallic title. But meanwhile there are known gold deposits of vast extent and richness which are not worked, because of the short-sighted policy of man. I refer, of course, to the hydraulic mines of California. The grangers of that State have kept these mines shut for years, thus depriving the world of perhaps \$10,000,000 annual supply of gold. If there had been no simultaneous increase in the production of silver the steady operation of this cause alone would have forced its gradual relative decline.

One of the best things that the "silver men" could possibly do for their favorite metal would be to open again this great source of gold. I understand that a bill has been, or will be, introduced in Congress bearing upon this "débris question." I have not seen its text. It may call for expenditures on the part of the general government which ought rather to be made by the State of California or by individuals. I reserve comment upon such features, but I am quite willing to say in advance that, whatever they may be, I do not think they are likely to be more objectionable than the present operations of the government in the purchase and locking up of silver. This is quite as improper, and it is foolish besides, as constituting a vast accumulation of that metal, to overhang the market for years. In a word, if one must choose, I am inclined to think the government would be better employed in promoting the opening of vast gold mines than in turning the vaults of the Treasury into a huge silver mine of its own.

R. W. R.

#### NEW PUBLICATIONS

HOW TO RUN ENGINES AND BOILERS: Practical Instructions for Young Engineers and Steam Users. By Egbert Pomeroy Watson, Editor and Proprietor of *The Engineer*. New York, 1892. Published by the Author. 125 pages.

This little book is a very good one to place in the hands of the everyday engine driver and fireman, not so much for the sake of teaching them part of their trade as for the sake of a reminder of facts which are easily forgotten. It is in the main clearly written, and the directions are of importance, but we notice some blemishes, which should be corrected in later editions. For instance, take the following, under the head of "Pumps": "The popular idea is that a pump has something to do with raising water or oil or molasses, or any other fluid it may happen to be at work upon, but this is a gross error first pointed out in the pages of *The Engineer*." We venture to believe that *The Engineer*, and this book by the editor of *The Engineer*, will long continue to have a monopoly of the belief that it is a gross error to say that a pump is an instrument for raising water. The author also says "The only thing which can prevent a pump from working is air, and air leaks on the suction side and force side, so called. Actually, there is no suction side." This will be news to most makers and users of pumps.

THE FINANCIAL, STATISTICAL AND GENERAL HISTORY OF THE GOLD AND OTHER COMPANIES OF WITWATERSRAND, SOUTH AFRICA. by Charles Sydney Goldman, F. R. G. S., of Johannesburg, pp. 370. Effingham Wilson & Co., Royal Exchange, London, Publishers.

This book constitutes a complete directory of the famous gold mines of Johannesburg, South Africa, but it is more than a directory; it is a historical record of the organization and subsequent operations of every mining company at work in that district. Each company is specially dealt with; all changes in capital by increase, reconstruction, consolidation or otherwise, output, expenditure and revenue, dividends and bonuses are chronicled. The method of working adopted in each mine and the nature and extent of such works are also briefly sketched.

Besides the detailed records of the individual companies, however, there are tables of general information and statistics relating to the mining industry of the Witwatersrand, while a general plan of the various properties on the Main Reef forms the frontispiece of the historical portion of the book. To the English investor in South African gold mining schemes this volume must be invaluable. In this country, of course, it can have no such field of usefulness, but to the statistician and technical libraries it will be indispensable. The greater part of the book is brought up to October 8th, 1891, though in several instances only up to June, 1891, the end of the financial year of many of the companies.

MONEY, SILVER AND FINANCE, by J. Howard Cowperthwaite, pp. 242. Price, \$1.25. G. P. Putnam's Sons, New York, publishers, 1892.

This little book, which is published in Messrs. Putnam's "Questions of the Day" series, is a common sense discussion of the silver question by a well-known New York business man. The first chapter was originally published as an article in *Lippincott's Magazine*, while an article by the author entitled "Free Coinage Fallacies," which was written for the ENGINEERING AND MINING JOURNAL, and published in our issue of September 12th, 1891, and was widely reprinted at the time, is also used. The remainder of the book is new. The following topics are discussed: The Evolution of Money, Trade and Finance; The Movement of Prices; India and Her Silver Rupee; Prices and Wages; Prices, Wages and Labor Saving Machinery; "The Debtor Class;" The "Balance of Trade" and Foreign Exchange; Foreign Exchange under Normal and Abnormal Conditions; Discussion with Representative Advocates of Silver; "Ultimate Redemption;" The Old Volume of Money Theory; The Present Silver and Currency Law; International Conferences and Bi-Metallism.

Mr. Cowperthwaite's book appearing during the height of the silver discussion in the present session of Congress was very timely, and with Mr. Ehrlich's excellent articles to which we have already referred has undoubtedly been of service in effecting the recent great change in popular opinion, which brought about the practical defeat of the silver bill when it came up for consideration in the House of Representatives last month. Mr. Cowperthwaite gives the plain and common sense arguments of an experienced business man in exposing the fallacies of the free coinage craze. His style is very engaging, and the book holds the interest of the reader from first to last. The chapters on the balance of trade, foreign exchange and the debtor class are especially good, the true relation of things being there set forth with such lucidity that even the reader uninitiated in the workings of commerce, and unfamiliar with the financial machinery by which it is conducted, should have no difficulty in understanding the disastrous effect which the passage of a free coinage bill would have upon the trade of this country, and consequently its industries. It is to be regretted that Mr. Cowperthwaite has introduced in his book some of the controversial papers which he wrote in the *Evening Telegram's* discussion of last summer, for while the points made are good, a discussion between an author and others in the former's own book always detracts from its dignity. This is a minor blemish, however, and on the whole "Money, Silver and Finance" is a book which everyone desiring to be informed on this important subject should read and will read with interest as well as profit.

A MANUAL OF THE STEAM ENGINE. PART II. DESIGN, CONSTRUCTION AND OPERATION. For engineers and technical schools (advanced courses). By Robert H. Thurston, A. M., LL. D., Dr. Eng'g. John Wiley & Sons, New York. 334 pages. Price \$7.50.

Part I. of Dr. Thurston's work, which has already been reviewed in these columns consisted chiefly of an epitome of the purely scientific side of the subject of the steam engine, considering its efficiency as a thermodynamic machine. Part II. is more closely related to the practical side of the problem, and contains a study of the principles and current practice in the design, construction and operation of modern engines. The work, in both parts, is designed especially for post-graduate courses in engineering schools, the two parts forming a full one-year's course for such students. The fact that these books are not intended for undergraduate instruction is evidence not only of their advanced character, but of the increasing tendency in engineering schools to provide students with a solid groundwork of mathematical training and in the elements of construction before attempting to give them higher studies in design and theory. As Dr. Thurston says in his preface, four years of purely pro-

fessional studies, based upon entrance requirements, including the higher mathematics, and a good high school preparation should place the young engineer safely at the desired point for beginning really graduate work.

Part I. of the Manual is without doubt difficult enough to be suitable only for post-graduates, but Part II. is of a much more readable character, being devoted almost entirely to practice instead of theory. It will therefore be valuable not only to the student who is fortunate enough to receive a post-graduate course, but to that much larger class of practical engineers who have not had the benefit of college training, and those who graduated from the technical colleges before post-graduate courses were known. The scope of the work may be judged from the chapter headings, as follows: I. Design of the steam engine. II. Valves and valve motions. III. Regulation; governors, flywheels, inertia effects. IV. Construction and erection. V. Operation; care and management. VI. Engine and boiler trials. VII. Specifications and contracts. VIII. Finance: costs and estimates. The work is written in Prof. Thurston's well known style, and is well calculated to sustain his reputation as an author. It shows, however, some appearance of insufficient revision of proofs. On page 33 it is stated that the maximum total expansion ratio for best effect becomes something like 2.5 to 3 for single cylinder engines with initial pressures of 25 to 30 lbs. of steam, and 6.25 to 9 with two-cylinder compounds with 60 to 100 lbs. Figures more nearly representing modern practice would have given 60 to 100 lbs. pressure for single cylinder engines, and 4 to 5 expansions, and 100 to 120 lbs. for compound engines with 8 to 12 expansions. On page 65 the length of stroke for minimum internal waste is said to be twice the diameter, but on the next page it is said to be half the diameter. On page 113 the formula has  $f$  in the denominator, but what  $f$  means is not stated. On page 116 Van Buren's formula for shafts has neither  $a$ ,  $v$ ,  $L$  nor  $t$  in it, but values of these are given below the formula. The second formula on this page should have the sign of the cube root instead of that of the square root.

#### 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.]

*Brick for Street Pavements.* By M. D. Burke, C. E. Published by Robert Clark & Co., Cincinnati, O., 1892. Pages, 86. Price, \$1. Illustrated.

#### 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.

#### Mine Leasing in the West.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Will you kindly state in the ENGINEERING AND MINING JOURNAL the custom in mining regions in the West of leasing mines, *i. e.*, what percentage is paid on the gross or net output by the lessee to the lessor?

NEW YORK, April 8th, 1892.

A SUBSCRIBER.

[The royalties asked of lessees in the precious metal mines of the West vary greatly, depending upon the development of the mine and the amount of dead work to be done. In the case of the mines with low grade ore, which has to be concentrated, as little as 10% is frequently asked. From this the rate of royalty ranges upward. In Colorado, where a large proportion of the mines are worked under lease, the average royalty may be put, perhaps, at 20% to 25%, although, in the case of mines which are well developed, and where the prospects of discovering ore, and especially ore of high grade, are good, the royalty demanded is generally higher. This royalty is paid on the net smelter's returns, *i. e.*, the ore mined is shipped to the smelters, who deduct the cost of treatment and discount on silver and lead for loss in smelting, and pay the balance to the owner of the ore. The royalty is paid on these net returns from the smelters.—Ed. E. & M. J.]

Florida Phosphates; Origin of the Boulder Phosphates of the Withlacoochee River District. EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your issue of April 2d you publish an article by Prof. N. A. Pratt on "The Origin of the Boulder Phosphates of the Withlacoochee River District," in which he promulgates a novel theory to account for their formation. He first proceeds to quote some of the theories already advanced by others, and then demolishes them to his own apparent satisfaction. Nearly every geologist has discarded (even if he ever entertained) the guano or bird-dung theory, but I venture to assert that no one else has done so for the same reason as Professor Pratt. He says of it, "but the evidences are all opposed to that theory in case of the Withlacoochee River deposits, and cannot be entertained here, for certainly this form of calcium phosphate has never existed in vertebral bone, which is the basis of all phosphatic bird deposits." This extraordinary statement is entirely inaccurate, and I fail to understand how Professor Pratt could make it.

Professor Pratt expresses his theory thus: "The evidences compel me to believe that all of the phosphate boulders in the ledges or surfaces exposed, and classed as terminated and conchoidal types, grew as a zoophyte, possibly as sponge, probably gigantic foraminifera or rhizopod, on the spot on which it is now found, just as sponges now grow on favored localities," but he does not attempt to account for the origin of the soft and other forms of phosphate except to say that "to the unassisted eye there is no indication of organic or organized structure. Such I have no doubt the microscope will reveal." As Professor Pratt states that it was two years ago when he originally expressed these opinions it appears to me he might have found time to have examined the phosphates or refer to the work of others. My own examinations and the work of all other scientists with which I am acquainted does not corroborate in any way Professor Pratt's views.

Professor Pratt considers that the limestone which formed the bed upon which these deposits grew was of Middle Eocene age and the animal must therefore be of later date, but he states that the "affinities" of his imaginary fossil are with *Stromatopora*, which is a type that became extinct after Devonian and Silurian ages.

Professor Pratt argues that because some shells secrete phosphate of

lime, therefore a hypothetical sponge or rhizopod might have secreted it. It would be more logical to argue that because most shells are formed of carbonate of lime therefore the bones of mammals should be, but they are not.

OTTAWA, Ont., April 9, 1892.

WALTER B. M. DAVIDSON, F. G. S.

#### Production of Silver in Germany.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Referring to the letter of Dr. Haeg, published in the last issue of your journal, relative to the silver product of Germany, I beg to say that the product of silver credited that country in the reports of this bureau is not a "presumed product" but the coining value of the silver ores produced in the German empire, taken from the official statistical publications of that empire.

I have repeatedly stated in my reports that the product of silver in Germany is undoubtedly larger than the sum credited it in the reports of this bureau. But the amount produced from domestic lead and copper ores has not been added for the reason that up to the publication of my last report I was not able to obtain the amount of silver actually extracted from such ores.

For several months past I have been engaged in an earnest effort to ascertain the actual product of silver in Germany from domestic ores, and, through the kind assistance of Dr. Soetbeer, I think that I have arrived at a very close estimate.

A review of the product of silver in Germany will be published in my next report on the production of gold and silver, which I hope to send to Congress next week, in which Germany will be credited with a larger silver product than heretofore.

It is not true that the statistics of argentiferous lead ores raised in Germany show the amount of silver contained in such ores. As proof of this, I inclose herewith a copy of a communication from the foreign office at Berlin, in which they state that it is impossible to ascertain the silver contents of the lead ores produced in the Bonn district, which produces more than half the lead ores mined in Germany.

E. O. LEECH, Director of the Mint.

#### MEMORANDUM.

There are no accurate data on the silver contents of the lead ore produced in the *Oberbergamtsbezirk* Bonn in the years 1887-1890, nor can the contents be ascertained by a calculation of the amount of pure silver obtained from the lead ores, because the smelting establishments of the Bonn district, so far as they produce silver, work ores produced outside of the Bonn district, and also foreign ores which are much richer in silver than the native ones.

The lean ores produced in the *Oberbergamtsbezirk* Bonn itself are, as a rule, poor in silver. To obtain this small quantity of silver requires a considerable outlay, the amount of which depends on the quantity of bullion to be worked off, and in which the silver collects on melting. For this reason the smelting establishments find it profitable to work rich foreign ores with the silver native ores, and by that means raise the average silver contents of the bullion.

#### The Improvement of Our Country Roads.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The subject of better roads in the United States has been discussed for many years, and in some places great improvements have already been made. At Hackettstown, N. J., the local elections during the last two or three years have turned upon this question. The roads there were in an abominable condition, and in the spring, when there was much ore to be carted to the railway station, traffic was almost impossible. I advised the townspeople to sow grass seed in the streets if they would not improve them, as the grass would at least prevent the dust.

What must be done to make good roads? In the first place most of them should be cut wider and made straighter. With the gravel from these cuts the roadbeds should be graded, and this gravel would at the same time make a good bottom for the macadam. For the latter hard stone should be used, cobblestone being laid first on the roadbed, and on these smaller stones for the cap or face of the road, which should be made compact by the use of a heavy roller; then, as wagons pass over the road where the ruts have worn, fresh stones from the sides should be wheeled into the ruts, which will cause the wagons to go elsewhere on the road and will in time make a hard surface. There should also be a gang of men always at work on the roads keeping them in repair.

In England and on the Continent, as every one knows, the roads are much better built and much better kept than ours. In England a road inspector is appointed for every county who has a staff of road masters, one or two in every parish, whose duty is to attend to the condition of the roads all the year round. They scrape up the mud, lay new stones in the roads, etc. The mud is always cleaned off the road before new stones are laid. The stones are carted to the sides of the road and deposited at intervals in piles, where they are broken by men with spalling hammers and then used for repairing work. The farmer who picks stones off his land can always sell them for a shilling or two per load to the roadmasters. The trees alongside the road are all trimmed so that the roadbed is not shaded.

That the general run of roads in this country are bad, there is no use in denying, so that discussion on this subject is unnecessary. What is especially wanted for their improvement is a few portable engines and rock breakers. Put the crushers on a strong carriage, so that they can be moved to points where rock can be obtained cheaply and handily. With a small drill driven by steam from the portable boiler, rock can be got very easily from ledges near the road side. Then pay the farmer for the stones which he picks from his land. Use these stones on the roads, and the latter will soon be in such a condition that we may be proud of them.

MATTHEW PENHALE,

Manager Glasgow & Montreal Asbestos Company.

BLACK LAKE, P. Q., Canada, March, 1892.

#### The Free Coinage Question.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The free silver advocates have so striven to becloud the public mind regarding a question which has always seemed so me at least a very simple one, that I think an extract from Lecky's "England in the Eighteenth Century" will make the matter as regards a kindred question at the time of the American Revolution clear. Mr. Lecky says: "It (Congress) imagined it could regulate all prices by law and maintain them at a level greatly below that which the normal operation of the law of supply and demand had determined. Laws with this object were speedily

made in all the States. The prices of labor, of food, of every kind of manufacture, of all domestic articles were strictly regulated. The measure, of course, aggravated the very evil it was intended to diminish—mob violence, directed against the engrossers, monopolies and forestallers, combinations of the more patriotic merchants binding themselves to sell only at the authorized prices.

Newspaper denunciations and occasional legal punishments were all insufficient and impotent, and John Adams wrote that in his sincere opinion the act for limiting prices, if not repealed, would ruin the State and introduce a civil war. At last in 1778 Congress voted that "all limitations of prices of gold and silver be taken off." Still more terrible were the laws making paper money legal tender. Few laws have spread a greater amount of distress, dishonesty and injustice, through a great community. All those who subsisted on life incomes or fixed rents, or interest of money, found their incomes rapidly reduced to a small fraction of their previous value. While on the other hand vast wealth was suddenly created, as the whole debtor class were enabled to free themselves from their obligations. Debts incurred in gold were paid off in depreciated paper. In a country where debtors were extremely numerous, and where the whole social and economical system rested on the relation of debtor and creditor, this law opened the door to the most enormous and far reaching fraud, but it acted differently on different classes. To the laborer who lived upon his daily wages the depreciation was of little moment, especially if he had been too improvident to lay by any store for the future.

On the other hand the wealthy and the saving and the helpless classes were in general utterly ruined. Widows and orphans in great numbers who had been left fortunes in money were paid off by guardians, executors or trustees, in depreciated paper. Old men who had lent out the savings of industrious lives, and had been living comfortably on the interest, were fortunate if they did not receive back their principal shrunk to perhaps one-fiftieth of its original value. Every one who had been sufficiently saving to lend was impoverished. Every one who had been reckless and improvident was enriched, and "truth, honor and justice," in the emphatic words of a contemporary American historian, "were swept away by the overflowing deluge of legal iniquity." "The first visible effect," wrote a contemporary American economist, "of augmentation of the medium and the consequent fluctuation of value was a host of jockeys who followed a species of itinerant commerce and subsisted on the ignorance and honesty of the country people. Perhaps we may safely estimate that not less than 20,000 men in America left honest callings and applied themselves to this knavish traffic."

Does it not seem suicidal to seek to enter this silver slough from which every nation of Europe which has silver as a legal tender is struggling to escape? And it can only be explained by supposing that the debtors of the South and West are fraudulently seeking to pay off their indebtedness at 60% or perhaps 50%; also to the natural wish of the mining magnates to keep up the price of silver at any cost to the nation. When gold was established as the standard of value in 1873, no one complained, for the commercial value of the gold and silver dollars was equal—and any mortgages since that date were given for gold value received—then, why in the name of justice should they now be paid off with 66-cent silver dollars, which may be by and by 50-cent dollars.

As for the policy of buying with the nation's money 54,000,000 ounces of silver annually, it is protection run mad. No such outrageous law was ever before passed for the encouragement of an industry, and if not repealed it will ultimately bring about the same effects as the free silver coinage would do suddenly, should Congress resolve to buy up the whole cotton crop of the South because there is a surplus of cotton. It would be a step no more insane than that of buying up the whole produce of the American silver mines, except indeed that the vaults at Washington could not contain the crop, and that, besides, it is a perishable commodity.

As has been repeatedly stated by the anti-silver party, the only remedy for the depressed price of silver would be an agreement among the principal commercial nations to fix a standard ratio between gold and silver, and then in coining a certain proportion of money in each standard.

Mr. Bland has contributed a pro-silver paper to the *North American Review*, and Senator Hill, at Elmira, essayed a clearing up of the subject, but both efforts are as clear as mud to my benighted mind. D. C.

NEW YORK, April, 1892.

#### Government Timber Tests.

EDITOR OF ENGINEERING AND MINING JOURNAL:

SIR: I am so situated that I cannot give much thought now to the specific question of an appropriation for "timber tests," but I am entirely one with you in the opinion that the functions of government should be restricted to such general acts as are necessary for the good of the commonwealth and which the citizens cannot perform for themselves; and in judging of any particular case, should prefer to err on the side of over-caution than that of liberality; for a government cannot be truly free, and at the same time paternal.

DAVID A. WELLS.

NORWICH, Conn., April 13, 1892.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In reply to your letter asking my opinion of the expediency of establishing a government system of testing timber, I beg to say that the proposition reminds me of a composition once handed in to the head of a very old academy upon "Self-Dependence." This composition began with a proposition that I think corresponds very closely to the demand upon the United States Government to take up this work. The essay was upon "Self-Dependence." "Self-dependence consists in that quality of the human mind which leads us to get somebody else to do what we ought to do for ourselves."

So long as the owners of buildings and prospective constructors of buildings rest upon this kind of self-dependence, the architecture of this country will continue to be as bad as the method of building admittedly is, in nine out of ten of all the buildings in progress, perhaps 99 in 100. That kind of self-dependence which would lead the engineer and the student to apply to the Government to establish tests of the strength of timber is the same as that which leads owners of buildings to rest upon an uncertain contract of indemnity for security against the grave faults in construction which they commit, while architects apparently give more attention to the outside appearance than to the interior motive of a building. Under such conditions the fire tax of this country will continue

at approximately to \$200,000,000 a year, while the greater part of the buildings will continue to be models of weakness, unfitness and ill-adapted design.

Each State should have its own scientific institute, chartered only by the State, but endowed by the people themselves, in which such work as the tests of timber may be applied suitably. We now have no science of bricks—no science of cement and mortar—no science of glass and glazing nothing but empirical and customarily bad practice in all these arts, because so many persons accept the school-boy's definition of self-dependence.

EDWARD ATKINSON.

BOSTON, Mass., April 13, 1892.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Referring to the editorial in your issue of February 27th with respect to the proposed appropriation by the government of \$40,000 for the purpose of conducting a series of experiments upon American timbers, it would seem that your own admission of the obvious advantages and the urgent need of such tests, to the engineering profession particularly, and of the eminent fitness of the officers of the Forestry division to conduct them, is a sufficient argument in favor of the proposed tests and of the desirability of their being undertaken by some competent commission, whether governmental or otherwise. The only difference of opinion on the matter is as to the propriety of their being undertaken by the Government. The arguments of Dr. Raymond, Mr. Fernow and Professor Johnson have been confined to showing the advantages of the proposed tests to the general public, and to showing the propriety of the work being undertaken by the Government, by reference to analogous cases, such as the geological survey. Neither of them has combated your central argument, and that is what I shall venture to do.

You say, "Such work as this does not properly constitute a function of republican government, and these [functions] should be limited as closely as possible to doing that which the citizens are unable to do for themselves. . . . Work which is of interest to but a portion of the people and which can be conducted by private or voluntary enterprise should not, in our opinion, be performed by the Government at the public expense. The very foundation of free republican government is in the self-reliance of the citizen, and the looking to the Government to do what the citizen can do for himself is destructive of that foundation." I beg to submit that this statement of the functions and principles of republican government is a pure theory, which is not based upon the experience of our own Government or upon that of any other government in the world. No government, republican or other, has ever restricted itself to doing that which the citizens are unable to do for themselves. All republican, as well as monarchical governments, are, in fact, tending in the opposite direction (see Herbert Spencer on "The Coming Slavery") and yet the very foundations of republican government have not been destroyed, nor even threatened, by this tendency. Your theory of republican government is a familiar one and is frequently used by Congressmen in their opposition to some particular appropriation, and by writers on theories of government, but in practice no President of the United States and no political party has ever consistently adhered to that theory. It is a good theory to conjure with in a political debate, but in practice, whenever there is a strong public demand for the Government to do some particular thing which the citizens, or private societies or companies might do for themselves, the theory goes overboard and the thing is done. If this theory had been carried out in practice to its fullest extent we should have had no Government post offices, or Government roads, no lighthouses, no river and harbor improvements, no coast survey or geological survey, no agricultural department, no bureau of forestry nor bureau of education, and possibly no Pacific Railroad.

It is as bad a thing in political science, as it is in natural science, to frame an *a priori* theory, and then try to make events fit the theory. The theory of individualism in politics, if carried out to its limit, would lead us back almost to barbarism in government. The opposite theory, or paternalism, if carried out to its limit, leads to Bellamyism or socialism. Truth lies between two extremes. The middle course is the safest. Each particular question of governmental action, such as the proposed timber tests, should be tried on its own merits and not settled by reference to an abstract theory. If it is found expedient and wise for the government to carry the mail rather than to have it carried by express companies, then let us continue our United States mail. If the people could be better served in the matter of telegraphic correspondence by the government than by a telegraph company, then let the government take the telegraph as a branch of the post-office. If governmental ownership of railroads would create more evils than benefits, then let the government keep its hands off the railroads. If the timber tests are urgently needed by the people to enable them to know which timber to cultivate and which to exterminate, and if the government can carry them out better and more quickly and certainly than any individual or corporation could, then the appropriation should be granted.

The Mechanical Section of the American Association for Advancement of Science, at the Washington meeting last August, discussed the matter of the timber tests, and unanimously recommended to the Association at large the passage of a resolution in favor of a governmental appropriation for them, and this resolution was passed, I believe, by a unanimous vote in open session when several hundred members were present.

The ENGINEERING AND MINING JOURNAL seems to be the only one to utter a note of discord in the general harmony of opinion on this subject, and I trust its opposition will not cause the refusal of the appropriation asked for.

NEW YORK, April 3, 1892.

WILLIAM KENT.

**The Ticonderoga Hot Air Engine.**—Through a slip of the pen we stated in our issue of the 9th inst. that the hot air engine built by the Ticonderoga Machine Company for Messrs. Moore & Wyman, of South Boston, Mass., was of 25 H. P., when 40 H. P. was meant. This is a remarkably large size for a hot air engine.

**Discovery of Sapphires in Queensland.**—The Government Geologist of Queensland confirms the recent reports as to the valuable discoveries of sapphires at Withersfield, on the Central Railway line, in that Colony. He states that the stones are equal to the finest gems in the mineralogical cabinets of Europe, and believes that diamonds will also be found. The lessees have refused an offer of £50,000 for the property.

RESEARCHES AS TO THE PROPERTIES OF ALLOYS.—II.\*

By Prof. W. O. Roberts-Austen, C.B., F. R. S.

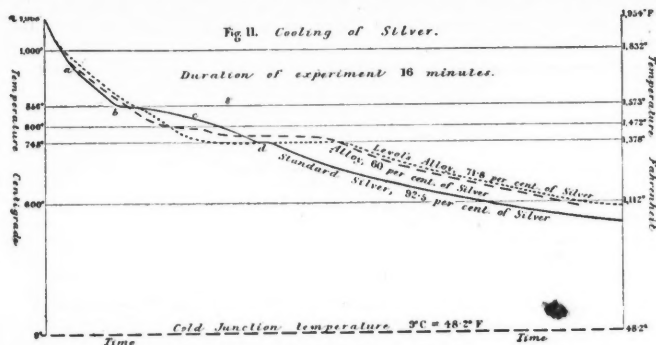
(Concluded from Page 400.)

The calculations by which the final results are obtained are as follows: From the curve representing a particular experiment the temperature of any point of interest may be obtained by reference to the calibration curve. This temperature has to be corrected, first, for error *e* in indications of the galvanometer, due to change of its temperature; and, second, for alteration *j* in the temperature of the cold junctions.

The measurement of temperature by the thermo-junction depends, as is well known, on the measurement of an electromotive force by means of the current set up in a circuit of known resistance. Theoretically there are a number of corrections to make, such as those which arise from the varying resistance of the junction itself and of the leads; but the comparatively high resistance of the galvanometer renders these insignificant. Thus the resistance of the wires forming the couple was in one experiment 2.42 ohms, of the leads 0.175 ohm, and of the galvanometer 201 ohms. The part of the wires heated to a high temperature was too short to form an appreciable part of the resistance, even if its own resistance were doubled. Consequently the first correction *e* reduces itself to a simple temperature correction, applied to the galvanometer. This at first sight might appear to involve several corrections: first, a correction for change *e* in resistance of the coil; second, a correction for variation *v* in the torsion of the suspending wire; third, a correction for any modification *m* of the magnetic field of the galvanometer.

The correction for change *c* in resistance of the coil is easily made. The coil is of German silver, which has a temperature coefficient of 0.00038 per degree centigrade. The deflection at the melting point of gold is 16 centimetres upon the scale; hence a rise in temperature of 1° C. decreases the deflection from 16 to 15.994.

The variation *v* in the torsional resistance of the suspending wire was found to be quite negligible. Time readings were taken of the oscillations of the mirror, 500 consecutive oscillations being taken several times each



day on different days and at different temperatures. No difference in time of oscillations greater than 0.2 second could be detected with a stop-watch. One indirect effect, however, was observed. The pillar of the instrument supporting the wire and coil does not appear to be made of the same material as the suspending wire itself; and as this suspending wire has some initial torsional strain, the zero of the instrument changes slightly with changes of temperature. After this was discovered special care was taken to watch the zero.

The modification *m* of the field in which the coil hangs is probably very small; any alteration would be at once checked and provided for by the system of introducing known high temperatures.

The temperature as indicated by the deflection of the mirror has also to be corrected for variation *j* in the temperature of the cold junctions. Obviously the pyrometer measures only the differences of temperature between the copper junctions and the junction of the special wires; but by keeping the former at one temperature the indications of the pyrometer are measures of the difference between this temperature and that of the heated couple. The curve connecting the deflections with their corresponding temperatures is very nearly a straight line throughout the range of the experiments; and consequently it is legitimate to add to or subtract from the deflection an amount corresponding with the small variation of the cold junction from some normal temperature taken at 18° C. This correction and that for change in resistance of the coil of the galvanometer are applied to the observed deflection produced by the source of heat, the temperature of which was to be determined. This deflection is then compared with the deflection (also corrected) that is obtained by the introduction of known high temperatures, usually afforded by a crucible filled with pure molten gold; and the difference, multiplied by the constant obtained from the part of the calibration curve (of the particular wire) which corresponds to the range of temperature, gives the difference in degrees centigrade from the known high temperature.

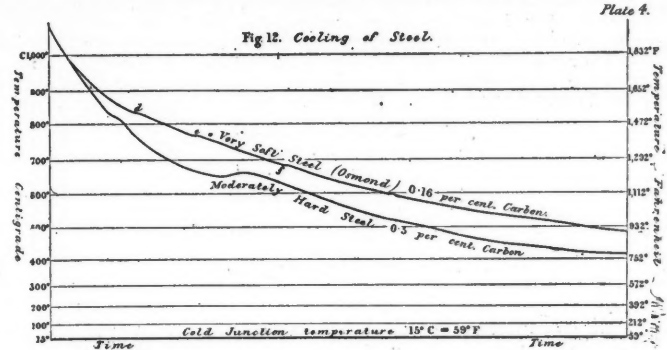
If the thermo-junction be ruptured, the ends of the wires may be joined again after the removal of the defective part. Nevertheless, in conducting a series of experiments it is very desirable to employ for as long as possible the same thermo-junction; and it is therefore necessary to adopt precautions with a view to its preservation. This gives rise to considerable difficulty, in view of the absolute necessity for bringing the couple into close proximity to the molten metal; and several methods of protecting the couple were adopted. Clay coverings were open to the objection of their fragility under sudden exposure to heat; and this entails the risk of spoiling a thermo-couple in the midst of an investigation. Inclosing the junction in little tubes of iron filled with silver answers very well for comparatively low temperatures; but iron alloys readily with many metals into which the tube would have to be inserted; for instance, the iron-protected junction could not be plunged into molten gold. Ultimately blocks were cut from portions of large "plumbago pots"

\* Report to the Alloys Research Committee, British Institution of Mechanical Engineers

used in mint work, and were carefully fashioned in the lathe into small crucibles of the ordinary shape, but provided with a tube or socket extending vertically from the base up to about one-third the height of the crucible, as shown in the section, Fig. 6. The thermo-couple could then be inserted in the tube, which was surrounded by the molten metal. The Morgan Crucible Company have since made crucibles of this pattern specially for this research. This plan was independently devised for the purposes of the present research; it had however been anticipated by Barus,\* who used a similar arrangement on a larger scale for determining the boiling points of metals. In ascertaining the point of solidification of a metal, the crucible filled with metal is withdrawn from the furnace, and placed over the thermo-junction so that the wires are near the top of the tube, but do not touch its sides. To prevent them from doing so, a cap made of sheet platinum is always kept fitted over them, and probably is specially useful in protecting the platinum wires from being contaminated with silicon and carbon, which Callendar† has already shown to increase the resistance of platinum wires; they certainly injure the wires mechanically.

LIQUATION OF SILVER-COPPER ALLOYS.

In order to gain some evidence as to the capabilities of the appliance, it was subjected to the following tests in connection with the liquation of silver-copper alloys, that is, the separation of their more fusible constituents. This series of alloys has previously been the subject of careful experiment, and much is now known respecting them. Not the least interesting fact connected with them is the remarkable molecular rearrangement they undergo during solidification. Levol,‡ who is the chief authority on the subject, concluded that the only homogeneous alloy contains 71.89% of silver and 28.107% of copper; and he considers it to be a definite combination of the two metals having the formula Ag<sub>3</sub>Cu<sub>2</sub>. Many years ago I also examined the behavior of the silver-copper alloys during cooling; and the following figures and diagram, Fig. 7, taken from my paper,§ may be given, as showing the way in which a cubical mass, 45 mm. or 1½ in. side, will arrange itself in cooling rapidly. It will be evident that the silver becomes concentrated toward the center of



the mass, which is richer in silver by 1.28% than the external portions.

Alloy containing 92.5% Silver and 7.5% Copper, cooled rapidly. (See Fig. 7.)

Central vertical plane.	Percentage of silver.	Corners.	Percentage of silver.	Sides.	Percentage of silver.
a	92.46	h	92.32	q	92.36
b	92.60	i	92.37	r	92.38
c	92.91	k	92.33	s	92.31
d	93.55	l	92.33		
e	93.10	m	92.39		
f	92.50	n	92.38		
g	92.42	o	92.27		
		p	92.32	Dip assay	92.51

Maximum difference, between center *d* and corner *a*, 1.28%.

The results of a memorable research led Guthrie|| to the conclusion that certain alloys in cooling "throw off atomically definite bodies, leaving behind a fluid mass which is not definite in composition;" so that ultimately the most fusible alloy of the series is left, which he calls the eutectic or most fusible alloy, and in it the "proportions between the constituent metals are not atomic proportions." Guthrie's experiments dealt only with alloys of low melting-points, such as the fusible metals; but photographic records of the rate of cooling, as measured by the platinum and platinum-rhodium thermo-couple, might be expected to show at what temperatures groups of silver-copper alloys solidify and fall out of solution. And at the same time evidence as to the probable composition of the eutectic alloy of the series should be as readily obtained by these means as it was, in the earlier experiments, by placing an ordinary mercurial thermometer in a bath of fusible metal.

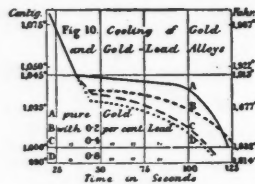
Fig. 11 represents such a photographic record of the rate of cooling of a mass of standard silver weighing 11 oz. It will be seen that the initial temperature indicated is 1,068° C., and that there is an abrupt fall to 856° C. at *b*, when the freezing of the mass as a whole begins. Just before this abrupt turn in the curve takes place there is a slight change in its direction at *a*, probably caused by a falling out of alloys rich in copper. After the abrupt break at *b* a slight upward tendency *c* shows that heat is evolved; but the curve continues to fall until another abrupt change occurs at 748° at *d*, which indicates that a second critical point has been reached. That this is attended by the evolution of heat is seen, for the spot of light remains stationary for 40 seconds; and it is doubtless caused by the solidification of the eutectic alloy, that is, the most fusible alloy of the series.

Similar photographic records of the cooling of Levol's alloy, Ag<sub>3</sub>Cu<sub>2</sub>, containing 71.89% of silver, show that there is only a single break, Fig. 11, which occurs at this same temperature, 748° C.; solidification throughout the mass then takes place. A record of the cooling of a mass of

\* Bulletin of the United States Geological Survey, No. 54, 1889, p. 92. † Philosophical Transactions of the Royal Society, vol. cxxxviii, 1887, p. 161. ‡ Annales de Chimie et de Physique, vol. xxxvi, 1852, p. 193; vol. xxxix, 1853, p. 163. § Proceedings of the Royal Society, vol. xxiii, 1874-5, p. 481. || Philosophical Magazine, vol. xvii, 1884, p. 462.

silver-copper, Ag Cu, containing 63.029% of silver, also gives only a single break at 748° C.; but, although the freezing point of the eutectic alloy is evidently close to this temperature of 748° C., it would not be safe to conclude that either Ag<sub>2</sub>Cu<sub>3</sub> or Ag Cu is itself the eutectic alloy; they are probably only the last alloys (in which the constituents are in simple atomic proportions) to fall out of a bath of indefinite composition. Other alloys of this series have been examined, and the curve of the one containing 60% of silver is also shown in Fig. 11. It seems to show that in a series of alloys the second point of solidification is not quite constant. The behavior of a solidifying mass of gun metal appears to present exactly the same characteristics; but the experiments have not as yet been concluded. It is easy in the case of alloys like fusible metal to keep the alloy melted, and to ascertain what the composition of the most fusible alloy really is, by repeatedly straining the fluid mass from the suspended crystals through a canvas or asbestos bag. The temperature required to separate the eutectic alloy of the silver-copper series would introduce many difficulties of manipulation, though the result might ultimately be obtained.

The accompanying photographic curve, Fig. 12, shows the application of the photographic method to recording the evolution of heat which occurs in cooling masses of steel. The experiment was made on a piece of the same steel which had already been subjected to experiments by M. Osmond. It had the following composition: Carbon, 0.160%; silicon, 0.012%; sulphur, 0.021%; phosphorus, 0.029%; manganese, 0.110%. The results of cooling it are shown by the upper curve in Fig. 12. It will be observed that as the mass cooled down there were, as M. Osmond had shown, two distinct evolutions of heat: one *d* occurs at 843° C. or 1,549° F., which is believed to mark the change of hard to soft iron, because it occurs in iron free from carbon; and the other *f* is at 675° C. or 1247° F., and is certainly due to the change in the relations between the carbon and the iron. There is probably also another slight evolution of heat *e* at 767° C. or 14.3° F. It is interesting to compare this curve with the one below it, obtained during the cooling of a mass of steel containing nearly 0.5% of carbon, in which there is a distinct evolution of heat at 820° C. or 1508° F., and a prolonged one at 650° C. or 1202° F. With reference to these curves, M. Osmond himself wrote to me on December 18th, 1890: "The photographs are very beautiful, but, as you say, this mode of representation [by time-temperature curves] is not well adapted for showing slight evolutions of heat which occur while the cooling of the mass is slow [and is represented by the flat part of the curve]. It is certain, however, that the slightest prominence shown in the curve is a real one, and is not due to errors of plotting. The curve representing my steel is per-



fectly clear, but your specimen appears to have been well chosen for showing the two critical points."

EFFECT OF SMALL QUANTITIES OF IMPURITY ON THE FREEZING POINT OF GOLD.

The fundamental effect of an impurity in modifying the mechanical properties of metals has been abundantly established: but the part played by the impurity may be twofold. It may act directly on its own account upon the mass; and, by changing its structure, may alter its mechanical properties when solid. Or, as Osmond's\* work has shown, it may cause, retard, or hasten the passage of a metal in which it is hidden from its normal to an allotropic state, and may affect its properties indirectly. For the purpose of investigating these two distinct sets of phenomena, gold offers many advantages. It may be prepared in a very high degree of purity; it is not liable to contamination by oxidation; and much is already known respecting certain of its mechanical and thermal properties as influenced by small quantities of impurity, which exert a truly astonishing influence on its strength and extensibility. Platinum would no doubt be even better; but its manipulation is attended with many difficulties. In the case of gold such difficulties can be met; and when they have been surmounted the work may be carried on with confidence, so as to prepare for the extension of the experiments to metals in ordinary use. It would appear therefore most desirable to obtain thermal evidence as to the influence of impurities on a cooling mass of gold. In what degree, for instance, is the freezing point of gold influenced by the presence of definite impurities? and is the final solidification of the mass preceded in the respective stages by a pasty stage? or does the passage from the fluid to the solid state take place rapidly? Many years ago I called attention to the remarkable lowering in the melting point of gold produced by the presence of silicon; but the want of a suitable pyrometer has hitherto prevented my making direct experiments upon the subject.

The method of preparing gold of a high degree of purity has already been described †. In each experiment now to be more fully described, 132 grammes, or 2,037 grains of gold, were melted in one of the crucibles provided with a central tube or socket, as already described, and weighing, with its cover, 130 grammes, or 2,006 grains.

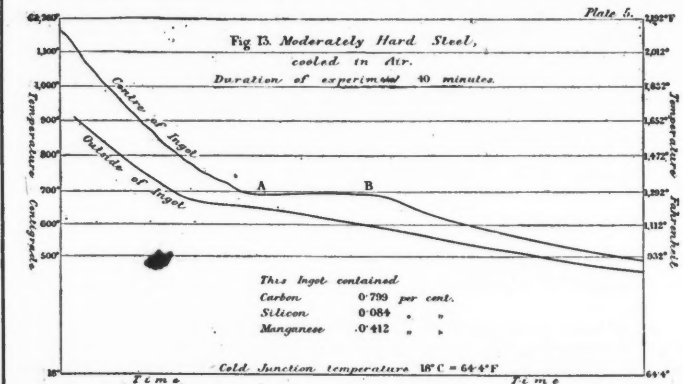
The initial temperature of the molten mass was high, somewhere about 1,200° C. or 2,200° F.; and the durability of the thermo-junction and the constancy of its readings had therefore to be carefully tested. It was found by repeated trials that different crucibles of the same size, filled with identical weights of gold, gave closely concordant results; but it occasionally happened that the platinum wire of the couple became brittle and broke. In such cases the fractured portion was removed, and the ends were twisted together again. Throughout the course of the experiments, a crucible filled with pure gold was kept at hand, and the freezing point of the molten metal was determined from time to time as a check.

The object of the experiments was primarily to ascertain whether the influence of impurities on the metal was really tangible, that is, whether

the insertion of the point of a fine stirrer of clay would indicate the existence of a pasty or gritty stage; but advantage was taken of the installation of the appliances to determine what retardation of the freezing point of gold is produced by the known elements which are added to it.

The result of Raoult's investigations on the lowering of the freezing points of solutions led him to the conclusion that one molecular proportion of any substance, dissolved in a hundred molecular proportions of any solvent whatever, lowers the freezing point of that solvent 0.62° C. or 1.12° F. This had not been tested in the case of solutions of metals in metals, until Heycock and Neville\* began an elaborate investigation of the subject. Their research, as far as it has at present been carried, deals first with the lowering of the freezing points of sodium and tin, produced by the addition to them of certain other metals; and second, with the molecular weights of metals when in solution. The results of their experiments when compared with the empirical laws of Coppey and Raoult may be briefly stated as follows. They are in accordance with the law "that for moderate concentration the fall in the freezing point is proportional to the weight of the dissolved substance present in a constant weight of solvent." By making the assumption that the molecule of zinc or of mercury is monatomic when in solution in tin, they confirm the second law "that when the falls produced in the same solvent by different dissolved substances are compared, it is found that a molecular weight of a dissolved substance produces the same fall whatever the substance is." But the third law, which states "that is a constant number of molecular weights of the solvent be taken the fall is independent of the nature of the solvent," they found to be probably incorrect, and theoretical considerations, indeed, would lead us to expect this. In the case of silicon in standard gold, which has already been mentioned, a long semi-fluid stage appears to be set up; the metal may contain solidified particles, and yet be sufficiently fluid to flow readily. This phenomenon has not yet been fully investigated.

In a research of much interest, Ramsay† has determined the molecular weight of a number of metals by Raoult's vapor pressure method; that is, he ascertained the depression of the vapor pressure of the solvent, produced by a known weight of dissolved substance, and he finds that although sodium behaves irregularly, yet "it would appear legitimate to infer that in solution, as a rule, the atom of a metal is identical with its



molecule, as the physical properties of those metals which have been vaporized would lead us to suppose."

The experiments were conducted as follows: The gold was melted in the crucible and its freezing point noted in two ways: first, by recording with the aid of a chronograph the rate at which the mass cooled, the results being plotted in a curve with time and temperature as co-ordinates. The exact freezing point was then indicated by the abrupt change in the direction of the curve. Second, the freezing point was also actually observed in the following way: the cover of the crucible had an orifice, which could be covered by a plug of charcoal, and through this orifice was inserted a fine pipe-clay rod held in the hand. A little experience with this, in touching the surface of the molten mass, enabled the existence of either a pasty or a gritty stage to be detected, and the point of actual solidification to be noted; and this point was telegraphed on to the chronograph tape by a distinctive sign. The gold was then remelted, and the impurity to be added was carefully weighed, wrapped in pure gold foil, and added to the molten mass, which was well stirred with a fine clay stirrer, and replaced in the furnace to make sure that the mass was thoroughly fluid. The crucible was placed in position over the thermo-junction, and the freezing point observed as before. Lead and bismuth exert a great influence in diminishing the tenacity and extensibility of gold, and they were therefore first selected with a view to study their action upon its freezing point. In the gold-lead series, Fig. 10, the full curve A is the normal line, representing the freezing of pure gold, and the dotted curves B C D were obtained as the results of successive additions of lead, B corresponding with 0.2%, C with 0.4%, and D with 0.8% of lead. The lowering of the freezing point was found to be proportional to the amount of lead added. No marked pasty stage was detected, and the lowering of the freezing point appears to be about 19° C. or 34° F. for every atom of lead added to 100 atoms of gold.

The calculations are as follows: The atomic theory assumes that there are as many atoms in 196 parts by weight of gold as there are in 208 parts by weight of lead. Consequently, if 0.2% of lead be added to a mass of gold, there will be  $0.2 \times 196 \div 208 = 0.19$  atom of lead per hundred atoms of gold. Dividing the observed fall of the freezing point in degrees centigrade by the number of atoms of impurity which causes it in a hundred atoms of gold, the figure known as the "atomic fall" is obtained; and this is nearly constant for any given mass of an individual metal. As soon as 0.3% of lead is present, oxidation causes a little trouble; and apparently a simple molecular action gives place to one of more com-

\* Comptes Rendus, vol. cx., 1890, p. 348. † Annales de Chimie et de Physique, vol. xx., 1890, p. 66. ‡ Philosophical Transactions of the Royal Society, vol. clxix., 1888, pp. 339-349.

\* Riemedijk, Journal of the Chemical Society, vol. Iv., 1889, p. 663; vol. lvii., 1890, pp. 376 and 656. † Journal of the Chemical Society, vol. Iv., 1889, p. 521. See also Tammann, Zeitschrift für physikalische Chemie, 1889, p. 441.

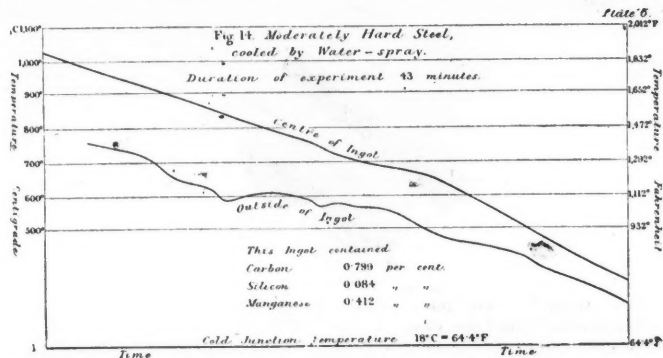
plex character, the result being that the further alteration of the freezing point is not so great as it was initially.

The series with bismuth showed a very regular lowering of the temperature of the freezing point, giving an atomic fall of 17° C. or 31° F. up to 2% or 3% of bismuth. Even with 19% of bismuth there is a point well marked in the curve, showing where solidification commences. A study of these curves gives rise to a suspicion that a "trace" of impurity has an important effect upon the latent and specific heats; but until the experiments are repeated under very accurate calorimetric conditions, this point is uncertain. Bismuth probably gives a eutectic alloy of very low melting point, the pasty stage being maintained down to temperatures differing but little from that of melting lead; but the experiments have not been carried further at present. It is remarkable that a small quantity of bismuth in gold produces a lead-gray or almost purple color of the fractured surface, which, upon burnishing, becomes at once golden yellow. This is doubtless due to the very distinct lamination that can be observed, the granules of nearly pure gold being surrounded by a brittle and impure mass.

Platinum gave an interesting series of results, which indicated an atomic fall of 17° C. or 31° F. But gold is very soon saturated with platinum; apparently 0.6% is sufficient for that purpose. The first addition of platinum at once stopped the "piping" of the solidifying mass, which is so marked a feature in very pure gold, and gave the characteristic crystalline surface which indicates the presence of platinum. An accident prevented the series from being carried beyond 1% of platinum, which amount, however, is sufficient to raise the freezing point again to that of pure gold.

Silicon, which has a small atomic weight, exerts a great influence on the freezing point of gold; but much difficulty was experienced in getting it to alloy with the gold. The fall produced was at the rate of 16° C. or 29° F. for each atom in a hundred atoms of gold.

Manganese was also somewhat difficult to alloy; but after the union of the gold and manganese had been effected the mass behaved in a peculiar way, indicating considerable internal changes in their mode of association near the freezing point. The bath remained quite mirror-like and limp until the freezing point was reached; it then suddenly clouded over, and a granular mass began to form. The results were remarkable from the



fact that the atomic fall was found to be only one-half that obtained in most other cases; thus there is reason to conclude that manganese exists in this particular instance as a diatomic molecule.

The effect of aluminum was also studied, on account of the interest it possesses in connection with the metallurgy of iron. The gold combined with this metal with avidity, and when cold the fracture showed very marked granular structure. A study of the curve indicates that an almost chaotic state is produced in the gold by the addition of aluminum: not only is the point of initial freezing lowered, but the metal only partially solidifies during a very long range of temperature, and could easily be poured at several hundred degrees lower than the initial freezing point. This in all probability is the reason for the conflict of opinion as to the amount and nature of the change produced in the freezing point of wrought iron by the presence of aluminum, as in the case of the well known "mitis" castings. The long pasty stage which aluminum sets up is very deceptive, and renders it difficult to determine which is the true freezing point. Aluminum has a low atomic weight, and causes a very considerable fall in the freezing point of gold; this fall, however, is only one-third of that produced per atom by other impurities.

Silver occupies a remarkable position in the series. Very pure silver was used, which had been tested by Stas; but it required nearly 5% of silver to cause any appreciable lowering of the freezing point. Whether solid gold is capable of dissolving silver cannot yet be proved; but it opens an extremely interesting field for research.

STEEL.

From the engineer's point of view the most interesting information which the pyrometer has as yet afforded is connected with the measurement of internal stresses in iron and steel. Osmond's work has shown that molecular changes take place in steel; and it is evident that the occurrence of these changes must be of vital importance when the metal is subjected at high temperatures to mechanical operations such as a rolling or forging. The question naturally arises, Do the molecular changes in the iron take place at one moment throughout the mass of metal? that is, is the rate of cooling approximately uniform throughout the mass? Or does the external portion of a hot ingot cool so much more rapidly than the center as to allow the molecular changes in the iron, and the alterations in the relation between the carbon and the iron, to become completed near the surface long before they take place in the interior of the mass? The experimental difficulties in the way of obtaining information upon these points have hitherto appeared to be insuperable; but the pyrometric method used in this research affords most important evidence, as a brief description of the following experiments will show:

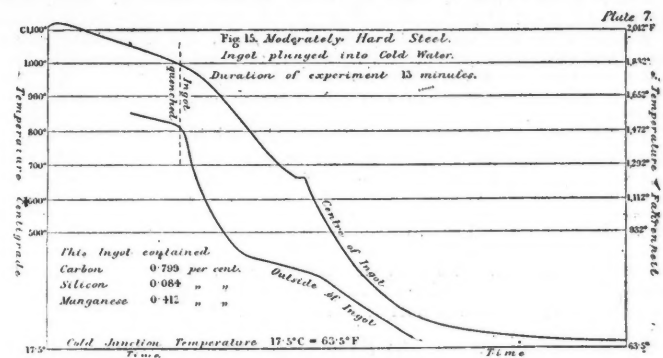
Two thermo-junctions made from adjacent pieces of the same coils of wire, and both insulated in the ordinary way by means of pipe clay tubes, were carefully prepared. A miniature ingot of mild steel, 4 in. diameter

and 8 in. long, shown in section in Fig. 8, was provided by the Director-General of Ordnance Factories; one hole  $\frac{1}{8}$  in. diameter was drilled from the center of one end to a depth of 4 in., and another hole of the same diameter was drilled near the edge of the same end to a depth of 1 in. The ingot was then heated to bright redness in a furnace; and when it had been withdrawn, the two thermo-junctions were inserted, one in each of the holes. Then by means of a special switch they were alternately connected for short but measured periods of time with the galvanometer of the photographic recording apparatus. Curves were thus obtained from both the thermo-junctions simultaneously, each curve being made up of short dashes. In the case of mild steel the evidence as to molecular change was but slight, but with a single ingot of moderately hard steel the results, which are shown in Figs. 13, 14 and 15, are very interesting. This ingot contained 0.799% of carbon, 0.084% of silicon and 0.412% of manganese.

In Fig. 13, which represents the cooling of the ingot in air, the upper curve records the cooling of the ingot and the lower the cooling of the outer portion. The initial temperature at the center was 1,160° C. or 2,120° F. The molecular change in the iron can be detected at 880° C. or 1,616° F., and the carbon change takes place at 696° C. or 1,285° F. In the lower curve, representing the cooling of the circumference, the carbon change takes place no less than four minutes earlier than at the center, and at the lower temperature of 66° C. or 1,229° F. as compared with 696° C. or 1,285° F. This is a most interesting point, as Osmond has already shown that the rate of cooling has a measurable effect upon the temperatures at which molecular change occurs. The great internal strain which must be set up between the points marked A and B in the upper curve is evident when it is borne in mind that the carbon change is accompanied by a considerable alteration of volume.

In Fig. 14 is shown a pair of curves obtained from the same ingot when cooled by a water-spray. These present but few additional points of interest.

In the experiment represented by Fig. 15 the ingot was plunged, when its exterior was at a temperature of 850° C. or 1,560° F., into a tank of cold water. The lower curve, however, representing the rate of cooling of the outer portions of the ingot, is not strictly autographic, as it was



slightly defective on the original photographic plate for temperatures below 600° C. or 1,100° F. The upper curve is autographic throughout.

In all these experiments it was found that the flow of heat from the centre of such an ingot was not sufficiently rapid to prevent there being considerable variations in temperature within the mass. There can be but little question that such experiments will deserve careful attention, and in the hands of competent observers should be fruitful of results.

**On Certain Very Definite Alloys of Sodium.**—M. Joannis (*Comptes Rendus*, cxiv., No. 11) has obtained the compound,  $Pb\ 81.62\% Na\ 18.38\%$ , contaminated, however, with a sodium amidide. On exposure to the air this compound heats strongly and in contact with water is decomposed, leaving soda and lead in the form of black flocks. The alloy of lead potassium,  $Pb_2K$ , is obtained by the action of an excess of potassium upon lead. Bismuth-sodium alloy,  $BiNa_3$ , is obtained in an analogous manner. It ignites spontaneously in the air, throwing up a splendid sheaf of sparks. It is decomposed by water with an escape of pure hydrogen. Antimony-sodium alloy,  $SbNa_3$ , is obtained in a similar manner. It ignites on exposure to air, and is decomposed by water with an escape of pure hydrogen.

**Ancient Gold Workings in Mashonaland.**—At the February meeting of the Royal Geographical Society (England), Mr. J. Theodore Bent gave an account of his explorations among the ruins in Mashonaland, South Africa. Those known as the Zimbabwe are the most extensive, covering a vast area, of which the center is a circular building "which is a perfect specimen of an ancient phallic temple," with massive walls, monoliths, three entrances, and "marvelous interior arrangements." Upon a hill above it was a fortress of extraordinary strength, within which was another temple, with an altar built of small granite blocks. Near this were found quantities of soapstone phalli. Its semicircular outer wall was decorated with pedestals five or six feet high, bearing carved birds resembling a vulture. Buried in the earth were iron bells, fine barbed copper spearheads, fragments of pottery of excellent glaze and workmanship, pieces of Persian and Celadon china, and soapstone bowls carved with representations of hunting scenes, processions, animals, geometrical patterns, and one inscription. Not far off stood a "gold smelting furnace made of very hard cement," crucibles of the same material, tools for extracting gold from the furnaces, burnishers and crushers. There were also heaps of "quartz casings, from which the gold-bearing quartz had been extracted prior to crushing." As the ruins were far from any gold reef, it is evident that the people who mined the gold chose this place for their capital because of its peculiar defensive advantages. Who these were is not yet clear, though Mr. Bent does not hesitate to say that they were of Arabian origin. As to the time in which they lived, one thing only is certain that it was before the days of Mahomet.

## WHAT A WAGON ROAD OUGHT TO BE.\*

Written for the Engineering and Mining Journal by G. M. Ford.

In our land of railroads and steam engines we have unaccountably allowed our wagon roads to fall into neglect. Indeed, but few of the road overseers who are appointed to see to the general welfare in this particular have even an intelligent idea of what a road ought to be. An ideal road should be perfectly straight, perfectly level, perfectly dry, perfectly hard and perfectly smooth; but, like all ideals, this is perfectly unattainable, and it is an open question if it would be best even if it were. However, these five requirements, in practical work, and under natural circumstances, are very conflicting and must be modified to suit the exigencies of each particular case.

A road should be perfectly straight in order to be the shortest distance between the points which it is to connect. But it is also important that a road should be as level as possible, and in hilly countries these two requirements conflict. A road should be level in order that the least possible amount of force may be expended in traction; and, on the principle that "straightness should always be sacrificed for the sake of obtaining a level," a good road, instead of climbing every hill and descending into every valley, will avoid, as much as possible, any change of level by winding around the hillsides. Besides, this can often be done without materially increasing the distance. In many cases a level and curved road around a hill is but little, if any, longer than the so-called straight one over it, considering both vertical and horizontal straightness. But even if the distance should be much greater, the level road would still be best, since a horse can draw a heavier load and travel much faster over it.

In ascending a steep hill the force of gravity tends to increase greatly the weight of a load, the increase being to the weight of the load as the height of the plane is to the length traveled. Thus a road ascending 1 ft. in 25 will increase the load  $\frac{1}{25}$  of its original weight. This theory fully accords with the results of experience, and it has been practically demonstrated that, representing a load as what a horse can draw on a dead level, he can draw but 90% of that load on a slope of 1 ft. in 100, and but 25% on a slope of 1 ft. in 10.

The popular theory that a gently undulating road is much less fatiguing to horses than a level one has given license for the construction of roads that have a rise *in toto* of many feet more than is necessary. This, however, is disproved by the statement of Dr. Barclay, an eminent professor of comparative anatomy of Edinburgh, Scotland, that it is "demonstrably a false idea that the muscles can alternately rest and come into action under these conditions." So we find true the principle that a road should never be allowed to ascend or descend a single foot more than is absolutely necessary.

While a perfectly level road is desirable, yet it is not advisable unless, as along a hillside, the land slopes away from it, thus giving a good drainage, for dryness in a road is even more essential than levelness. Now the maximum slope in a road, in ascending concerns the draught, and in descending, it concerns the safety of rapid transit. It is found to be about 1 ft. in 30 to 35, according to the nature of the road-bed. But the minimum slope is wholly concerned in the drainage, and this should never be less than 1 ft. in 125. If a road were a dead level, the water would stand in the ditches and undermine the road-bed, or in the road-bed itself, so that it would always be muddy during wet weather; and this should be carefully avoided.

We have now considered the three primal requisites for a good road, but there are still two which are of considerable moment. They are hardness and smoothness. On a soft road-bed the wheel of the ordinary wagon will be continually cutting ruts and leaving depressions in which water may gather and the road will become muddy. It is also impossible to keep such a bed in the proper shape for drainage, for the vehicles continually passing over it will wear it away, and it will tend to become flat. Besides this the softer the road the greater the traction. A rough road also tends to increase the traction and should be made as smooth as possible.

The width of a road will, of course, depend upon the amount of travel it is to accommodate. This should never be less than 16½ ft., which is sufficient to allow two ordinary vehicles to pass each other. A width of 33 ft. is amply sufficient for all country roads, and unless the road is very much used it is never necessary to go beyond this, at least for the road-bed.

In constructing a road through a level country it should always be raised above the level of the land to avoid making it a drain during rainy seasons. The material from the ditches can be used for this purpose. The bed having been raised to the proper height, care should be taken in shaping it. It has been found that two planes meeting in the center of the road, having the angle slightly rounded, is best. The angle of inclination may be about 1 ft. in 24. This gives a dry bed, with no danger of upsetting a wagon, and induces travel indifferently on all parts of the bed. In a steep hill the slant may all be toward the inside, and the ditch on the upper side may be drained by blind ditches leading under the road. This will do away with the system of breakers, which are among the greatest evils of our country roads.

There should be raised foot paths on the sides of all carriage ways. They need not be more than six or eight inches high, and while they require some little additional labor in construction, they richly repay the expense in their added comfort to pedestrians. Outside of these should be placed the ditches, one on each side in a level country and one, on the upper side, when the road is constructed on a hillside. These are very important, since they are essential to the dryness of the bed, and under the most favorable circumstances they should be between two or three feet deep, the depth increasing with the width of the road and the nature of the soil. To prevent their being filled up, it is well to have a hedge or fence between them and the foot paths, and great care should be taken to keep them clear of obstructions.

As regards the covering of the roadbed, this should be such as will combine cheapness with durability. Among the best is gravel and finely broken stone. Paving stone is really the best, but it is too expensive for ordinary roads. In soil especially suited to the purpose, the bed may be

left bare. In this case especial care should be taken in regard to the drainage.

While the first roads of our country cannot strictly be said, like the streets of London, to have been laid out by the cows, nevertheless, they were often the results of accident, being the nearest route from house to house of the neighbors, in what was then sparsely settled districts. As the population of the country grew, these were seldom changed, but simply widened to accommodate the increase of traffic. Thus we have many poorly located roads, which the farmers now object to changing, preferring them as they are to having their farms cut up in making new ones. Yet it would be greatly to their advantage to do this, since they waste much more time and labor in traveling over steep roads than the land which would be spoiled in making new ones would be worth.

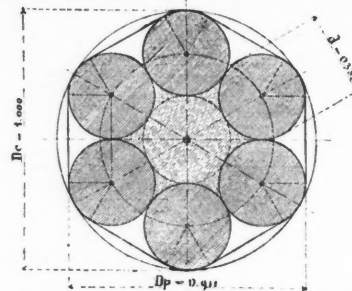
## MEASUREMENT OF WIRE ROPES; CIRCUMFERENCE vs. DIAMETER.

By A. S. Hallidie.

A custom has obtained of measuring ropes by their diameters, and the consequence has been that many disputes have arisen between the seller and buyer regarding the actual size of such ropes. The method that has generally prevailed heretofore has been to measure ropes by their circumference, and this custom is still in use where ordinary technical or business accuracy is required, and no other way of measuring a rope can be relied on for accuracy and fairness. This applies equally to all kinds of ropes, whether three, four or six stranded.

Take, for example, a rope made of six strands; its section is as shown in the accompanying diagram, and there being no accepted rule as to where the diameter shall be measured, it may be taken at any part of the circumference of the hexagon formed by the six strands.

Now, what constitutes a one-inch rope when measured by diameter? Is it one inch measured on a line cutting the axis of two opposite strands, or is it measured on a line cutting midway on the faces of the hexagon, or is it any point between? There can be no dispute as to this method of measurement applied to a round bar of iron; but modify the circle to suit the conditions of a six-strand rope (nearly all *wire ropes* are thus made) and the trouble begins. The measurement on line "De" is one



inch, but on line "Dp" it is only 0.911 inch; hence there is a cause for dispute that would not exist if the circumference was taken as the measure, instead of the diameter.

But even in measuring the circumference of a rope there is a possibility of unfairness, in the absence of a defined method of measurement, although this possibility is much reduced. Such ship chandlers and hardware men as are required to sell rope by circumference are very apt to take a piece of rope yarn and wrap it around the rope, and cut across the overlapping parts; but a mining or cable railway superintendent requires a more accurate way of measuring, and will take a place of twine.

Better than either is a piece of ordinary writing paper about one-quarter inch wide, which is wrapped around the rope, and cut off at the overlap with a sharp knife. This will give the circumference measured on the faces of the hexagon, and determine exactly the size of the rope.

A careful consideration of the question will show this advantage in measuring rope this way; each division of space of the circumference is three times that of the diameter, hence the circumference is three times as accurate, and in every way, both as to fairness, accuracy and simplicity, is to be preferred. The diagram shown herewith will graphically explain my argument. In this  $d$  = diameter of strand;  $Dc$  = diameter of circle;  $Dp$  = diameter between hexagon sides;  $C$  = circular circumference;  $Cp$  = hexagonal circumference;  $Dc = 3d = 1.000$ ;  $Dp = 2.732d = 0.911$ ;  $d = \frac{Dc}{3} = 0.333$ ;  $Cp = 9.14d = 3.046$ ;  $C = 3.14 = 3.1416$ ;  $C = 1.031 Cp$ ;  $Cp = 0.97 C$ .

**A New Method for the Treatment of Zinc Residues.**—*La Société Anonyme de Produits Chimiques*, of Paris, has patented a new process for the treatment of residues containing zinc. Ores or residues containing zinc are, according to this invention, treated with bisulphate of soda, whereby two kinds of industrial residues can be utilized for the production of commercial products. The one residue comprises zinc turnings, filings, scraps, clippings, scum and dross from molten zinc, and various other residues too poor in zinc for distillation in the furnace. The other residue is the valueless residue of chemical works, known in commerce as bisulphate of soda. The treatment of the zinc residues with the bisulphate of soda is effected in a closed boiler, or preferably in an ordinary reverberatory furnace, the proportions of the mixture varying according to the richness in metallic zinc of the residues under treatment. The charge is drawn from the furnace immediately the mass becomes pasty and thrown into water, which dissolves the zinc and soda in the form of sulphates charged with sulphate of iron, the earthy and other impurities being precipitated. After decantation, the dissolved iron is separated from the liquor by the ordinary method. From the filtered clear neutral liquors, sulphate of soda is crystallized out, collected, and, after being desiccated to render it anhydrous, is put into sacks or barrels for sale. After decanting the mother liquors, lime water or sulphide of sodium is added, and the precipitate is calcined at a dull red heat in a crucible, the resulting product being zinc white.

\*This article is sent us in response to our offer to publish essays in competition for the prizes offered by the Pope Manufacturing Company, of Boston, made in our issue of February 27th.—ED. E. AND M. J.



## BLAST FURNACE SLAG; ITS DISPOSAL AND UTILIZATION.

By William Hawdon.\*

The disposal of slag by mechanical means engaged the writer's attention more particularly in the year 1885, when all the land available for slag tipping at the Newport Iron Works of Sir B. Samuelson & Co. at Middlesborough had been pretty well filled up. He then designed the apparatus shown in the accompanying engravings, of which Fig. 1 is a longitudinal view. *A A* are endless chains made of long steel or iron links, which are fastened together by pins or rivets. *B* is the primary driving shaft, driven by a small engine, or if more convenient by a belt. At *C* is a pair of pulleys over which the endless chains pass; they are driven from the shaft *B* by geared wheels, and cause the chains to travel in the direction shown by the arrow. The pans which carry the slag are fixed on the chains, and are shown in cross section in Fig. 2. They are 90 in number, and are each made in three pieces and are bolted on the chains *A* by means of two lugs cast on the bottom. The slag is conveyed from the furnace by means of the trough *F*, from which it flows in a molten state into the pans as they travel beneath it. The pans then pass through the water trough *D*, after which the slag is still further cooled by being sprinkled with water from the perforated pipe *H*. Finally in passing over the pulleys *E* the slag is tipped out of the pans into a chute discharging into wagons *E* beneath. For taking up any wear on the chains, a worm wheel and screw, fixed at *J*, are connected by links *K* to the pulley shaft *E*, whereby the chain can at any time be tightened up as required.

At the Newport Works the eight machines are each driven by a steam engine with single 5-inch cylinder; but only about half its power is really necessary. The chains are run at slightly varying speeds, according to the output of slag, the average rate being about 13 ft. per minute. The eight machines together deal with 1,000 tons of slag per 24 hours. In the water trough *D*, into which the pans dip down with the chains after passing the bearing pulley *G*, the water is kept at a level reaching about two-thirds up the sides of the pans, and kept boiling by the heat, a certain portion of it usually splashes over into the pans and assists in cooling the slag; but this is not essential to the process. Two or three trucks are kept in reserve on a slight incline, so that when one truck is full another is lowered

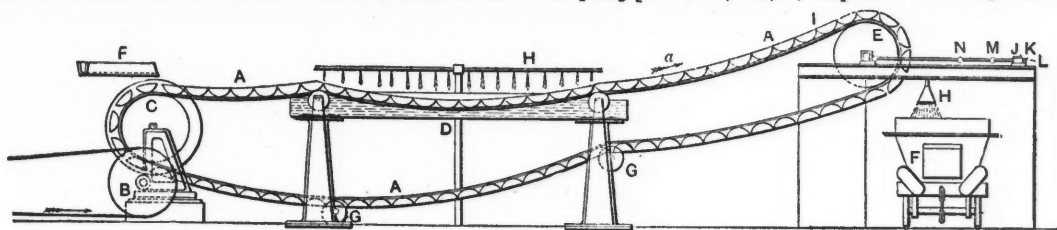


Fig. 1.



Fig. 2.

## HAWDON SLAG CARRIER.

into its place without stopping the machine. The trucks are made with bottom doors, or with side or end tip, to suit the particular requirements of the works where they are employed.

At casting time the slag which may follow the iron at the end of the cast is run into cast iron troughs, and when cooled is broken up by the slagger and thrown into the trucks, so that bogies and boxes are dispensed with in the general working of the blast furnace when these machines are employed. There is thus a considerable saving in labor, and in wear and tear of machinery and material employed in the disposal of slag from ordinary blast furnaces. Burst balls of slag, which might burn up the sleepers and roads and cause extra labor, are unknown. It is now no longer necessary to bar the balls off the trucks at the tip; and the constant repair, renewal and shifting of rails and sleepers on the tip are now unnecessary. Two men per shift do the whole of the work required for the disposal of 6,000 to 7,000 tons of slag per week at the Newport Works, with one locomotive per shift, which is assisted on the day shift only for one-half of the time by a second locomotive, thus averaging 1½ locomotives per shift, in place of three locomotives when tipping on a mountain of slag. The enormous wear and tear of bogies and boxes due to the hot slag is now done away with; and the wear on locomotives is reduced to a minimum, the dust and dirt due to the old method being dispensed with.

The slag is run into the pans about one inch to two inches thick, and breaks up into pieces from the size of a nut to a few pounds weight. It is largely used in roadmaking, especially for the foundation of new roads. For concrete, being already small in size, it requires little further breaking to make it suitable; and for this purpose it has been found to be particularly adapted, some thousands of tons having been used for the walls of piers, wharves, etc., and also for the walls of buildings.

**Tests for Cement.**—Mr. V. de Michele, of 14 Delahay street, Westminster, London, proposes the following tests as sufficient to insure a good, sound Portland cement: Pats ¼-in. thick in water, absolutely sound at seven days; tensile strength, 400 lbs. per square inch at seven days; fineness, 10% residue on a 50 sieve. In carrying out the tests the following precautions should be adopted: The pats should be gauged on glass, immersed in water immediately, and left there for the whole period, one pat to each three bricks. The test bricks should be gauged by a skilled man, with any quantity of water, in any way he likes. The average of three should be taken, which should represent about 100 tons or less. The strain should be applied as quickly as possible. The sieve should have 2,500 holes per square inch, and be of wire 1/16-in. in diameter. Shaking should be continued until nothing ground in the mill passes.

\* From a paper read before the Institute of Mechanical Engineers (England), February, 1892.

## DECISIONS OF THE COURTS AFFECTING THE MINING INDUSTRY.

Department of the Interior.

## MINING-CLAIM—CONTESTED POSSESSION—JUDICIAL PROCEEDINGS—DUTY OF LOCAL OFFICERS.

1. The judgment of the court in mineral cases is made conclusive upon the parties by section 2326 Rev. Stat. U. S.

2. When in a suit for possession of a claim judgment has been rendered it is error on the part of local officers (register and receiver) to allow entry of claim in the absence of the judgment-roll. It is their duty to make the entry conform to the decision of the Court, as shown by the judgment roll, and then to transmit the same to the General Land Office, in order that the patent may also conform to it, as provided by the statute.—*Owners of Silver King Lode*, appellants, v. *Owners of Sanquoy Lode* (Colo.)—[Land Office decision for respondents affirmed by Secretary, March 29th, 1892.]

U. S. Circuit Court.

## REMOVAL OF CAUSES—FEDERAL QUESTION—DOUBTFUL QUESTIONS—MINING ACTS—PRIOR SUPREME COURT DECISIONS—U. S. PATENT—QUESTIONS OF FACT.

Action between parties to quiet title:

1. Whether a certain mine is a "vein," "lode," or "ledge" within the meaning of the United States Revised Statutes (secs. 2,320, 2,322, and 2,325) is a question of fact to be determined from the use of those terms among practical miners, and the decision thereof involves no federal question within the meaning of the acts providing for the removal of causes.

2. A question as to what is the top or apex of a mineral vein is also one of fact, which involves no federal question.

3. A cause is not removable when there is no doubt as to whether a federal question is presented.

4. When the apex of a mineral vein passes through one end line and one side-line of the claim the owner's rights are determined by the case of *The Iron Silver Mining Company v. The Elgin Mining and Smelting Company* [118 U. S., 196, 6, Supreme Court reports, 1177], and the case

comes under the rule that when a proposition has been decided by the U. S. Supreme Court it no longer involves a federal question.

5. The conveyance by patent of a mineral vein or lode whose top or apex is cut by the end-lines of the claim is a complete grant of the vein throughout its entire depth, although it may extend outside the vertical lines of the location; and hence any subsequent dispute as to boundaries is a controversy of fact which involves no federal question.—*The Blue Bird Mining Company (Limited) v. Largey et al.*, and *Largey v. The Blue Bird Mining Company (Limited)*. [U. S. Court, District of Montana, Feb. 3, 1892.]

**NOTE.**—The same questions were involved in both cases. The first cause was remanded to the State court whence it came, and in the second demurrer to the complaint of the complainant was sustained and the complaint dismissed.

**The Mineral Production of Tasmania in 1891.**—The quarterly mining returns for Tasmania show that for the three months ended December 31st the quantity of quartz crushed yielded 10,717 oz. of gold, as against 2,780 oz. for the corresponding quarter of 1890, while the amount of gold won from alluvial was 1,958 oz., as against 610 oz. for the last quarter of the previous year. There were 1,298 tons of tin ore raised, against 1,361 tons in 1890; while in coal the quantity raised was only 9,207 tons, as against 15,330 tons.

**The Nitrate Fields of Chili.**—The caliche, or raw nitrate of soda, is not equally distributed over the pampas, says a writer in *Blackwood's Magazine*. The most abundant deposits are situated on the slopes of the hills which probably formed the shores of the old lagoons. An expert can tell from the external appearance of the ground where the richest deposits are likely to be found. The caliche itself is not found on the surface of the plain, but is covered up by two layers. The uppermost, known technically as *chuca*, is of a friable nature, and consists of sand and gypsum; while the lower—the *costra*—is a rocky conglomerate of clay, gravel and fragments of feldspar. The caliche varies in thickness from a few inches to 10 or 12 ft., and rests on a soft stratum of earth called *cova*. The mode in which the caliche is excavated is as follows: A hole is bored through the *chuca*, *costra* and caliche layers till the *cova* or soft earth is reached below. It is then enlarged until it is wide enough to admit of a small boy being let down, who scrapes away the earth below the caliche so as to form a little hollow cup. Into this a charge of gunpowder is introduced and subsequently exploded. The caliche is then separated by means of picks from the overlying *costra* and carried to the refinery. Both in appearance and composition it varies very much. In color it may be snow white, sulphur, lemon, orange, violet, blue and sometimes brown, like raw sugar.

THE MANUFACTURE OF SULPHURIC ACID FROM BRIMSTONE AND PYRITES  
AT ATLANTA, GA.

Written for the Engineering and Mining Journal by N. P. Pratt.

Recently, while putting into operation a new set of chemical works, I took the opportunity offered of making a series of carefully executed test-runs, showing actual practical results from a sulphuric acid plant of 100,200 cu. ft. capacity, using pyrites, in the vicinity of Atlanta. This point being upward of 300 miles inland, and the ore used being imported Spanish "Sierra Morena," the results may be of interest. The works were built under the direction of the writer in the course of his regular technical practice, much doubt being openly expressed by our acid makers generally at the proposed use of foreign pyrites in this vicinity.

The furnace is a grate burner of 12 kilns, each 5 ft. 8 in. by 4 ft. 4 in. by 2 ft. 3 in. deep from charging door to grate bars, the ratio between burning surface and chamber being 1 sq. ft. to 317 cu. ft. of chamber space. The furnace and nitre oven is somewhat peculiarly arranged, but it is unnecessary here to discuss these features. The set consists of two chambers, one large main chamber and one small back chamber, whose capacity is 24% of the total chamber space; both Glover and Gay Lussac towers, with all modern appliances, are used. The two chamber pans are connected by pipe under the passage floor.

The works were duly started, water being used to lute the chamber curtains, though, of course, acid of proper strength was secured for tower and potting purposes. It has been the writer's custom to start his new chambers on water, which can be easily done without delay or damage under careful treatment. At the end of ten days the whole process was in full and satisfactory operation and properly regulated. When the acid withdrawn by the chamber syphon registered 44° Beaumé at 15° C., seeing the milling department would not be ready to receive any acid for several weeks, I resolved to make the tests herein discussed. The cargo of "Sierra Morena" ore on arrival was carefully averaged and yielded in the writer's laboratory in Atlanta, 52.43% sulphur. The depth, strength and temperature of all chambers and tanks were accurately recorded and care taken to weigh all charges as carefully as possible. The calculations are based on the standards adopted by the committee of the Franklin Institute, Philadelphia, March, 1882.

The total stock on hand, 11 o'clock A. M., February 6th, 1892, was as follows:

	Inches.	Beaumé. Deg.	Cu. ft.	Equivalent to lbs. 50° B.
Pan of chamber set.....	9'94	46	4,017'3	311,109
Ground tank No. I.....	12'0	61	44'4	6,109
" " " II.....	22'0	40	202'4	13,500
" " " III.....	11'0	62	40'7	5,802
Tower tank No. I.....	25'0	61	41'4	5,687
" " " II.....	25'0	40	45'0	2,992
" " " III.....	14'0	62	25'2	3,592

Total equivalent to 50° B. on hand at 11 o'clock, Feb. 6th..... 348,801

Stock calculated again, 11 o'clock A. M., February 11th, was as follows:

	Inches.	Beaumé. Deg.	Cu. ft.	Equivalent to lbs. 50° B.
Pan of chamber set.....	12'2	47'5	4,930'0	429,157
Ground tank No. I.....	12'0	61	44'4	6,109
" " " II.....	11'25	40	103'5	6,903
" " " III.....	19'5	62	72'2	10,291
Tower tank No. I.....	18'5	61	33'3	4,582
" " " II.....	16'0	40	33'3	1,921
" " " III.....	25'5	62	45'9	6,543
Consumed potting nitre.....				1,500

Total..... 467,007

As the stock on hand February 6th was 348,801 lbs. there was made in five days 118,206 lbs. 50° B. The total ore consumed on this five-day run was 48,000 lbs.

Stock calculated again, 11 o'clock A. M., February 19th, was as follows:

	Inches.	Beaumé. Deg.	Cu. ft.	Equivalent to lbs. 50° B.
Pan of chamber set.....	16'13	50	6,519'0	620,478
Ground tank No. I.....	16'0	61	59'2	8,146
" " " II.....	4'0	47	36'8	3,165
" " " III.....	15'3	62	56'6	8,068
Tower tank No. I.....	9'3	61	16'7	2,298
" " " II.....	17'3	47	31'2	2,683
" " " III.....	24'0	62	43'2	6,158
Consumed potting nitre.....				3,900

Total..... 654,896

As the stock on hand February 6th. was 348,801 lbs., there was made in 13 days, 306,095 lbs., 50° B. Total ore consumed on this 13-day run 124,800 lbs.

During this period the ore was fairly well burnt, the cinder carrying about 1.50% sulphur. Reckoning on a basis of 51% available to the chamber process, on the five-day test the yield was 300 units monohydrated acid per hundred weight of sulphur burnt out, equivalent to 482 units of chamber acid, 50° B. On the 13-day test the yield was 299 units monohydrated acid, equivalent to 481 units of chamber acid, 50° B. Each test, therefore, was confirmed by the other.

It was with difficulty that the newly trained furnace men could be made to keep the burner room floor clear of small lumps of fresh ore, dropping while re-charging the kilns. Indeed, it takes great vigilance on the part of the chamber manager to enforce proper care in this regard. On numerous occasions I have sampled for analysis cinder dumps of well burnt ore that were so mixed with lumps of unburnt pyrites as to render an otherwise valuable residue utterly worthless, besides entailing a loss of some 4% of sulphur contents paid for by the unit.

Manufacturers will often stickle for a small fraction of one per cent. when paying purchase money per unit, and yet the same manufacturers often lose much more by a policy which keeps incompetent men in their burner rooms and makes expert advice a stranger to their operations.

For the past 12 years the writer has had intimate professional relations with large chemical concerns throughout the South, and he has repeatedly made accurately conducted test runs covering long periods in the quiet

season when no acid was withdrawn from the chamber. These results have shown 294 units of monohydrated acid per hundredweight of best Sicily seconds charged. Reckoning on a basis of 93% pure this is 300 units per hundredweight of actual sulphur, equivalent to 482 units of 50° B. There is no reason in assertions often made that the yield per unit of sulphur consumed is smaller from pyrites than from brimstone, nor is the ratio of nitre necessarily greater in the use of pyrites. There is a scientific reason why more chamber space is required, but aside from this alone other shortcomings are entirely due to errors in construction, to improper handling of the plant or to both. During the pyrites test discussed four per cent. of nitre on the sulphur burnt out was used, a precaution taken on account of inexperienced furnacemen. The plant has since been running regularly on three per cent., below which I never care to drop.

From large experience I am satisfied in using brimstone an average of 1 lb. per 18 cu. ft. of chamber space yields the most economical results in this climate, though a smaller ratio can often be had at approved plants during the cooler months. In the use of pyrites, 1 lb. burnt out to 22 cu. ft. is satisfactory in every sense the year round, with less wear and tear on the kilns than upon the brimstone furnaces. Upon chambers where a pure, high grade ore is used, there is little reason to expect more wear and tear than where brimstone is used, and, practically, the difference is hardly worth consideration.

Dr. Lunge, in the recent edition of his great work on sulphuric acid, states, as the range of the best managed works on the Continent and in Great Britain, a yield of 250 to 290 units of monohydrated acid, giving as a result of his personal work 300 units under approved conditions. There can be no question but that 300 units can be had out of sulphur from either brimstone or pyrites in expert hands at plants of approved construction. When we remember this represents 482 units of chamber acid of 50° B, out of a theoretical possibility of 492.5, the results appear large, but are capable of practical proof.

I desire now to touch upon the question of comparative cost of acid from brimstone and pyrites in this city (Atlanta, Ga.), the result of careful tests with the sole object of arriving at the truth. We will use in this comparison "Sierra Morena" lump pyrites, the purest, highest grade ore on the market, and best Sicily seconds, delivered at the works in Atlanta. The calculations are based on pyrites lump at 14c. per unit at the port of Savannah, and brimstone at \$23 per long ton (2,240 lbs.) at the same port, this being the average price for brimstone for the past 10 years. I will, therefore, use this figure, discarding the abnormal price of this article prevailing for the past 15 months. As freight is equalized per sulphur contents, the ratio of comparison practically remains for most localities in the Atlantic and Gulf States. I will consider the actual output and cost from two plants of 100,000 cu. ft. each, bearing in mind, however, the greater economy obtainable from larger plants.

The pyrites test-run first discussed yielded for 13 days the following costs results: 124,800 lbs. Sierra Morena ore cost, delivered at works, \$517.40; 2,184 lbs. nitre, delivered at works, \$45.36; labor (4 men at \$1.25 and 2 men at \$1) for 13 days of 24 hours each, \$104; cracking ore by Blake crusher at 10c. per ton of 2,000 lbs., \$6.24; coal, 20,000 lbs. at \$2.50 per ton, \$50; insurance 13 days, 2% on \$30,000, \$21.40; standing repairs, wear, tear and taxes for 13 days, \$71.11; chamber manager at \$72 per month, \$31.20; total cost of 302,185 lbs., 50° B. acid, \$821.71. Entire cost of one ton (2,000 lbs.) of 50° B. acid from lump pyrites, \$5.43.

The cost results at a carefully managed brimstone plant of similar capacity yielded, under my personal direction, for 30 days, the following: 144,000 lbs. brimstone (best unmixed seconds), delivered at works, \$1,697.14; 5,040 lbs. nitre, delivered at works, \$104.83; labor (two men at \$2, two men at \$1.25) for 30 days of 24 hours each, \$195; coal, 45,000 lbs., at \$2.50 per ton, \$56.25; insurance, 2% on \$30,000, for 30 days, \$50; standing repairs, wear, tear and taxes for 30 days, \$164.10; chamber manager, \$72; total cost of 691,200 lbs., 50° B. acid, \$2,329.32; entire cost of one ton (2,000 lbs.), 50° B. acid from brimstone, \$6.77.

Taking the average cost of brimstone in Atlanta for the past 15 months, viz.: \$33.40 per long ton (2,240 lbs.), by substitution in the above calculation it will be seen that for the past season one ton of 2,000 lbs. of 50° B. acid has cost in Atlanta \$8.07. In other words, sulphuric acid is now being made in the neighborhood of Atlanta, from Sierra Morena pyrites, at 4c. per unit at the port of entry, for \$2.64 less per ton than it has cost Atlanta manufacturers the past season to make it from brimstone, and \$1.34 less per ton than the average cost of acid from brimstone here for the past 10 years.

With our brimstone friends bent on squeezing to the last possible degree, and with this article at best uncertain and feverish, these simple facts furnish food for much reflection, especially at this season of depression in all branches of chemical manufacture.

[The results obtained by Mr. Pratt, at Atlanta, as set forth in this article, agree very closely with the results indicated by Dr. Wyatt in the chapter on sulphuric acid manufacture in his "Phosphates of America."—Ed. E. and M. J.]

**The Phenomena of Coal Dust Explosions.**—At a recent meeting of the Chemical Society (England) "A Lecture Experiment to Illustrate the Phenomena of Coal Dust Explosions" was described by Prof. T. E. Thorpe, F.R.S. It is an apparatus by which the phenomena of a coal dust explosion, resulting either from a local explosion of fire-damp or by the direct action of a blown-out shot, may be illustrated. For class-room demonstration he recommends the substitution of lycopodium powder for the coal dust, on account of the greater ease and certainty of the experiment, and also because its use allows of the observance of certain phenomena, such as the mode in which the dust which escapes complete combustion is thrown on projecting objects, and also the fact that the explosion gathers strength as it progresses, which is made evident by the gradually increasing area of clear space before such objects as the dust is swept away by the force of the explosive flame. By observations made by means of a List manometer with this apparatus, he finds that there is no evidence of a diminution of pressure along the sides of the space through which the flame rushes, and he is of opinion that there is no experimental proof of the validity of the "suction theory" held by certain colliery managers, which assumes that in consequence of this alleged diminution of pressure occluded fire-damp is drawn out from the coal, and contributes to the violence of the explosion.

## FAILURES IN BOOMED TOWNS; SHEFFIELD, ALA.

Written for the Engineering and Mining Journal.

The town of Sheffield, in Colbert County, Ala., was "boomed" during 1886 by a company largely composed of persons who had been successful in speculations in Birmingham real estate. These people purchased large tracts of land on the south side of the Tennessee River, two miles from Tuscumbia, the county seat, and laid it off into streets, building lots and sites for manufacturing enterprises; several of the latter were started, prominent among them being a blast furnace owned by the Lady Ensley Furnace Company, one by the Hattie Ensley Furnace Company, and three by the Sheffield Coal, Iron and Railway Company—five in all. During the early part of the boom there was much enthusiasm displayed by all who were interested in the scheme as well as by purchasers, but the price of real estate was carried to such high figures that the feeling began to subside, as it was clear that the resources of the place did not justify them; the speculative fever once broken, it has been a hard matter to revive it, though there have been repeated efforts in that direction ever since the first relapse.

The chief foundation upon which the claims for the future prominence of Sheffield were based were its applicability to the manufacture of cheap iron. Starting, as it did, at a time when the cry of "eight dollar iron" was the slogan for Birmingham and its followers, the place would have received little attention had it not taken up the same password. Incidentally, its prospectus pointed to the fact that anything, from table ware to mowing machines, could be manufactured there more cheaply and sell more readily than at any other place in the country, and that with its various advantages in this way and transportation by rail or water, it was destined to become the manufacturing center of the New South. A number of brick and many frame buildings were erected, and during the construction of these and the furnaces much money was

field (30 miles distant), from \$1.80 to \$2.25 per ton. Coke can be secured at Jasper, Ala., and delivered for \$2.75 per ton, and from Pocahontas for \$4 to \$4.25. Limestone is abundant throughout the country, and can be delivered for about \$0.65 per ton. With these figures a close approximation to the cost of producing iron at Sheffield can be made.

Assuming that one-half Jasper coke is used with an equal amount of Pocahontas, 2 tons ore at \$2 per ton = \$4; 2,400 lbs. coke at \$2.75 and \$4 per ton = \$4.05; 5 tons of limestone at \$0.65 per ton = \$3.25; total cost of material, \$8.37; labor and other items, \$3.25; total cost of iron per ton, \$11.62, to which is to be added freight to Chicago, \$3.60; Cincinnati, \$2.50; Louisville, \$2.25. The iron is much darker and stronger than the average of that made in the South, and brings a slightly better price.

Apart from its nearness to good ore, this place has no claim as a good locality for the production of cheap iron. Coke must be transported for long distances, involving increased loss in braize and delay in delivery both of which will rapidly eat up what small profit there may be in the iron. The facilities for shipping are only fair; by crossing the river a branch of the L. & N. Railroad may be reached, and otherwise the iron must go on the Memphis & Charleston for delivery to roads touching its destination. During certain seasons in the year shipment may be made by boat, but this means long delay in final delivery, and has not as yet been adopted to any extent.

Of the other enterprises in the place little can be said. None was started on a very large scale, and a few have survived and are working along, but by far the larger proportion of those which were talked about in the early days of the "boom," died before they passed the phase of changing from paper to construction.

Sheffield is well located for the production of steel by the basic open hearth process. The iron made from these brown hematites alone seldom runs over 0.60% phosphorus, and silicon can be kept below 0.50% with little difficulty. There are, indeed, few ores in the South which can so



JEFFREY GIANT COAL DRILL.

brought into the place and business thrived; banks, saving and loan associations, and various other institutions of like kind were present and gave it a decidedly busy appearance. After this work was over with and matters came to a standstill, workmen began to leave and business drooped in consequence. This state of affairs went from bad to worse, and the most strenuous efforts of the promoters to bring it back to its former state have resulted in only a little temporary excitement, which has as quickly subsided. The scattered brick buildings, with many a foot of once valuable "town lots" between them, give the place a rather desolate appearance, which is added to by the untidy condition of the few stores and other institutions there. All the indications of poor trade are self-evident, and it is apparent that with Florence and Tuscumbia, both older towns, so close by, the country trade is too much divided to give a profitable business to any of them, and Sheffield gets least of all.

Shortly after the completion of the furnaces they were put in blast, and two, the Lady Ensley and Hattie Ensley, have been in almost continuous operation ever since. One of the furnaces of the other company was also in action for some time, but after the concern failed and the plant went into the hands of a receiver, it was blown out and has since remained idle. After the receiver's sale to a new corporation, called the Alabama Coal and Iron Company, many repairs were made and everything placed in shape for operating, the evident purpose being to sell the plant, as many of the members of the new company were interested in the former one, and also in the town company, and have been endeavoring for some time to get their money out of the place.

The iron ore used by these furnaces comes mostly from the extensive Ensley mines, at and around Russellville, Franklin County, Ala., and is probably the richest brown hematite occurring in the South. Analyses of shipments covering a long period gave as an average: Iron, 53.67%; alumina, 5.58%; silica, 8.52%; phosphorus, .327%. In the furnace this works well, giving an unusually fine quality of iron. These ores all occur in clay from which they must be washed. At Russellville the material handled will average from 20% to 25% ore, which costs, washed and delivered in Shef-

easily be handled for this purpose as those used here. Other conditions are favorable, and, if such a plant were operated in connection with one of the furnaces, thus insuring a supply of iron at cost price, no reason is apparent why it would not succeed. Other establishments to work the steel into shape for market could follow, and with wise and vigorous management, soon find sale for a large quantity of material. The nearest competitors in this line are Chicago, St. Louis, Chattanooga and Birmingham, and the latter two are at the disadvantage of having to use iron made from the fossil ores of their district.

If such plants are started it should be done in a strictly business manner and with capital sufficient to tide a long way past the experimental period which follows such work, no matter how familiar with it the manager or employes may be; moreover, for a time after starting, it will be necessary to carry much of the finished material until a ready market can be established and competition overcome.

## THE JEFFREY GIANT COAL DRILL.

The accompanying illustration represents the Jeffrey latest improved power drill, which will be known as the "Giant Drill." The general construction of the frame is the same as the drills heretofore furnished, and which are now used largely throughout the coal fields. The Giant Drill is so called on account of the increased power derived from the new pattern of engine used, consisting of a double rotary valve engine, which in actual service develops, it is claimed, great power with a minimum consumption of air. A new and simple feed arrangement has also been added, but an air feed may still be used. In the latter case an air or feed tube is substituted instead of the screw. Being operated by air, the feed is not positive, which allows the auger or drill bit to advance slowly, when striking an unseen sulphur ball or hard cutting, thus preventing more or less strain. The Jeffrey Manufacturing Company, of Columbus, O., is the manufacturer of these drills.

## THE GOLD AND PLATINUM INDUSTRY OF THE URAL.\*

The auriferous deposits of the Ural have been classified by Karpinsky into primary and secondary groups. In the former gold is found either in quartzose vein-stuff, or interspersed through the mass of crystalline rocks, such as diorite and serpentine, while the secondary deposits are auriferous sands, situated either immediately above the primitive deposits, or transported to and re-arranged at some distance from the point of origin. Platinum is only found in secondary or alluvial deposits. The primary gold deposits of the Ural are very numerous, four groups of them being actually worked—namely, those of Berezowsk and Goroblagodask, of the district of Miask, of the Baschkir territory, and of the Orenburg Cossacks.

The Berezowsk deposits, which are the only ones that have been systematically developed to any extent, are included in an area of about 22 square miles, in which the prevailing rocks are schists penetrated by numerous veins or dykes of a fine grained granitic rock containing pyrites known as beresite, varying in thickness from 12 ft. to 120 ft. and upward, many of which extend beyond the limits of the mining region. The beresite dykes are traversed by numerous fissures filled with quartz, forming veins varying in thickness from about 10 mm. to 70 mm., or, on an average, 30 mm., having a general east and west course, often uniting into groups but never becoming parallel to the enclosing dyke. Sometimes, but rarely, they pass from the beresites into the neighboring schistose rocks. The vein-stuff, as well as the rock, where most auriferous, is rusted from the decomposition of pyrites; the best mines yield from 1 to 1½ oz. per ton, 10 grams (about 7 dwts.) being considered as the lowest workable limit. The pyrites is often much richer than the quartz, in some instances averaging up to 6 or 7 oz. per ton. Below the level of decomposition of the pyrites into gossan, or as it is locally called, *krassiks*, the gold appears to be entirely contained in the sulphides.

The secondary auriferous deposits, although called sands, are almost entirely clays, pure or somewhat sandy, and inclosing rolled masses and blocks of many different rocks. They are found throughout the whole Ural region over a length of more than 500 miles, having filled the valleys and forming marshy plains on both slopes of the chain, the larger development being, however, on the eastern side.

Gold is found in the alluvium in particles of all sizes up to large nuggets, accompanied by many other minerals, such as palladium, platinum, osmiridium, native copper, diamond, cinnabar, iron pyrites, magnetite, chromite, specular iron ore, rutile, brookite, anatase, corundum, garnet and quartz. Speaking generally, the deposits associated with rocks containing hornblende and augite are richer than those in which granite and gneissic rocks prevail.

The auriferous beds vary in thickness from about 1½ ft. to 3½ ft., in breadth from 60 ft. to 150 ft., and exceptionally to about 300 ft., and in length from 60 ft. or 80 ft. to 1,500 ft., the direction being generally parallel to that of the chain. The most extensive deposits are those of Balbuk, 2½ miles, and Stolbuk, 3½ miles long. The sterile covering or overburden is usually less than 13 ft., although exceptional deposits have been found at 60 and even 130 ft. below the surface. The cover very frequently forms peat bogs. The amount of gold varies from 12 to 39 grains per ton of sand, although occasionally it is double or even four times the latter amount.

Platinum has not up to the present time been found except in alluvial deposits, in which it is always associated with gold; sometimes the latter predominates, and the platinum may not exceed 1% of the product. On the other hand, gold may at times be almost absent, and the deposits in which this condition prevails, although less abundant, are those of most value. They are confined to districts of Nischne, Tagil, Goroblagodask and Biseik. In the first of these localities they extend for about 25 miles to the south of the village, and from the associated minerals, such as olivine and chromite, they appear to be derived from the waste of a mass of serpentine known as Mount Solvaiska or the White Mountain. The platinum is found in grains and nuggets, the largest of the latter weighing about 320 ozs. The yield varies from 39 to 195 grains per ton. The richest deposits, those of the Martiane River, are from 13 ft. to 16 ft. thick, and are covered by 60 ft. or 70 ft. of overburden chiefly consisting of clay. The conditions of occurrence in the other localities are similar to those described above except at Goroblagodask, where the bed rock of the alluvia is limestone, but outcrops of porphyry and serpentine are found in the vicinity.

The gold deposits are partly the property of the Crown or its lessees, and partly of private individuals, but in the latter case there is often a reservation of minerals which are subjected to special royalty rents. The rate paid by the Crown lessees is from 8½% to 20%, in addition to which a 3% tax is levied on all gold produced in any of the mines, the product being compulsorily salable to the State. Platinum working, on the contrary, is free from all taxation, and the government monopoly of refining, which was kept up for a time, having been abandoned, the product is mostly placed in the London and Paris markets.

In working the alluvial deposits two methods are followed. In the first the plant and apparatus are provided by the ground owner, who hires labor and directs the operations either personally or by deputy; while in the second, a system of tribute is followed, the ground being let to free workmen or *starateli*, who provide everything necessary for working, and deliver the produce at a fixed rate to the proprietor. This price may vary with the difficulty of working from \$9 to \$10.50 per oz.; but in all cases the prime cost in the proprietary workings is higher than in those of the free laborers, who are able to handle, to a profit, stuff with from 8 to 10 grains of gold per ton. Platinum sands are considered poor when containing less than 45 grains, and rich when above 180 grains per ton. The lowest profitable limit seems to be about 39 grains.

The platinum workings of Avrorinski are at present the most important operations of their class. The deposits, from 13 ft. to 16 ft. thick, lie upon a conglomerate of serpentine, are covered by nearly 80 ft. of dead ground, and extend for about 1½ miles, with a breadth varying between 70 ft. and 250 ft. The average yield is about 87 grains of platinum minerals per ton, but in places it goes up to 20, 30, or even 50 times as much. The working is entirely subterranean, small pits 70 ft. to 80 ft. apart

being sunk to the deposit, and the material, being drawn to the surface by windlasses, is washed in the ordinary Siberian frame at the mouth of the pit. About 400 hands are employed, the work going on night and day.

The crude platinum contains about 1 part in 4,000 of gold, which is separated by amalgamation and washing with water in large capsules. The final product contains 90% of platinum. The whole of the gold produced in the Ural and Siberia is sent to the Government assay office at Ekaterineborg, where it is melted and cast into bars, the assay of which forms the basis of final settlement between the Government and the miners.

## CALIFORNIA'S EXPERIENCE WITH SILVER.

California is not a free silver State, and never has been, says the San Francisco *Argonaut*. At no time in its history has there been any general expression of opinion in favor of the white metal. During the war California was a gold State through thick and thin; the Specific Contract Law, which has never been repealed, favored gold to the exclusion of any other metal or currency.

Nor can the experience of this State with silver coin during a number of years, when there was a varying and heavy discount on silver in spite of its legal tender quality, be forgotten; when manufacturers and employers of labor used to buy silver with which to pay wages, thus compelling the workmen of California to pay an enhanced price for articles of necessity, since the retail tradesmen made up for the discount on silver by raising the selling price of their goods. In those days every man tried to pay his bills in silver and collect them in gold. The result was, as always, that the final loss came on the workman, who paid silver to the retailer. The retailer had to pay in gold to the wholesaler, so he charged the workman gold prices. The workman who got \$20 a week in silver lost \$2 of his wages before they were put into his hand.

Here is another chapter of California's experience with silver. The trade dollar was worth 100 cents; two half dollars were worth 83 cents. The trade dollar, however, was not a legal tender—it was only minted bullion. But the workman was not up in these subtleties of finance—he took the trade dollar in payment of his wages, because it was worth more than two half-dollars, and he thought it was as good. In a few months retailers refused to receive trade dollars for more than 90 cents; they disappeared from circulation; but the last to take them were the workmen, and millions of dollars were made out of the wage-earners in this silver swindle.

## HUMPHERY'S NEW OXY-MAGNESIUM LAMP.

At the last meeting of the English Camera Club, in London, on the 22d ult., Mr. E. J. Humphery, M. A., exhibited a new magnesium lamp of his invention. This lamp is shown in section in Fig. 1. The oxygen enters the lamp from a cylinder, and common gas either at normal or, preferably, at a higher pressure. In the latter case a weighted gas bag is used. The powder is blown out in the shape of an Argand flame, but with pure oxygen in contact with its inner and outer surfaces. Above the flame is

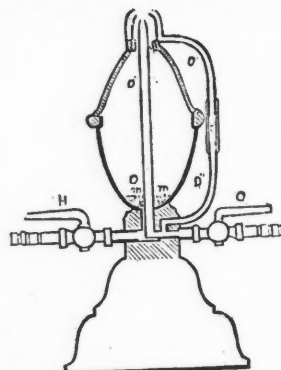


FIG. 1.



FIG. 2.

metal piping to convey the white smoke into the chimney of the room. It gives a dazzling light, and Mr. Humphery stated that Captain Abney had testified that burning magnesium in an atmosphere of pure oxygen increases the actinic power of the light 12 times. In Fig. 1 O<sup>11</sup> is the oxygen tap, H the coal gas tap, and *m m* the magnesium powder. Fig. 2 represents a glass globe in which magnesium ribbon is burnt in oxygen, and can be used as a hand lamp.

## ASSOCIATION OF APATITE WITH BEDS OF MAGNETITE.\*

By W. P. Blake, M. E.

The frequent association of apatite in layers in the midst of magnetic iron ore is highly significant of a stratified and organic origin of both minerals. Usually the phosphate of lime is more abundant toward the sides of the bed than at the center, where the magnetite may be entirely free of apatite, while at the sides, or near the planes of contact of the iron ore with the country-rock, apatite may abound. A few notable examples may direct attention to this matter and result in a great extension of the list.

The Sanford ore-bed, one of the largest and most massive of the enormous beds of iron-ore in Northern New York, carries enormous quantities of apatite in thin layers apparently stratified, or the result of segregation, and this apatite, known locally as "red sand," is most abundant toward the confines of the bed. Crystalline apatite may also be found in the outer layers of the bed of ore at Iron Mountain, Mo., and similarly in some of the enormous beds of magnetite in Southern Utah.

\*A paper read before the American Institute of Mining Engineers, Baltimore meeting, February, 1892.

\* From *Annales des Mines*, Vol. XVIII, p. 537.

## THE MINING LAW OF ONTARIO, CANADA, OF 1892.

Written for the Engineering and Mining Journal by A. Blue.

The mining laws of Ontario have been consolidated and amended by an act of the session now closing, under the title of "The Mine Act, 1892." The principal changes of the new measure relate to the royalties, the price of mining lands, the right to work minerals reserved to the Crown, and the staking out of mining claims.

The act of last year, which provided for the levying of royalties on ores and minerals, fixed the rate at 3% on silver, nickel and copper ores, not exceeding 2% on iron ores, and on other ores and minerals such rates as might be imposed by order in Council, not exceeding 3%, reckoned in all cases upon the value of the ore or mineral at the pit's mouth. Under the new act the royalty is calculated upon the value at the pit's mouth less the actual cost of labor and explosives for mining and raising the ores to the surface, thereby making the royalty a tax on the bounty of Nature only. The old act further provided that no royalty should be imposed or collected upon any ores mined, wrought or taken until after seven years from the date of the patent or lease, except upon ores known to be rich in nickel, on which it might be imposed at the end of four years. The new act does away with the latter clause, so that now no royalty can be charged until the lapse of seven years from the date of the grant. It also provides that in no case shall the rate of royalty be higher than the rate provided for by the statute in force at the time of sale or lease of the location.

Previous to May 4th, 1891, minerals on granted lands were free from royalty, and a clause in the new act declares that they shall remain free and exempt from every royalty, tax and duty. The Legislature indeed could not make this tax retroactive if it were so inclined, for the attempt was recently made in Quebec, and it has been abandoned there under threat of disallowance.

By the act of last year the price of mining lands in the Province was more than doubled, and at the same time provision was made for the introduction of the leasehold system. The latter has since come largely into favor, partly, perhaps, because it commends itself to mining men, but partly no doubt because of the increased purchase price. The new act reduces the price by nearly 25 per cent., so that now mining lands north of Lake Nipissing and the French and Mattawa rivers will be sold at \$3.50 per acre if in a surveyed township and within 12 miles of a railway, at \$3 if in unsurveyed territory and within 12 miles of a railway, and at \$3 and \$2 respectively for all other mining lands in surveyed and unsurveyed territory. Lands south of Lake Nipissing and the French and Mattawa rivers are \$2.50 per acre if in a surveyed township and within 12 miles of a railway and \$2 if elsewhere. The rent for leased lands remains as in the old act, and the working conditions are the same as before.

Where mines, minerals and mining rights are reserved to the Crown, as in the case of lands patented under the Free Grants and Homesteads Act, or of agricultural lands sold under the amended Crown Lands Act which came into operation on May 4th, 1891, the owner may apply and shall have priority for the fee or leasehold of such rights, unless a previous application has been made therefor and a deposit made of at least half the purchase price or rental, or unless an original discovery has been made by a subsequent applicant within one month prior to the application of the owner. The price per acre for such mining rights is 50% of the rates as fixed for a patent or lease of mining lands in which surface and underground rights go together.

Should the owners of the surface and mining rights fail to agree upon compensation for injury or damage to the surface rights, either in the form of a specified interest in the mineral rights or ore or mineral to be secured to the owner of the surface rights, or by payment or agreement to pay in money or the giving of security, the Director of the Bureau of Mines has power to order and prescribe the manner in which compensation shall be ascertained and paid or secured, which may be by the appointment of valuers or arbitrators or by directing a suit or action in any county or district court.

Under the old law, any person holding a miner's license might stake out a mining claim upon crown lands in a mining division of the length of 200 ft upon a vein or lode by 100 ft. on each side of it, and to hold it subject to working conditions. Under the new act the mining claim which may be so staked out is enlarged to 660 ft. along the vein by 330 ft. on each side of it, embracing an area of 10 acres, or a company of persons may stake out and work a claim of double that area, the working conditions being the same as in the old act. Only a person holding a license can stake out or work a claim, and it must be renewed annually. The licensee is also required to pay a yearly rent on his claim at the rate of one dollar per acre.

The discoverer of a new vein of ore or mineral may stake out two mining claims of the prescribed dimensions; but to entitle him to this privilege the place must be distant at least three miles from the nearest known mine or discovery on the same vein.

In the case of mining locations, the minimum area of which is 40 acres, and which must be regularly surveyed, a prospector or explorer who originally discovers valuable ore or mineral at least three miles from the nearest known mine or discovery on the same vein or lode, or at a distance of one mile if upon a new vein, is exempted from the payment of royalty for a term of 15 years from the date of the patent or lease.

The outlook for this year is full of promise at the present time, especially in the nickel district, and it is expected that several furnaces will be built this year. Although the season is not yet favorable for prospecting, some 8,000 acres have been applied for, mostly by American capitalists from the West and Northwest. It is also understood that a strong French syndicate is getting ready for mining and smelting operations.

**Improved Means for Rendering Petroleum or Other Liquid Hydrocarbons Non-Explosive.**—S. Kirsch, of Hamburg, Germany, claims that petroleum oil may be rendered non-explosive by the addition of "small but sufficient quantities" of a mixture constituted as follows: Aniline, 0.30%; sulphate of lime, 0.92%; sulphate of magnesia, 0.22%; bicarbonate of sodium, 2.77%; chloride of sodium, 92.81%; sal-ammoniac, 1.84%; water, 1.14%. The illuminating power of the petroleum is alleged not to be impaired by the addition.

## THE BASIO BESSEMER PROCESS APPLIED TO THE METALLURGY OF LEAD\*.

Dr. Roesing, formerly director of the Friedrichshütte works in Upper Silesia, has applied the basic converter to the treatment of base bullion. By this process the lead is oxidized to litharge, which is then reduced by carbon or by galena. A part of the lead may be desilverized by zinc and refined in the converter. The following processes constitute the new system: A, treatment in the converter; (1) of base bullion for pure litharge and enriched lead; (2) enriched lead for impure litharge and lead-silver; (3) desilverized lead for refined lead. B, reduction of the pure litharge by carbon for merchantable lead. C, treatment of the galena with molten litharge for base bullion. The most interesting and most important of these innovations is the treatment of the base bullion in the converter.

Caloric calculations having led to the anticipation of favorable results, experiments were made with this process in the laboratory in quantities of 500 grams; then with charges of 6,000 kilos. in a Thomas converter at the Friedrichshütte in Upper Silesia. The method presented no difficulty; the charge of 6,000 kilos. of base bullion was blown for 15 minutes with air pressure of 1½ atmospheres. The lead had been heated previously a little above its melting point. The litharge formed had a temperature of more than 1,200° and was very fluid. It crystallized in mass on cooling without formation of any amorphous litharge, and fell in scales. The silver contents of the litharge were 0.0036%, but could be diminished in regular working.

In treating poor, impure and zinciferous lead the refined lead obtained in a few minutes was of excellent quality and the following composition: Lead (by difference), 99.9934%; antimony, 0.0007%; arsenic, 0.0005%; copper, 0.0013%; iron, 0.0022%; zinc, 0.0015%; silver, 0.0004%.

In consequence of the great increase of temperature in the converter during the blowing, new charges may be worked immediately without reheating the vessel, so that there is no delay in the process. In regular operation it would possibly even to utilize the heat obtained in the converter for the fusion of the lead.

The basic lining of the converter stood perfectly. The engineers of the Friedrichshütte steel works declared "that they are satisfied that the basic lining will last better in treatment of lead than in the manufacture of steel."

The impurities of the lead (zinc, arsenic and antimony) are removed in a more rational manner than in the common process since the blast acts uniformly throughout the mass and not merely upon the surface of the bath; the latter is to-day purified the first, then uselessly oxidized, while the impurities contained in the lower strata of the metal are a long time withheld from the action of oxygen. There results therefore an oxidation, which is superfluous and injurious to the lead. In the new process it is necessary to take into account the reduction in the expense of treatment and the loss in the working of intermediary products. As for the loss in blowing there is produced naturally in that operation very thick lead smoke, but as it is of very short duration, the amount is small and it can be easily recovered because it is not mixed with combustion products. In this process there is a saving in comparison with cupellation, according to the calculations made at the Friedrichshütte, of 18 marks and 94 pfennig (\$4.50) per 1,000 kilograms of base bullion. As for enrichment of the lead it is recommended not to carry it too far at once, but rather to interrupt the blowing at intervals and unite the lead of several charges which can be submitted to a new operation for enrichment.

In the experiments at the Friedrichshütte with base bullion containing 0.425% of silver, lead assaying 0.673% silver has been obtained as a maximum and condensed fumes with 75% lead and 0.0086% silver.

The litharge obtained is very liquid and can be reduced in a very simple manner by pouring it on a bed of incandescent carbon in a special furnace by which it is immediately reduced. The same furnace may be employed for the treatment of the galena. The latter is comminuted to fine grains and heated to the point where roasting commences. If the liquid litharge is spread on this galena it is rapidly decomposed with the evolution of sulphuric acid gas which is mixed neither with an excess of air nor with combustion products, and consequently can be recovered easily. The rapidity of the decomposition of the litharge by carbon or by the galena permits of a large production in small apparatus, and the consumption of fuel amounts only to that required in the preliminary heating. The amount of labor necessary and the loss in metal are both very small.

We received advance proofs of the recent decision of the Supreme Court in the State of South Carolina—Coosaw Mining Company case, to which we referred last week, too late for insertion in this issue. This is a very important decision and will be published in our issue of the 23d inst.

**Porcelain Industry in Japan.**—Seto-mura, a village in Owari Province, has been one of the principal centers of the porcelain manufacturing industry, and prior to the great earthquake of October 25th last, according to *Industries*, the annual out-turn of porcelain exceeded \$400,000 in value, over 500 furnaces and 3,500 employes being engaged daily in the industry. Only 15 of these 500 furnaces, however, remained intact after the calamitous earthquake.

**The Dividends Paid by Mount Morgan Mine.**—The average number of men employed annually by the Mount Morgan Gold Mining Company. Limited, during a period of four years is, says an Australian paper, 1,400. The gross amount of gold turned out since the start is 907,697 ozs., and the number of tons treated 383,330. The sum of £2 15s. per share has been paid in dividends (of which there have been 46, ranging from 6d. to 2s. 6d), making an aggregate of £2,750,000.

**Improvements in the Manufacture of Barium Chloride and Strontium Chloride.**—M. N. D'Andria, of Manchester, England, has invented a new process for the manufacture of barium and strontium chlorides. The sulphides of barium or strontium, obtained by the reduction of the corresponding sulphates, are treated with a neutral solution of iron protochloride (a by-product from galvanizing); the solution of alkaline earthy chlorides is filtered "from the remaining sulphide of iron formed," and is evaporated to crystallization. In an alternate way of working the iron protochloride is furnished along with the sulphate and coal, and the chlorides dissolved out at once from the reduced mass.

\* Translated from *Revue Universelle des Mines, de la Metallurgie*, January, 1892.

## PERSONALS.

Mr. Andrew Carnegie sailed for Europe on Wednesday, the 12th inst.

Mr. W. L. Abbott, late chairman of Carnegie, Phipps & Co., Limited, expects to sail for Europe for a six months' tour on April 28.

Mr. Henry M. Howe, mining engineer and metallurgist, of Boston, has been retained as an expert for the Pottstown Iron Company in its suit with the Bessemer Association.

Mr. Joseph S. Harris, who has been connected with the Reading Coal & Iron Company as mining engineer, has been appointed vice-president of the company, with headquarters at Philadelphia, Pa.

Mr. Marsh, the manager of the British Broken Hill mine, has resigned, in consequence, it is said, of a disagreement with his directors, and Mr. Cecil C. Morgan, of London, has been appointed to the vacancy.

Capt. W. J. Gilbert, who has for some time been superintending the Union Cordova gold mine, in Calaveras County, Cal., has returned to his home in Cornwall. The Union Cordova mine has been closed down.

Mr. John Daniell, superintendent of the Clark-Bigelow Copper Companies, has been visiting the Boston and Montana properties in Butte, Mont., and before his return will examine the Santa Fe Copper Company's properties in New Mexico.

Captain J. W. Plummer, general manager of the Elkhorn Mining Company's properties in Montana and Assistant Manager Molson have been voted a bonus of \$2,500 by the directors of that company in recognition of their satisfactory work during the past year.

Mr. Arthur Winslow, State Geologist of Missouri, and James D. Robertson, one of his chief assistants, are in Joplin making an examination of the zinc mines and gathering data for the final report on this district, which Mr. Winslow hopes to have published and ready for distribution this fall.

Mr. E. D. Campbell, Professor of Qualitative Analysis in the University of Michigan, Ann Arbor, Mich., was at work on the 12th inst. in the chemical laboratory over a glass receiver containing hydrogen and oxygen, when the gas exploded. Bits of glass cut into his eyes and inflicted such severe injuries that they had to be removed by the surgeons.

Mr. J. Pierpont Morgan has just given \$500,000 to the New York Trade Schools, which were founded by Col. Anshmuty about ten years ago, and have done admirable work. The schools last week graduated 521 pupils, who had all thoroughly learned some trade. The trades chiefly taught are plumbing, bricklaying, painting, plastering, carpentry, tailoring and stonemasonry.

Mr. John F. Wilson, who for 27 years has been a prominent figure in the coal trade of this city, and for many years has had charge of the sales department of the Lehigh and Wilkesbarre Coal Company, has resigned his position and proposes to spend the remainder of his life in well-earned "peace, ease and comfort." Mr. Wilson has long been recognized as one of the ablest, most successful and most popular sales agents in the anthracite trade, and his retirement, which for two years past he has contemplated and desired, will remove from the trade one who has done valiant service for this great industry, and for the company he has for many years so ably represented.

Mr. Carl Bolckow, Chairman of Bolckow, Vaughan & Company, of Middlesbrough, England, failed on the 26th ult., as we noted in our issue of the 2d inst. The Midland England News, speaking of this event, gave the following interesting account of this world-famous company of iron masters: "The late H. W. F. Bolckow and John Vaughan were the first ironmasters on Tees side. They commenced business as iron manufacturers even before the vast deposits of ironstone in the Cleveland hills had been discovered. The two partners first met at Newcastle-on-Tyne. Vaughan, who as a working puddler, had trudged from the neighborhood of Worcester to Tyneside, was a works manager for Messrs. Bell, when he met Bolckow, who at that time was worth several thousand pounds, which he had made as a corn importer. Bolckow was the son of a Mecklenburg farmer, and he knew a good deal about the value of wheat, but had no special knowledge of the iron industry. Still, his capital and commercial aptitude, and Vaughan's technical skill, enabled the pair to start in a small way as iron manufacturers at Middlesbrough. They sold iron to blacksmiths, wheelwrights and others purchasing small quantities. But the business did not pay, and in a few years was witnessed the strange spectacle of infuriated workmen chasing bailiffs out of the establishment. In that crisis Joseph Pease, who had been instrumental in constructing the first public highway, came to the rescue of Bolckow & Vaughan. Soon afterward an ironstone seam some 4 ft. thick was discovered, and thus the foundations of the colossal concern now known as Bolckow, Vaughan & Company were firmly laid. Mr. Bolckow was elected the first member of Parliament for Middlesbrough. He built himself a magnificent mansion, and desired to enroll his name among the

great county families of England. He had no son or daughter, so he bequeathed the great bulk of his fortune to his nephew, C. F. H. Bolckow. This gentleman, whose failure is now announced, has been no reckless spendthrift. He has always lived quietly and without ostentation. In fact, he has often been railed at for his parsimony. But the conditions of his uncle's will compelled him to go on buying land, in order to permanently endow the name of Bolckow. Thousands of acres, including several villages in the vicinity of Thirsk, have been bought by Mr. Bolckow; and as the interest on land has been very low of late years, and the dividends of Bolckow, Vaughan & Company have fallen off, it is feared that Mr. Bolckow's income has become terribly restricted.

## OBITUARY

Jonas Laubenstein, the extensive coal-screen manufacturer, with shops at Ashland and Minersville, Pa., died at the latter place on the 10th inst., aged 65 years.

J. H. Moulton, of New York, a railroad and mining engineer, dropped dead on the street on the 9th inst. Mr. Moulton assisted in drawing the plans for many railroads in Central America, where he lived for many years. The Guatemala Central was under his direction. He has of late been engaged in operations connected with silver mines at Ouray, Colo.

Ferdinand de Stwolinski, a well-known mining engineer, died at his home in Fort Scott, Kan., on Saturday. For several years Mr. de Stwolinski had been engaged as the consulting engineer of the Walburn-Swenso Manufacturing Company, of New York City, St. Louis and Fort Scott. He had charge of all the mining interests of the concern in Mexico and the West. Mr. de Stwolinski's biography and portrait was published in our issue of Oct. 31st, 1891.

## SOCIETIES.

The American Society of Civil Engineers will hold its annual convention at the Hygien Hotel, Fortress Monroe, Va., beginning on Wednesday, June 8th. Members are invited to contribute for presentation at the convention papers on any topic of professional interest, and to discuss papers already published in the Transactions. Papers should be in the hands of the secretary as quickly as possible, to insure proper preparation and a satisfactory arrangement of the programme. Members intending to send papers should give early notice of such intention. It is expected that reports will be presented by the special committees on Uniform Methods of Testing Materials used in Metallic Structures; on Standard Rail Sections; on Impurities of Domestic Water Supply, and on Units of Measurement. The Board of Direction, at the meeting held April 5th, appointed to the office of assistant secretary of the society, Mr. Charles Warren Hunt, M. Am. Soc. C. E., of New Rochelle, N. Y. At the meeting held on March 1st, Mr. Thomas B. Lee, of New York, was appointed auditor. At the meeting to be held April 20th, at 20 o'clock, the report of the committee "On Uniform Methods of Testing Materials used in Metallic Structures, and on Requirements for these Materials to further improve the Grade of such Structures" will be discussed. This report was printed in the Proceedings for January, and is now in the hands of the members. Written discussion may be sent in, either for presentation at the meeting or for publication in the Proceedings.

## INDUSTRIAL NOTES.

The Crescent Steel Company, of New York, has issued its new catalogue for 1892.

The Howard-Harrison Iron Company at Bessemer, Ala., is under contract to furnish water pipes for the city of Cincinnati at \$21 per ton for straight pipes and \$40 per ton for specials.

The Iroquois Furnace Company, whose plant is at South Chicago, will employ three steamers and their consorts to carry its ore. Two of them will run to Escanaba and the other to Ashland.

The American Fluoride Company, of New York, informs us that owing to the large increase in its business, it has decided to open a branch office at 73 West Jackson street, Chicago, for the distribution of its fluoride water purifiers and boiler compounds.

The Chandler & Taylor Company, of Indianapolis, Ind., report that it is now working on a complete new line of saw mill machinery, which it expects to have ready by early summer. The standard mill has already been completed and has been favorably commented on. The Heacock patent variable belt feed works will be used on all mills.

The Berlin Bridge Company, of East Berlin, Ct., has taken the contract to build a new producer building for the Solvay Process Company, of Syracuse, N. Y. The building will be 30 ft. wide, 100 ft. long, three stories high, built entirely of iron, being of plate iron, in order that there may be no wood work about the building to take fire.

The Pittsburg Reduction Company informs us that it has removed its office from Room 59, No. 95 Fifth avenue, Pittsburg, Pa., to No. 116 Water

street, same city, where a stock of aluminum, sheet, wire and ingots, will hereafter be kept. All correspondence should be addressed to 116 Water street, and all supplies for the works should be sent to New Kensington, Pa.

The Illinois Steel Company expects to receive this season via the lake at its docks at South Chicago 1,250,000 tons of ore for consumption at its plants there, Bridgeport and Joliet. The ore required for the two latter will be forwarded by rail. Contracts for its transportation have been made with the Minnesota Steamship Company and the Inter-Ocean Transportation Company.

At all the furnaces in the Mahoning Valley where the semi-monthly pay-day occurred on the 11th inst., the 10 per cent. reduction in wages of employees went into effect in accordance with the resolutions adopted by the Mahoning Valley Iron Manufacturers' Association. At the other furnaces the reduction will take effect April 15. At none of the furnaces has the question of ordering a strike been seriously considered by the employees.

The Eagle Iron Company has been incorporated to build and operate a blast furnace to manufacture charcoal pig iron at Spring Valley, Wis. The furnace will smelt the local brown hematite ores, analyzing 50 per cent. iron and 0.06 to 0.10 per cent. phosphorus. S. Frank Eagle, late of Youngstown, O., is interested in the company and will, it is said, be in charge of the plant, but the officers have not yet been elected.

The Quaker City Mortar Company has been organized to manufacture all kinds of mortar used in the building trades, using the process patented by the Charles Warner Company, of Wilmington, Del. The company will start with a paid in capital of \$200,000. The old Girard Tube Works, at Twenty-third and Filbert streets, Philadelphia, have been purchased by the company, and it is proposed to alter the buildings and install the necessary machinery for carrying on the work.

Hon. Charles W. Stone has introduced a bill in the House of Representatives providing for a standard measure for sheet iron and plates. It was referred to the Committee on Coinage, Weights and Measures. A hearing has been arranged on the bill at which a delegation from Pittsburg representing the Amalgamated Association of Iron and Steel Workers will appear. The delegation consists of William Wiehle, president of the association; Messrs. William Hughes, Charles Kaufman, George Somers, Milton Cook and Thomas Hogan.

The Oliver Iron and Steel Company is working up the stock of ore at Rosena furnace, New Castle, Pa., and the furnace will go out of blast in about three weeks. The company's lease expires June 1, and it will not be renewed. The furnace has made some good runs, but consumes a great deal of coke, and is therefore not calculated for successful operation in times of close margins such as the present. The Edith furnace, in Allegheny, controlled by the company, is one of the best for its size in the county and will supply sufficient Bessemer iron to run all the Oliver plants except the Hainsworth Steel Works.

The Illinois Steel Company, of Chicago, has introduced a printing telegraph system in its mills by means of which the men at the reheating pits can inform those at the finishing end of the mill as to the heat numbers of the ingot, the ingot numbers and the number of rails to each ingot, so that the proper number may invariably be stamped upon each rail that leaves the mill. In addition to these numbers the "pit" and "hole" designations are also dispatched by the same means. It is stated that the mechanism works in a very satisfactory manner. The transmitter is in charge of one of the men at the reheating pit, and the receiving instrument is in charge of a boy, who reports on a blackboard for the use of the stamper the different numbers and letters as they are printed on the tape by the receiving instrument. The distance between the two is about 350 ft.

The Diamond Prospecting Company, of Chicago, and the Sullivan Machine Company, of Claremont, N. H., have consolidated their business under the name of the Sullivan Machinery Company, with capital of \$500,000, and with offices at Chicago, Denver, New York, and Claremont, N. H. They manufacture the well-known Sullivan diamond drills and channelling machines, Stanley entry driving machines, coal cutters, tipples, etc. They have a large and well supplied plant at Claremont, N. H., and are starting shops at Ladd, a point on the C., B. & Q. road in Illinois. They propose extending their business to cover a complete line of diamond drills, coal mining and quarrying machinery. The officers of the new company are P. K. Copeland, President; with headquarters at Chicago; J. P. Upham, vice-president; J. D. Upham, treasurer, and Thomas W. Fry, secretary and superintendent, with headquarters at Claremont, N. H., and Thomas L. Dee, western agent, with headquarters at Denver.

The annual report of the Northwest Thomson-Houston Company, covering operations in Idaho, Minnesota, Montana, North and South Dakota, Washington, Wyoming, Oregon and northern Wisconsin, shows for the period from June 1st, 1891, to March 19th, 1892, a total business of \$1,934,000, or at the rate of \$2,700,000 per annum. Seventy-five lighting and 33 railway companies use the Thomson-

Houston apparatus within this territory. The report says that the 2 per cent. quarterly dividends on the stock, both common and preferred—\$750,000 of each—are likely to continue. The balance sheet shows: Assets as follows—Franchise, \$110,000; machinery, tools and fixtures, \$20,958; plants and railways in progress, \$128,268; merchandise, \$624,852; repair department inventory, \$21,313; securities of other companies, \$630,547, less \$284,200, allowed for conservatism, \$346,347; notes and accounts receivable, \$917,101; cash, \$242,707; total, \$2,411,548. Liabilities—Capital stock, one-half preferred, \$750,000; notes and accounts payable, \$678,731; contingent account, \$43,427; surplus June 1st, 1891, \$100,601; gain to March 19th, 1892, \$161,261; total, \$261,862; dividends paid, \$37,472; total, \$224,390; added to contingent account, \$35,000; total, \$189,390; grand total, \$1,411,548.

Bolckow, Vaughan & Company (Limited) held its annual meeting at Manchester, England, a fortnight ago. The meeting was presided over by the Deputy-Chairman, Mr. H. D. Pochin, who made reference, in opening, to the unfortunate circumstances which deprived them of the presence of Mr. Carl Bolckow. He apologized for the very unsatisfactory character of the last year's working, which he mainly attributed to the present state of the labor market. The profit last year was only £74,441 as against £317,000 in 1890. The business done had been about as large as ever, but the working people had practically received all the gain. The chairman referred to the strike now in progress, and announced the determination of the directors to stand firm, no matter how long it lasted or what was the cost. There was considerable discussion, chiefly in reference to the unsatisfactory return from the Eston Steel Works, and the inadequate amount of the reserve fund (£120,000) in comparison with the share capital of £3,218,000, some of the speakers urging that, instead of taking any amount from the reserve fund for dividend purposes, the dividend should be passed, and the whole of last year's profit be added to the reserve. There was a strong expression of opinion that the board might be strengthened by the addition of two local directors. The chairman announced that the average dividend paid by the company during the last 27 years had been 7½ per cent. The dividend declared of 2½ per cent. for the year, as compared with 6 per cent. for the two former years, is only paid by the withdrawal of £30,000 from the reserve fund, which is thus reduced to £120,000.

The Thomson-Houston Electric Company's report for the year states that during the first half year business was materially poorer than the previous year. The decrease was some 30 per cent., but this loss was almost wholly recovered in later months, and there was a gratifying increase in every department. The unfilled orders in hand at the present time, as compared with the same date of last year, are more than double in amount, and in each of the various departments of the business the orders received since January 1st are very largely in excess of those of a year ago. The outlook for the ensuing year is most encouraging. The gross business from the Boston office for the past nine years has been: 1883, \$426,987; 1884, \$700,470; 1885, \$983,996; 1886, \$1,405,041; 1887, \$2,335,594; 1888, \$4,435,902; 1889, \$8,222,789; 1890, \$10,217,661; 1891, \$10,304,580. The newly organized lighting companies numbered 118 in 1891, making 873. These companies have in use 100,293 arc lights, and about 800,000 incandescent lights, compared with 87,131 arc lights and 616,355 incandescent lights on Jan. 1st, 1891. The number of street railway companies operating and under contract increased 59 during the year, making 204 in all, employing altogether nearly 3,000 cars, with an aggregate mileage of about 2,500 miles. Great advance has been made in the development of electric locomotives for freight and passenger service. The first installation for freight purposes has lately been very successfully made, and has more than realized all that was expected of it. It is confidently believed that electric passenger locomotives, with a speed of 40 to 50 miles per hour, will soon be in successful operation. In the balance sheet it is explained that the liabilities do not include \$500,000 Thomson-Houston collateral trust bonds, issued in 1889 as an accommodation to the Manhattan Electric Company of New York, and assumed and secured by that company. The T.-H. company has received from its stockholders from time to time \$10,500,000 in actual cash from subscriptions to its common and preferred stock. The last issue of common stock, amounting to \$1,500,000 at par, was sold in September, 1890, at 100 per cent. premium, yielding to the treasury \$3,000,000 in cash. Thus \$1,500,000 of the surplus Feb. 1st, 1891 (\$6,022,533.71), is represented by premium received from the sale of common stock; the balance by accrued surplus earnings of the company. The surplus net earnings for the fiscal year just closed, after deducting \$1,236,366 paid during the year as dividends on common and preferred stock, is \$1,524,414.25, making the total surplus Feb. 1st, 1892, \$7,546,947.96. Prior to March 1st, 1892, there had been paid to the stockholders in cash dividends a total of \$1,731,131.88. In addition to this, there had been distributed among the stockholders as a special dividend \$1,000,000 of common stock at par, which was taken from the surplus account of the company April 15th, 1889, and securities of the par value of

\$2,416,468.27 were placed in the hands of trustees for the benefit of the stockholders of the company Oct. 5th, 1889. There has also been sold to trustees, for the further benefit of the stockholders of the parent company, stocks and bonds of local companies, classed as Thomson-Houston securities, series A, B and C, from which the shareholders have realized as profit, in excess of cost to them, an amount which, added to the present market value of the shares, would aggregate \$775,000. The balance sheet is of Jan. 30th, 1891, and shows: Accounts receivable, less 10 per cent., \$5,941,163; notes receivable, less 7½ per cent., \$1,514,040; cash, \$1,727,276; real estate, about 70 per cent. of cost, \$430,341; machinery and tools, about 60 per cent. of cost, \$491,044; patterns and models, \$135,000; patents, \$338,354; local company's stocks, 35 per cent. of par, \$473,586; local company's bonds, 70 per cent. of par, \$1,858,570; manufacturing company's stock, at cost, \$3,729,195; construction company's stock, at cost, \$1,210,750; United Securities Company's stock, at cost, \$525,420; consignments, \$32,116; merchandise, inventory, factory, \$1,731,481; merchandise, inventory, railway, \$72,593; merchandise, inventory, lighting, \$52,613; total, \$20,263,447. Liabilities—Common stock, \$6,000,000; preferred stock, \$4,000,000; accounts payable, merchandise, \$498,808; notes payable, collateral, \$1,429,486; notes payable, unsecured, \$587,005; mortgage, \$1,200; guarantee account, \$200,000, surplus Feb. 1st, 1891, \$6,022,533; profits for the year, \$1,524,414 (less dividends of \$1,236,366; total, \$20,263,447; surplus Jan. 30th, 1892, \$7,546,947.

**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, and his address will be furnished to any one desiring to supply him.

Any one 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 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.

All these services are rendered gratuitously in the interest of our 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.**

2,640. Three miles of 35-lb. steel or iron rails with fastenings, frogs and switches for same, a dummy engine, 3 cars and a steam pile driver; also iron stove fronts and steel I beams. Georgia.

2,641. Power and wood-working machinery for a sawmill. North Carolina.

2,642. A light locomotive and cars to haul logs and lumber; also a saw or husk frame carriage and headlocks. Mississippi.

2,643. Brick machinery. Tennessee.

2,644. Sheet iron (best), perforated sheet iron, washers, rivets, etc. Virginia.

2,645. A 15-H. P. coal hoister complete. Texas.

2,646. Polishing felts, grits, powders, pulleys, shafting, mandrels for emery wheels, heavy mandrels for grindstone, belting, and an engine lathe 8-in. swing, 40 in. between centers. Arkansas.

2,647. Machinery to equip a mill for mining and preparing graphite for market, including putting it into foundry facings and other manufactured products. Georgia.

2,648. Flour barrel and hoop machinery. Virginia.

2,649. A second-hand piston pump to run by belt; capacity 250,000 to 300,000 gallons per day. Nebraska.

2,650. Ten tons 56-lb. and 40 tons 25-lb. T rails. North Carolina.

2,651. A second-hand brick press in good order, with grinding pan, with a capacity for manufacturing from 8,000 to 10,000 fire brick per day. Colorado.

2,652. A planer and engine lathe. Arkansas.

2,653. Porcelain tubs, heaters and other bath house supplies. Texas.

2,654. Iron for street railway to be equipped for electric system. Texas.

**GENERAL MINING NEWS.**

**ALABAMA.**

**ETOWAH MINING COMPANY.**—This company is constructing a railroad from Kaolin to its ore beds, for the purpose of facilitating the extraction of both hard and soft ores.

**ALASKA.**

**ALASKA-TREADWELL GOLD MINING COMPANY.**—This company reports the following results for the past month: Shipment of bullion, \$48,000; tons of ore milled, 19,080; tons of sulphurets treated, 457. Of

bullion there came from sulphurets \$12,825. Gross expenses for period have been \$28,665. The bullion yield for first ten months of the last financial year was (including concentrates sold, \$14,969.99) \$635,755.17, while for the same period of the current financial year bullion yield has been \$600,000. The ten months' earnings available for dividends last year were \$301,992.70. The ten months earnings, available for dividends this year have been \$289,000.

**ARIZONA.**

**MOJAVE COUNTY.**

(From our Special Correspondent.)

A deposit of mica has been discovered by C. Hand and E. Spencer, north of the Colorado River. The sheets are clear and transparent, and vary in size from 4 x 10 to 6 x 10 in. Chicago capitalists intend developing the property.

**YAVAPAI COUNTY.**

**GLADIATOR.**—This mine, on the War Eagle Lode in the Bradshaw Mountain Range, 35 miles southeast of Prescott, is said to be showing ore bodies of great value and has, with the Oakwood and Juniper claims for mill and tunnel sites, been bonded to a syndicate composed of residents of Prescott, Arizona, and Washington, D. C., for \$150,000. A railroad, now under survey, from Prescott to Phoenix and the Southern Pacific Railroad, will pass near the property.

**HARQUA HALA.**—This property has been examined by Mr. L. Gilson, a San Francisco mining man, in behalf of New York and Boston parties who are considering the advisability of its purchase for \$750,000. Mr. Gilson reported after an investigation that large quantities of ore were in sight, that the bottom was good and that the net profits during the nine months that the mill had been running averaged something more than \$30,000 a month. It is likely that the mine will be purchased.

**UNITED VERDE COPPER MINING COMPANY.**—The smelters started on the 1st inst. with the intention on the part of the management to work the mines to their utmost capacity during the coming summer.

**CALIFORNIA.**

**AMADOR COUNTY.**

**SOUTH SPRING HILL.**—On the 800 level the vein is 66 ft. wide, 40 ft. of which is in good milling ore.

**BUTTE COUNTY.**

The discovery of the ancient river channel between Oroville and Bangor has stimulated mining in Butte County. Men are making \$6 to \$8 a day from gravel yielding \$1 a barrel, and it is thought that this channel, while not so rich as some of the older ones, will prove a profitable field for mining operations.

**ELDORADO COUNTY.**

**PACIFIC.**—This property in Placerville has shut down. It is understood, however, that the English company which now owns it, together with six other locations on the same lode, will soon resume work, utilizing the water power of its canal to generate electricity.

**LOS ANGELES COUNTY.**

**SAN DIMAS.**—The excitement over the discoveries in San Dimas cañon has died away.

**MONO COUNTY.**

**STANDARD CONSOLIDATED MINING COMPANY.**—A shipment of \$21,700 has been made and dividend No. 78, of 10 cents per share, payable on the 26th inst., has been declared. The report for the year ended February 1st shows: Bullion product, \$237,995; total receipts, \$253,313; disbursements, \$214,940; balance, \$38,373, of which \$18,992 were paid in dividends. The assets above liabilities, February 1st, were \$151,173.

**NEVADA COUNTY.**

**CALIFORNIA.**—This mine is said to be steadily improving, and it has been demonstrated that the new ore chute, believed to be identical with the Pittsburg ore chute, will yield \$20 a ton on the average.

(From our Special Correspondent.)

**NORTH BANNER CONSOLIDATED TUNNEL MINING COMPANY.**—An assessment of 2 cents per share has been levied, falling delinquent on May 5. At the annual election recently held, the following officers and directors were elected: G. Fletcher, president; J. F. Kidder, vice-president; E. H. Brown, treasurer; T. J. Mitchell, secretary; and A. Mallison and J. Jacobs.

**PEABODY.**—Some very rich ore is being taken from this mine just now.

**PLUMAS COUNTY.**

**DRURY.**—It is reported that a seven foot ledge of \$25 ore has been struck in this mine at Indian Valley.

**SAN BERNARDINO COUNTY.**

Tin is said to have been discovered near Scanlon district in the Old Woman's Mountains.

(From our Special Correspondent.)

**IBEX.**—The ore in this mine has improved in grade, with depth. Forty car loads now on the dumps will be sent to the mill at the beginning of next month.

**RUBY MINING AND MILLING COMPANY.**—This company is working the Wilcox mine near Banner, by tunnels run in on the vein, the gain of backs being at least 1 ft. for every foot of tunnel

run. The lower tunnel is in over 400 ft., and the upper one nearly 200 ft. in, with a fine vein of ore showing. There is 8 in. of ore that will run \$50 to \$60 per ton.

**READY RELIEF.**—A 12-ft. Pelton wheel is being installed, to run the 10-stamp mill, the two power drills in the mine, and furnish electric lights in both mine and mill.

#### COLORADO.

Mineral surveys approved by the United States Surveyor General of Colorado, during the week ending April 9th, 1892:

Survey No. 7,368, Land district Central City, Name of claim Grand Duchess Lode; 7,360, Montrose, Poland Lode; 7,241, Garfield, Jo Peach Lode; 7,285, Middle Watch, Florence, Bowling Green, Kentucky, Stockholm, Silver Cloud, A. S. Johnston, Belle of the West, Galveston, Deep Water and Langstaff lodes; 7,221, Gunnison, Denver Lode; 7,169, Central City, Max Lode.

At a recent meeting of the board of directors of the Colorado Mining Stock Exchange at Denver it was decided to list prospects that have not been long enough worked to receive a United States patent. The rule will hold good for four months, beginning April 1st. Any prospect that is approved by the listing committee and the board of directors of the exchange can be placed on the board and a chance given to the prospectors to secure sufficient capital to proceed with the development work. The price of listing these properties during the four months has been reduced by one half. Properties capitalized at \$500,000 or less can be listed, if suitable, for \$100, and all over that at \$250.

#### CLEAR CREEK COUNTY.

**AMERICAN SISTERS MINING COMPANY.**—Owing to the miners' refusal to accept a reduction in wages this company has closed down the Two Sisters mine. Work on the Joe Reynolds mine also has been stopped.

#### EL PASO COUNTY.

**VIRGINIA MINING COMPANY.**—At a depth of 32 ft. a strike has been made in the Lincoln lode, which lies at the foot of Gold Hill, and is one of a group owned by this company. The ore is of the same character as the Anaconda and a vein 4 ft. wide has been opened.

#### GUNNISON COUNTY.

**DENVER CITY CONSOLIDATED MINING COMPANY.**—Manager W. A. Hinkley, of this company has received an entirely new hoisting plant, and the full crew of the mine is at work putting the machinery in place. The company has been reorganized and 500,000 shares of stock issued at par value of \$1 per share.

#### HINSDALE COUNTY.

**UTE & ULAY MINES, LIMITED.**—The new plant of machinery being put in at this property is nearly all in place, and one side of the mill will be started up shortly. The entire plant will be put in motion by April 20th, when the company will ship about 50 tons of concentrates per day. The mines will employ about 300 men.

#### LAKE COUNTY.

It is reported that the company will take over the La Plata Smelting works at Leadville and apply the Matte smelting process to its pyritic ores.

**MAID OF ERIN SILVER MINES, LIMITED.**—This company has declared dividend No. 4 of 1s. per share or \$139,725, making \$558,900 paid since the present company took over the property. Since 1887 \$1,910,850 have been paid in dividends.

**MINNEHAHA.**—Mr. C. F. Schronfeldt has sold to Jesse F. MacDonald one-fourth interest in this placer in the California mining district. Consideration, \$15,000.

#### OURAY COUNTY.

**NEW GUSTON COMPANY, LIMITED.**—The directors of this company announce an interim dividend for first quarter of the current year of 2s. and a bonus of 1s. per share, payable on the 16th inst., being at the rate of 60% per annum. This dividend amounts to \$82,500. The directors, in pursuance of the policy indicated in their circular of the 16th of December last, have retained in hand a considerable amount of realized profit. The railway to the mines having been blocked by snow during February and March, no shipments were made, and consequently the present quarter's profits are reduced. Last year the railway was reopened in April.

#### PARK COUNTY.

J. D. Churchill has secured a five-year lease from the Union Pacific Coal Company to open up what is known as No. 7 coal vein at Como.

**LIVINGSTON.**—The 75-foot tunnel on this lode has been completed and a promising ore body uncovered.

#### PITKIN COUNTY.

**DELLA S. MINING COMPANY.**—A despatch from Aspen announces an important strike in this property. The ore body is said to be large.

#### SAN MIGUEL COUNTY.

**MEMPHIS.**—This mine on the Pandora vein above the Cimarron mine, has been sold to Mr. Hubreed, the owner of the Cimarron and the Virginius mines. The consideration is not stated.

**SHERIDAN & MENDOTA CONSOLIDATED MINING COMPANY.**—Mr. G. James Morrison, of Shanghai, China, president of the Board of Directors of

this company, is in Telluride consulting with J. H. Ernest Waters, manager of the company, in regard to putting in more machinery and appliances for largely increasing the output of ore. This disproves the statements so widely circulated, that this company had shut down its mines on account of the low price of silver.

**SMUGGLER-UNION MINING COMPANY.**—This company has placed an order with the Trenton Iron Works of Trenton, N. J., for a wire tramway. This tramway will start at the mouth of the tunnel on the Marshall basin trail and extend about 4,500 ft. to the Pandora park below, to connect with the Denver & Rio Grande Southern tracks. This tunnel is now in 200 ft. and will be completed in about two years. In the meantime a tunnel is being run through from the properties to the Sheridan shaft, and the ore will be brought down over its inclines until the Smuggler-Union tunnel and tramway are completed. Active work will be begun on the tramway as soon as the weather permits.

#### IDAHO.

##### ALTURAS COUNTY.

**QUEEN OF THE HILLS.**—It is reported in Salt Lake that this property has been acquired by an English company, and as a consequence the property will now be worked on a large scale.

##### LEMHI COUNTY.

**YELLOW JACKET.**—The ten-stamp mill on this property has been running steadily for four years on ore which averages \$10 a ton, with 5% of concentrates running \$250 a ton. The vein is from 40 to 60 ft. wide on a contact between quartzite and granite. The company owns 14 claims, 4 of which are patented.

##### OWYHEE COUNTY.

**POORMAN MINES, LIMITED.**—This company has declared a quarterly interim dividend of 3d. per share or \$18,225, making \$36,450 paid to date, the present dividend, No. 2, being the second for the half year ending February 29th.

##### SHOSHONE COUNTY.

The differences between the mine owners and the miners in the Cœur d'Alene have not been settled as yet. A Wallace dispatch says: "The mine owners appear to be in earnest, and it is generally inferred from their announcement that unless the miners return to work on June 1st men will be imported from outside points to work in the mines. If this proves to be the case it is likely to cause trouble, and it is earnestly hoped that arbitration will be resorted to and all difficulties amicably settled. Everything is very quiet here at present, and the prospects are decidedly gloomy." The gist of the whole trouble is, writes a Wardner correspondent, that the Cœur d'Alene Mine Owners' Association proposes to operate its mines independently of any labor organization, and the miners of the district have organized unions for the purpose of maintaining a standard of wages and in various ways promote the welfare of the miners. The owners and managers of these mines have also organized an association whose name is the Cœur d'Alene Mine Owners' Protective Association, the object of which is popularly supposed to be, aside from promoting their general interests, to combat any objectionable rules or demands made by the miners. The Cœur d'Alene *Barbarian* has come out boldly and charges all the trouble to "agitators," and takes this view of the situation: "That the apprentice shall receive the same pay as the skilled journeyman is a thing that does not reconcile itself to the sensible mind."

#### KANSAS.

##### CHEROKEE COUNTY.

During the week ending April 9th the output of ore from the mining districts of Galena and Empire City was: Rough ore, pounds milled, 1,692,750; rough ore, pounds sold, 1,677,050; zinc ore, pounds sold, 920,760; lead ore, pounds sold, 236,340. Sales aggregated a total value of \$14,643.

#### MICHIGAN.

##### COPPER.

**ADVENTURE.**—At this mine orders have been received to prepare to sink the shaft another hundred feet to the second level. A sump will be made in the first level so as to catch all the surface water, and a pump has been sent to the mine for the purpose of pumping the water to the surface. The vein as far as drifted on in the level has not shown a great deal of copper.

**FRANKLIN MINING COMPANY.**—There is nothing particularly new at the mine. At the mill the company is following out the instructions of the Government regarding the protection of the channel from their sand. A crib is being built which will prevent the sand from entering the channel. To start with, this crib-work will be 650 ft. long, and give all the room necessary for the present. As necessity demands, it will be extended along the shore, and can be so arranged as to furnish sand room for about 10 years.

**KEARSAGE MINING COMPANY.**—The product of mineral for March was 90 tons, an increase of 8 tons. Total product since January 1st has been 280 tons, an increase of 57 tons.

**OSCEOLA MINING COMPANY.**—The output for March was 336 tons, an increase over March, 1891, of 30 tons. Since January 1st the product has been 978 tons, an increase of 77 tons.

**QUINCY MINING COMPANY.**—This mine produced 500½ tons of mineral for March, against 500½ tons for March, 1891. For three months the product foots up 1,500½ tons, against 1,406½ tons last year, an increase of 94½ tons.

**TAMARACK MINING COMPANY.**—This company produced 922 tons of mineral in March against 850 tons in the same month of 1891. Since January 1st 2,760 tons, an increase of 380 tons, and from July 1st, 1891, 8,355 tons, an increase of 1,687 tons, for a similar period in 1890 and 1891, have been produced.

#### GOLD.

**MICHIGAN GOLD MINING COMPANY.**—A dyke, the presence of which has generally been coincident with richer ore, has been encountered in the workings of the mine, and the officers are confident of better results.

#### MINNESOTA.

##### IRON—MESABA RANGE.

**CINCINNATI IRON COMPANY.**—The quarterly report of this company has been issued. It states that \$7,256.96 have thus far been expended in explorations, fees and salaries. Now that the extent of the deposit has been proven sufficiently large, clearing and stripping will soon be commenced preparatory to putting the property in shape to ship.

##### IRON—VERMILLION RANGE.

**SHERIDAN IRON MINING COMPANY.**—Developments at this property continue to be satisfactory to the company. The diamond drill which was located just south of the main shaft, after boring vertically through 31 ft. of ore and into the foot wall, has now been removed 200 ft. north, and will bore southerly at an angle of 45°, so as to strike the hanging wall at a depth of 250 ft., and then through the vein so as to ascertain its thickness at that depth. Another 15 H. P. boiler and No. 5 Cameron pump was taken out this week to furnish water to a second diamond drill, also leased from the Minnesota Iron Company, which will be started about half a mile east of the main workings. The idea is to ascertain extent of the Sheridan vein as early in the season as possible, with a view of getting transportation facilities this year. The result of the drill hole now being bored southerly to crosscut the vein will be most important, as it will to a large degree determine the width of the Sheridan vein and the merits of the property.

#### MISSOURI.

##### JASPER COUNTY.

(From our Special Correspondent.)

##### JOPLIN, April 11.

There was a steady output of ore last week from the lead and zinc mines throughout the entire district. Zinc ore has advanced from \$21 to \$22.50 per ton and the ore buyers seem to be anxious for all they can get. Lead ore advanced to \$24 per thousand, with a strong demand.

Following are the sales from the different camps:

Joplin mines, 2,057,460 lbs. zinc ore and 299,590 lbs. lead; value, \$29,822.25.

Webb City mines, 313,270 lbs. zinc ore and 12,170 lbs. lead; value, \$3,731.95.

Cartersville mines, 1,731,010 lbs. zinc ore and 123,770 lbs. lead; value, \$21,949.70.

Zincite mines, 110,600 lbs. zinc ore and 6,330 lbs. lead; value, \$1,426.55.

Oronogo mines, 85,640 lbs. zinc ore and 9,560 lbs. lead; value, \$904.45.

Carthage mines, 250,900 lbs. zinc ore; value, \$2,844.50.

Burch Center mines, 11,170 lbs. zinc ore; value, \$115.

Galena, Kans., mines, 920,760 lbs. zinc ore and 236,340 lbs. lead; value, \$14,643.

Districts, value, \$75,527.40.

Aurora, Lawrence County, mines, 137,027 lbs. zinc ore, 630,000 lbs. silicate and 230,000 lbs. lead; value, \$10,316.75.

Lead and zinc belts, total value, \$85,844.15.

The St. Louis & San Francisco Railway Company was unable to supply the demand for cars at Aurora; therefore considerable ore was held over.

**REX MINING AND SMELTING COMPANY.**—This company's property is locally known as the "1,000-acre tract," from the fact that the land contains 1,012 acres. It is now attracting as much if not more attention than any other mining land in the Joplin district. I visited it last Saturday in company with the vice-president, Mr. Samuel I. Smith and found about 150 shafts in actual operation, of which 31 had reached the ore body and are now producing. The tract of land is subdivided into 80, 40 and 20 acre lots, most of which are leased by the Rex Mining and Smelting Company to other mining companies, and they subdivide their leased land into mining lots, 200 ft. x 200 ft., and sub-lease to miners at an advanced royalty.

The first shaft we visited was on a subleased lot and is operated by McKee & McAntire. We were informed that the shaft was 85 ft. deep and some ore was found at 30 ft. to 35 ft., but the main run of ore was not cut until a depth of 70 ft. to 75 ft. had been reached. They are now drifting on that and last week cleaned up and sold 38,800 lbs. of free zinc ore at \$22.50. The formation in which the ore is found in this mine is what may be termed loose or open ground.

The next property visited was the Crossman Bros. & Porter. This was the first shaft to open



up the ore body on this portion of the land. The run of ore has been explored by drifts and found to be large, and a large amount was produced and cleaned by hand jigs, but these were found too slow so the mine was shut down and a contract let for the building of a 50-ton concentrating plant which is now almost completed.

The next property visited was that of Mr. Chas. Gregory, who is operating a 40 acre tract on which there are a number of shafts being sunk by sub-leasers, several of which have reached the ore body and are commencing to produce ore. Next is the Stillwell Mining Company, operating 80 acres, which was the first to locate on the land and was the first to find the ore body by drilling. This was on October 15, 1891. We then went to the mines of the American Mining Company operated by Mr. F. M. Sharp, who has a lease on 40 acres which have been thoroughly tested by drilling and shafts. Mr. Sharp is now sinking a working shaft 5 ft. x 8 ft. in the clear.

Mr. Sam'l I. Smith and Mr. Motter of St. Joseph, Mo., have just purchased a tract of land on the north of the 1,000-acre tract, on which they will locate a town site called Rex City, and the K. C., F. S. & M. Railroad has just completed a survey of a spur from its main line which passes directly through Rex City and into the 1,000-acre tract. J. R. H.

MONTANA.

BEAVERHEAD COUNTY.

**POLARIS MINING COMPANY.**—This company has filed articles of incorporation, with a capital stock of \$150,000, of which \$50,000 is paid in. The incorporators are John E. Knapp, of Orange, N. J.; Edward M. Brown, New York; John B. Dumont, Plainfield, N. J.; Frank Mills Yard, London, and Charles B. Currier, New York. O. T. H. Allen, of Dillon, is the agent for Montana.

DEER LODGE COUNTY.

**CHAMPION MINING COMPANY.**—The work of sinking from the 600 to the 800-ft. level on the Champion is now being actively prosecuted. No crosscut will be made until the 800 is reached. With the company's excellent equipment, this plan of exploitation should be completed by June 1st, when the continuity and value of the vein ought to be quite thoroughly demonstrated. Forty men are now employed at the mine, the greater number of whom are engaged on this development. Little if any ore is being raised at present, a large reserve, sufficient to keep the mill in continuous operation, having accumulated on the dump and in the bins. At the mill, near Deer Lodge, everything is working smoothly, the usual quantities of ore being reduced and with little change either way in the output.

JEFFERSON COUNTY.

**ELKHORN MINING COMPANY, LIMITED.**—The following report has been cabled from the mine: "The end of the 1,350 south drift is now in ore, assaying 50 oz. per ton the whole width of the breast; the character of the ore remains unchanged, and appearances are favorable in every way possible."

MADISON COUNTY.

**WAUSEKO.**—This property, which had been worked under a bond by the Colorado Mining and Smelting Company, has been shut down. The cause of suspension is said to have been the enormous quantity of water encountered in the work.

SILVER BOW COUNTY.

**BUTTE & BOSTON MINING COMPANY.**—The reduction works of the company were damaged by fire on the 13th to the extent of \$60,000.

**KITTY MORRIS.**—The shaft, which is now down 250 ft., will soon be sunk deeper. No ore will be shipped, owing to the low price of silver. On the 250-ft. level the vein is said to be from 2 ft. to 4 ft. wide, averaging over 200 ozs.

**ORPHAN GIRL.**—The ore from this mine, which has been leased by the Butte & Boston Mining Company, is said to be running as high as \$300 a ton, and the mine, which has laid idle for many years, has been producing enough ore to keep the 40-stamp Silver Bow mill employed.

**PARROT SILVER AND COPPER COMPANY.**—The shaft at the Parrot mine has reached the depth of 700 ft., and sinking will soon be resumed to the 1,000 level. The mine is yielding about 350 tons of ore a day.

NEVADA.

ELKO COUNTY.

**NEVADA QUEEN MINING COMPANY.**—The third level No. 1 stopes are looking well, and produced for week ending April 2d six cars of first class ore and 101 cars of second class, assaying respectively \$300 and \$37 a ton.

EUREKA COUNTY.

(From our Special Correspondent.)

The roads are still filled deep with snow, and no ore shipments have been made for two weeks past.

**RUBY MINING COMPANY, LIMITED.**—It is reported that a surface tunnel will be driven to tap the upper workings of the Dunderberg mine, as the last resort in that property. \* †

LINCOLN COUNTY.

**PIOCHE CONSOLIDATED MINING AND REDUCTION COMPANY.**—A drift is about to be run from the Onondaga to the Day mine to facilitate the working of the lower levels, as well as affording better

ventilation. All work has been suspended at the Mendha and Hamburg mines at Highland, although the Hamburg is said to have good breasts of pay ore in sight.

NYE COUNTY.

**BREYFOGUE.**—The San Francisco parties who for some time have been dissatisfied with the management, have purchased the interest of George Montgomery, and expect now to put the mine on a profitable basis.

STOREY COUNTY—COMSTOCK LODGE.

**UNION CONSOLIDATED MINING COMPANY.**—The present developments in the joint drift, with the Sierra Nevada on the 900 level, has passed into vein matter containing hunches of quartz, which give an occasional assay.

(From our Special Correspondent.)

The bullion producing mines on the lode have been so successfully manipulated in the past that the several companies have never thought it worth their while to comply with the requirements of the law. It is specifically provided that each week the superintendents shall, under oath, file complete reports showing the amount of ore extracted, from what part of the mine taken, the amount sent to the mill for reduction, its assay value, the amount of hullion received, the amount of hullion shipped, and the amount, if any, retained at the mine. Several of these stipulations have been "more honored in the breach than in the observance," but now the Mining Stock Association, of San Francisco, has notified the several companies concerned that henceforward they must publish the mine assay each week, as well as the battery assays, or legal means will be taken to compel them to do so. The Overman company has been the only one that has made a practice of obeying the law.

The following is the weekly statement of ore extracted from Comstock mines and milled, with the mine and battery assay values:

Mine.	Tons extracted.	Tons milled.	Mine assay.	Battery assay value.
Con. Cal. & Va....	1,136	800	Not rep.	\$25.30
Hale & Norcross....	.....	442	.....	15.00
Overman.....	700	80	\$30.39	.....
Savage.....	626	553	Not rep.	20.00
Yellow Jacket....	121	.....	.....	.....

\* Cars. † Shipped to Brunswick M.

**CONSOLIDATED CALIFORNIA & VIRGINIA MINING COMPANY.**—The Morgan mill has stopped running and on the 1st inst. the Eureka mill started up. The following were the results at the Morgan mill during March: Tons of ore, 4,277; hullion produced, gold, \$47,271.83; silver, \$25,294.73; total, \$75,566.62. Yield of bullion per ton, gold, \$11.95; silver, \$6.61; total, \$17.66. Assay value of the ore, per ton, for battery samples, gold, \$12.35; silver, \$9.16; total, \$21.52. A series of experiments with the MacArthur-Forest process has been made at the mine and the results are said to have been satisfactory. The returns averaged 92%.

**HALL & NORCROSS SILVER MINING COMPANY.**—H. M. Levy, the ex-president of the company, has returned to San Francisco after his lengthy stay among the sage-brush.

**OVERMAN SILVER MINING COMPANY.**—On the 1st inst. shipments commenced to the Vivian mill. The face of the upraise from 1,200 level shows 2½ ft. of ore, assaying \$25 per ton. On the 1,100 level incline upraise 42 ft. above track floor, there is a seam of fair grade ore 2 ft. in width. The water in the shaft is now 79 ft. below the 1,400 level. \*\*

NORTH CAROLINA.

ROWAN COUNTY.

**NEW GOLD HILL COMPANY, LIMITED.**—The directors of this company have just issued a special report upon its property by Mr. George Grant Francis, M. E., who was sent out to inspect the mines in February last. Mr. Francis concludes that if certain results of the mill and chlorination tests, which he proposes should be made, demonstrate that working on such larger scale as he has indicated will pay working costs, including mining and dead work, then the work should be prosecuted with vigor. The Randolph shaft should be forked out, and both the lodes sunk deeper and drifted on. The country should also be well cross-cut into from one of the deep levels, and a new shaft sunk and cross-cuts made where so many outcrops are shown by shallow pits on that portion of the property, which is northeasterly of the Randolph lode toward the Noce property, where a well-defined lode near the boundary line is exposed, showing it to be about 2 ft. wide and carrying free gold. From here, southwesterly, on the Gold Hill property, is a long stretch of virgin ground, which, if rich enough to pay, would constitute a mine itself. Mr. Francis goes on to say, a mill to crush 90 tons a day and a chlorinating works to treat the product will be necessary. The experiments indicated will cost from \$1,000 to \$1,500 less the gold recovered, and will occupy about six months' time; meanwhile, full information can be obtained as to water available for dressing, plans and estimates for the mill, concentrating and chlorinating plant, and he advises the sinking of a shaft at once on that virgin portion of the property northeast of the Randolph lode, to at least 200 ft. in depth. As to the process, he thinks the Thies is at present the best.

NEW MEXICO.

GRANT COUNTY.

**LAST CHANCE MINING COMPANY.**—The regular shipments from this property have doubled in amount and value, says the Silver City *Enterprise*, the grade of the ore in the third or lower tunnel proving, as in all cases at Silver Creek, much higher as depth is reached.

**PACIFIC GOLD MINING COMPANY.**—This company's mill has been shut down on account of the scarcity of water in the reservoir. The tunnel from which the water company gets the water supply for the city will be cleaned out, and it is expected that there will be plenty of water to run the mill in a few days.

Ten stamps in the old Carlisle mill will be started up soon, says the *Southwest Sentinel*. Five stamps will be run on gold ore and five on ore from the Alabama mine. The old camp promises to begin a new life, but such extensive operations as were carried on by the Carlisle Gold Mining Company cannot be hoped for at present.

SIERRA COUNTY.

Ground has been broken for a new smelter at Hillsborough, and 2,000 tons of coke have been ordered. It is expected that the smelter will be ready for operation in June.

PENNSYLVANIA.

COAL.

**LEHIGH & WILKESBARRE COAL COMPANY.**—At a meeting of the Lehigh & Wilkesbarre Coal Company, held on the 11th inst., Mr. George F. Baker was elected first vice-president and Mr. F. M. Williams was elected second vice-president. Mr. J. R. Maxwell continues as president of the company.

OIL.

It has been rumored that a combination has been formed to raise the price of crude petroleum by shutting all wells down for six months, beginning May 1st. The proposition, it is said, is meeting with favor from individual producers and the Standard companies alike.

SOUTH DAKOTA.

LAWRENCE COUNTY.

**BIG MISSOURI.**—This mine has shut down because the railroad company refuses to haul its ore to the Uncle Sam mill on Elk Creek, alleging that the siding to the mill is dangerous.

**DEADWOOD & DELAWARE SMELTING COMPANY.**—The plant has gone out of blast preparatory to enlarging its capacity. The shut down, however, was hastened by the poor quality of the New Castle coke, running, as it did, 28% ash. A contract has been made with a West Virginia coke firm for two carloads daily of their product.

**GOLDEN REWARD CHLORINATION COMPANY.**—The force of men employed at the Boscobel, one of the properties recently purchased by this company, has been doubled, and the mine is now producing about 50 tons of ore per day.

PENNINGTON COUNTY.

**WADE.**—This property near Harney City at the depth of 100 ft. shows a good body of silver and gold ore.

UTAH.

JUAB COUNTY.

A strike of gold ore, running from \$8 to \$17 a ton, is reported in Death Valley, 20 miles south of Eureka.

**CENTENNIAL-EUREKA MINING COMPANY.**—The production of this company for ten months ending December 31st, 1891, as officially reported, was as follows: 7,982,783 lbs. of ore, containing 90,061 lbs. of copper, 308,179 lbs. of lead, 405,350.07 oz. of silver, and 2,445,741 oz. of gold. Dividends were paid in 1891, amounting to \$330,000.

VIRGINIA.

**VIRGINIA MINING AND INVESTMENT COMPANY.**—This company, whose property is situated at Cotopaxi, on the Norfolk & Western Railroad, shipped last week two carloads of manganiferous ore to Johnstown, Pa., as sample lots. This company is also shipping to Buena Vista furnace large quantities of brown hematite ore.

ROCKBRIDGE COUNTY.

**BOSTON TIN MINING COMPANY.**—The option on the tin mines at \$200,000, held by this company, expires on the 19th inst. In a recent interview, one of the officers of the company said that \$100,000 had been expended for machinery and development; that 20,000 tons of ore were on the dump, and that 1,500 tons had been smelted. Analysis, he said, proved that the ore averaged 3½% metallic tin. We have not heard that any of this tin has been in the market.

FOREIGN MINING NEWS.

AUSTRALIA.

NEW SOUTH WALES.

**BROKEN HILL PROPRIETARY COMPANY, LIMITED.**—The output of this company for the week ending March 31st was 5,509 tons of ore yielding 881 tons of lead containing 198,324 oz. of silver. The usual monthly dividend of 2s. per share, amounting to £96,000, has been declared for March.

CANADA.

PROVINCE OF NOVA SCOTIA.

An extensive deposit of barytes has been located

in the northern part of Cape Breton by Alex. McLeod, of Baddeck.

Considerable prospecting has been done on a vein of galena at McAdam's Lake, East Bay. The vein is not very regular, but the ore is said to be of good quality.

#### MEXICO. MICHOCACAN.

LA LUZ DE LA BONDA.—This mine, at Halpujahuahua, which tradition says produced some \$400,000, has been purchased by a number of local capitalists. J. Peña, formerly of the Concepcion, and A. Sahlberg, of the El Oro, will take charge of the property.

#### CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, April 15.

**Heavy Chemicals.**—There is no change to report in this market. With the solitary exception of caustic soda the various chemicals have been dull and utterly devoid of any features of interest. For caustic, however, there has been a very fair inquiry and more sales than last week; the price has been well maintained. Quotations remain unchanged as follows: Caustic soda, 70%, 2.95@3.05c.; 74-76%, 2.97½@3.07½c.; 77%, 3.10c. Carbonated soda ash, 48%, 1.62½c.; 58% (basis 48%), 1.50c. Alkali, 48%, 1.60@1.65c.; 58%, 1.45@1.47½c. Bleaching powder, 2.15@2.20c.; sal soda, English, 1.02½@1.05c.; domestic, .90@1c.

**Acids.**—It is the old story in this market, tersely told by one of the leading manufacturers: "Big business and small profit." The effects of the squabble of two years ago have not passed away yet, and the market ever since that time has been decidedly in the buyer's favor. The export trade is reported good, especially with Cuba, and probably will continue until the fall. There is no change in prices. We continue to quote acid per 100 lbs. in New York and vicinity, in lots of 50 carboys or more: Acetic, \$1.60@\$.2, according to quality; alum, lump or ground, \$1.55@\$.1.80; muriatic, 18", \$1; 20", \$1.12½@\$.1.25; 22", \$1.25; nitric, 40", \$4; 42", \$4.50@\$.4.75; sulphuric, 90c. @\$.1.10; mixed acids, according to mixture; oxalic, \$7.25 @\$.7.75. Blue vitriol is quoted all the way from \$3.25@\$.3.50. Glycerine for dynamite 1½@12½c., according to quality and quantity.

**Brimstone.**—There are conflicting reports about this market, which certainly is lower and weaker than at the time of our last report. Quotations for goods on the spot are as follows: Best unmixed seconds, \$24@\$.24.50, and best unmixed thirds, \$23@\$.23.50. To arrive, best unmixed seconds, \$23; best unmixed thirds, \$22. Late cables report an unsettled feeling on the other side, and no one dares to predict what the course of the market will be a week hence.

**Fertilizers.**—A fair business has been done in this market during the past week. There is a better feeling, due to a fairly active demand for ammoniates. Some sales are reported, and prices, although unchanged, are quite firm. Quotations are: Sulphate of ammonia, \$2.90 for bone goods and \$2.90@\$.2.95 for gas liquor. Dried blood, \$1.95 @\$.2 per unit for high grade and \$1.85@\$.1.90 for low grade. Acidulated fish scrap, \$11@\$.12, factory. Dried scrap, \$23.50@\$.24. Azotine, \$1.85@\$.1.90. Tankage, \$17.50@\$.21, according to grade. Bone meal, \$22.50@\$.23.50.

**Double Manure Salts.**—Quotations are as follows for lots of from 10 to 50 tons ex-vessel New York: 43-53%, \$1.13½@\$.1.23½; 80-85%, \$1.81½@\$.1.89; 90-95%, \$2.16@\$.2.28½.

**Kainit.**—There is nothing of interest to report of this chemical. Prices remain \$8.75 for invoice weight and \$9 for actual weight, New York and Philadelphia.

**Muriate of Potash.**—There has been the usual amount of arrivals during the week and the market continues as last reported.

**Phosphates.**—Under date of the 11th, inst., our Charleston, S. C. correspondent writes as follows: "Kiln dried rock 57% guaranteed is quoted at \$5.25 @\$.5.50 per ton. No one seems at all anxious to sell at these prices and I think that the low quotations which have been circulated lately in the North are due to an effort on the part of buyers to break down prices. Many of the mines have closed down and others are mining very little. Fertilizer shipments from September 1st, 1891, to April 1st, 1892, amount to 197,814 tons and 260,721 tons for the corresponding period of the previous season, a decrease of 62,970 tons.

Mr. Paul C. Trenholm, of Charleston, S. C., sends us the following interesting statistics, showing the shipments of phosphate rock from Charleston during the month of March:

	1890.		1891.		1892.	
	Crude.	Ground.	Crude.	Ground.	Crude.	Ground.
Domestic..	14,606	..	17,619	..	15,378	56
Foreign..	6,990	..	95	..	.....	..
Grand total..	21,596	..	17,714	..	15,378	56

South Carolina railroad shipments for March, 1891, were not obtainable, being 3,567 tons, which would aggregate 21,186 tons for that month.

**Nitrate of Soda.**—Quotations for nitrate on the spot are \$1.70 to \$1.75. Dealers decline to name any price for future shipments, owing to the reports of the nitrate combination in England, which will have an effect in raising prices.

#### Liverpool.

April 6.

(Special Correspondence of Joseph P. Brunner & Co.)  
The continuance of the colliers' strike in the Durham district is making itself felt on the Tyne. Manufacturers there have had to restrict their output considerably and the result is that prices on the Tyne have been advanced to the extent of 7s. 6d. per ton on soda crystals and 10s. per ton on 77% caustic soda. In the Lancashire district, however, business is very slow, and only a hand to mouth trade passing.

At this time of the year a good demand is usually looked for, owing to the opening of the spring trade, but this has been very disappointing so far this year.

**Soda Ash.**—Orders from the States have been refused this week, as manufacturers state they are fully sold for the next three months, and they will only entertain orders for small parcels. The quotations therefore are quite nominal and for commoner qualities may be quoted as follows: Caustic ash, 48%, £5 6s. 3d. per ton; 57 and 58%, £6 7s. 6d. per ton.

Carb. ash, 48%, £5 9s. 9d. per ton; 58%, £6 12s. 9d. per ton. Ammonia ash, 58%, £6 7s. 6d. per ton, all net cash. Prime brands are held for a premium on above figures.

Soda crystals are inclined to stiffen a little in sympathy with the advance on the Tyne, and £3 10s. @ £3 12s. 6d. per ton, less 5%, are nearest spot values, although possibly a little might still be had at a shade under the lower figure.

**Caustic Soda.**—There is no improvement in the demand for this article, which remains very dull. Prices are well maintained, however, and we quote as follows: 60%, £9 7s. 6d. per ton; 70%, £10 10s. per ton; 74%, £11 10s. per ton; 76%, £12 7s. 6d. @ £12 15s. per ton, all net cash. For parcels under 10 tons 5s. per ton extra is charged. The "Union" will not sell on this market for export to the States.

Bleaching powder is only selling in a moderate way at £7 15s. @ £8 per ton net cash for hardwood packages, for all quarters, except the States and Canada.

Chlorate of potash, although still scarce for prompt delivery, is in a rather lifeless condition, and the rush is all over. Manufacturers are fully sold for early delivery, and quote 7d. per lb., less 5%, for any delivery extending over the next three months, and 6½d. for July to December. There are resellers, however, for prompt delivery at 6½d., and 6¼d. would probably be accepted for the last six months.

Bicarb soda is more active at £6 15s. @ £7 per ton, less 2½%, for one cwt. kegs, according to brand and quantity, with usual allowances for larger packages.

Sulphate of Ammonia.—There has been rather more doing in this article lately, although the market is not active. Prices are perhaps a shade firmer, but there is not much change, and nearest quotations are about £10 6s. 3d. @ £10 7s. 6d. per ton for good grade 24%; and £10 10s. @ £10 12s. 6d. per ton for 25%, both in double bags, less 2½%, f. o. b. here.

#### MINING STOCKS.

[For complete quotations of shares listed in New York, Boston, San Francisco, Baltimore, Denver, Kansas City, Deadwood, Dak., Pittsburg, St. Louis, London and Paris, see pages 440 and 442.]

NEW YORK, Friday Evening, April 15.

This has been a short week and the closing of the Exchange to-day, Good Friday, shows in the small total sales for the week. The market was entirely featureless and as dull as it possibly could be.

The Comstocks were in little demand. There were sales of 250 shares of Consolidated California & Virginia at \$3.90@\$.4, 100 shares of Hale & Norcross at \$1.40, 100 shares of Sierra Nevada at \$1.40. Of Yellow Jacket 200 shares were sold at \$1@\$.1.05. Comstock Tunnel appeared in some demand; of the stock 4,500 shares changed hands at 13@14c., and \$2,300 of bonds were sold at 18@19c.

There was a sale of 100 shares of Bullion at 70c. An equal number of Mexican changed hands at \$1.60. Other sales were 100 shares of Potosi at \$1.20, 200 shares of Union Consolidated at \$1.40, and 200 shares of Utah at 40c.

Of the California stocks there was a sale of 200 shares of Bodie Consolidated at 47@48c. Of Bulwer 200 changed hands at 55c. Astoria is reported to have been traded in to the extent of 200 shares at 2c. Brunswick Consolidated underwent a decline; 6,100 shares were sold; the closing price was 8c. Standard Consolidated was in a fair demand and shows a slight rise in price. During the week 1,000 shares were sold at \$1.40@\$.1.70.

Among the Colorado stocks there were sales of 1,300 shares of Chrysolite at 19c., and 1,700 shares of Leadville Consolidated at 16 and 17c. There was a sale of 400 shares of Monitor at 2c.

The Aspen Mining and Smelting Company has declared a dividend of 10c. per share, aggregating \$20,000.

The only Black Hills stock dealt in was Caledonia, of which 100 shares were sold at \$1.05.

Of Phoenix of Arizona 100 shares were sold at 45c.

#### Boston.

April 14.

(From our Special Correspondent.)  
The week opened with a dull and lifeless market for copper stocks and prices ruled at the lowest for the week, but yesterday there was a decided change in the situation and orders from good

sources to buy the leading specialties gave a better tone to the market, and prices show a liberal advance all round. The strength of ingot copper leads many of our leading operators to believe that higher prices for good stocks must ensue during the coming month.

The Montana stocks are the leaders in point of activity as offering greater margins for profits than the low-priced Lake stocks, although the latter are favorites for investment. Calumet & Hecla advanced to \$275, a gain of \$5 per share, with only sales of 25 shares for the week, and Tamarack sold up to \$175, a gain of \$10.

Boston & Montana was dull and heavy early in the week at \$42@\$.42½, but a good demand for it to-day carried it up to \$44, with a slight reaction at the close. Butte & Boston was also strong to-day and advanced to \$14½, after selling down to \$13½ during the week.

There was a good demand for Osceola to-day, which advanced the price to \$33, a gain of \$1½. Franklin was not quite so strong as last week and did not sympathize with the advance in the balance of the list. Sales were made at \$14½. Kearsarge dropped to \$12½ and was only fairly steady.

Centennial sold at \$9½@\$.10. The buying of this stock for some time past has been, it now appears, for control. At the annual meeting yesterday the property passed into the hands of New York parties, who propose to issue bonds on the property to raise the necessary funds to develop the mine and put it, if possible, upon a paying basis. It is believed by parties in interest that the issue of \$25,000 bonds may yet work wonders for Centennial shareholders.

Atlantic sold at \$12½, the same as last week.

The Quincy Mining Company made application a few days ago for the reinstatement of its stock upon the Exchange. The proposition was refused, and will be until such time as the company makes arrangements for the registration of its stock with a bank or trust company.

Silver stocks are neglected, with sales of Catalpa at 20c. and Crescent at 10c.

#### San Francisco.

April 8.

(From our Special Correspondent.)

The mining stock market has become stagnant during the past week, and prices have steadily declined. The chippers have, in the absence of any news from the front, done about as they pleased, and have made trading more active than was warranted by the situation by rumors of a movement in the Potosi section. This month the mining assessments falling delinquent amount to \$349,700, and that alone is a heavy weight to carry during such a dull time.

The North End Comstocks to-day sold heavy, Consolidated California & Virginia going for \$4.50 and closing at \$4.35 bid. Ophir sold for \$2.50; Mexican, \$1.65; Sierra Nevada, \$1.40; Union Consolidated, \$1.30; Utah, 40c., and Scorpion, which sold freely, at 15c. All these figures are a heavy decline on ruling rates a week ago.

The middle group, with the exception of Best & Belcher, that sold to-day for \$2.35, have participated in the general weakness. Gould & Curry sold this afternoon, on regular call, at \$1.25, Hale & Norcross ruling at the same rate. A considerable amount of the last named stock is being bought on the strength of a rumor that strong hands intend in the near future to advance the value of the stock very materially. As there is no reason why the Hale & Norcross should not sell at much better figures than as at present quoted, and the present management is being closely watched in its efforts to bring order out of the chaos into which the company was plunged by the Levy gang, it is quite likely that in the near future this stock will have a boom. As an assessment is pending, however, such an advance can scarcely be expected this month.

Potosi at \$1.15, and Savage at \$1.30 show a decline on the week's trading of 15 and 20 cents respectively, with sales light.

The Gold Hill and south enders have sold at both sessions to-day fairly well at the reduced prices. Alpha is quoted at 30 cents; Alta, 70 cents; Belcher, \$1.25; Benton Consolidated, \$2.00; Bullion, 70 cents; Caledonia, 25 cents; Challenge Consolidated, 70 cents; Chollar, \$1.00.

Of the outside stocks the Bodies have been the most active Bodie Consolidated selling for 40 cents; Bulwer for 40 cents; Mono for 60 cents and Summit for 5 cents. A few scattering sales have been made of Commonwealth at 10 cents; North Commonwealth at 25 cents; Nevada Queen at 55 cents, and Mt. Diablo at \$1.20.

#### St. Louis.

April 14.

(From our Special Correspondent.)

Trading was very dull this week and business was unusually small. There seemed to be no life in the market and very few stocks found buyers.

American and Nettie opened at 62½c. and on a sale of 700 shares sold down to 60c., closing at 58½c. It fell on the following day to 50c., then rose to 53½c. and remained dull up to the close with the best bid 50c. Central Silver opened on a sale of 2,600 shares at 1½c., sold 4,500 shares the following day at 1@1½c., followed by 1,900 at 1½c. 2,100 shares at 1½c., 11,400 shares at 1½c. and closed at 1½c. on a sale of 2,000 shares.

Elizabeth opened at 45c. and closed at 42½c. A the opening bid 100 shares sold and 100 shares the following day brought 46½c., 100 more at 46½c., and at the close 500 shares sold at 45c.

Montrose was dealt in lightly, and to an opening of 14c. sold on Saturday at 15c. At closing 300 shares sold at 13c. Yuma was quiet at 5 @ 4c., only one sale of 1,000 shares being made. No other sales were effected.

**DIVIDENDS.**

Poorman Mines, Ltd., dividend No. 2, of six cents per share, \$18,225, payable April 30, at the office of the company in London, Eng.

**ASSESSMENTS.**

COMPANY.	No.	When levied.	D'tn't in office.	Day of sale.	Amt. per share.
Andes, Nev. ....	38	Mar. 8	Apr. 11	Apr. 29	.25
Belcher, Nev. ....	43	Mar. 8	Apr. 12	May 3	.50
Best & Belcher, Nev. ....	51	Mar. 3	Apr. 7	Apr. 29	.25
Bullion, Nev. ....	3	Mar. 17	Apr. 21	May 11	.25
Confidence, Nev. ....	29	Mar. 30	May 3	May 25	.75
Con. New York, Nev. ....	7	Mar. 10	Apr. 12	May 5	.10
Crown Pt., Nev. ....	57	Mar. 15	Apr. 19	May 10	.50
Fall River Cons., Cal. ....	7	Feb. 24	Apr. 2	Apr. 25	.02
Gold Mountain, Cal. ....	2	Mar. 29	May 3	May 23	2.00
Hale & Norcross, Nev. ....	101	Mar. 24	Apr. 28	May 20	.50
Head Center & Tranquility, Ariz. ....	4	Mar. 14	Apr. 19	May 12	.03
Kentuck Cons., Nev. ....	3	Mar. 22	Apr. 26	May 19	.10
Lew Wallace, S. Dak. ....	3	Feb. 16	Apr. 18	May 7	.001 1/2
Norway, Utah. ....	Dec. 24	Feb. 1	July 21	.02	
Occidental, Nev. ....	10	Apr. 6	May 9	May 31	.25
Original Keystone, Cal. ....	12	Mar. 4	Apr. 14	May 7	.10
Peer, Ariz. ....	9	Feb. 24	Apr. 6	Apr. 28	.10
Silver Hill, Nev. ....	30	Mar. 31	May 5	May 25	.10
Siskiyou Cons., Cal. ....	3	Mar. 15	Apr. 22	May 1	.01
Telegraph, Cal. ....	3	Mar. 8	Apr. 16	May 5	.01 1/2
Utah, Nev. ....	14	Mar. 8	Apr. 12	Apr. 29	.25

**PIPE LINE CERTIFICATES.**

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

Opening.	Highest.	Lowest.	Closing.	Sales.
Apr. 9.....	57 1/2	57 1/2	57 1/2	8,000
11.....	58	58	58	18,000
12.....	58 1/2	59 1/2	59 1/2	78,000
13.....	59 1/2	59 1/2	57	17,000
14.....	57 1/2	58	57	24,000
15.....	.....	.....	.....	.....
Total sales in barrels.....	.....	.....	.....	145,000

**COAL TRADE REVIEW.**

NEW YORK, Friday Evening, April 8th.  
Statement of shipments of anthracite coal (approximated), for week ending April 9th, 1892, compared with the corresponding period last year:

Regions.	April 9, 1892.	April 11, 1891.	Difference.
Wyoming Region..	339,899	301,699	Inc. 38,200
Lehigh Region..	96,859	104,083	Dec. 13,194
Schuykill Region.	199,012	184,365	Inc. 14,647
Total.....	635,770	590,147	Inc. 45,623
Total for year to date.....	9,937,731	9,030,669	Inc. 887,062

**PRODUCTION OF BITUMINOUS COAL for week ending April 6th, and year from January 1st.**

Regions.	1892.		1891.	
	Week.	Year.	Week.	Year.
Phila. & Erie R. R. ....	1,909	25,862	38,952	38,952
Cumberland, Md. ....	98,148	929,402	1,202,400	1,202,400
Barclay, Pa. ....	3,207	55,789	46,686	46,686
Broad Top, Pa. ....	11,771	162,321	167,826	167,826
Clearfield, Pa. ....	84,076	1,008,987	1,241,203	1,241,203
Allegheny, Pa. ....	25,423	313,487	398,012	398,012
Beach Creek, Pa. ....	44,731	622,851	651,763	651,763
Pocahontas Flat Top. ....	47,878	670,649	647,225	647,225
Kanawha, W. Va. ....	45,153	690,226	624,982	624,982
Total.....	361,996	4,479,554	5,019,009	5,019,009
<b>WESTERN SHIPMENTS.</b>				
Regions.	1892.		1891.	
	Week.	Year.	Week.	Year.
Pittsburg, Pa. ....	26,074	357,851	249,518	249,518
Westmoreland, Pa. ....	32,171	497,678	569,325	569,325
Monongahela, Pa. ....	9,345	123,972	152,700	152,700
Total.....	67,590	979,501	1,011,543	1,011,543
Grand total.....	429,586	5,459,055	6,030,552	6,030,552

**PRODUCTION OF COKE on line of Pennsylvania R. R. for the year ending April 9th, 1892, and year from January 1st, in tons of 2,000 lbs.: Week, 106,765 tons; year, 1,669,495 tons; to corresponding date in 1891, 843,385 tons.**

**Anthracite.**

The market is remarkably firm and strong. At a meeting of the sales agents on April 14th the question of raising prices was discussed, but no decision was reached. The exact rate proposed is not known to outsiders, although it is rumored that it meant an increase of at least 10 cts. along the line, and that this was but preparatory to further advances. It was not deemed advisable, or at least politic, to make this advance at this stage of the Reading deal, so the matter rests in abeyance until the next meeting. There has been a considerable diminution in stocks, and the out-

put, which is kept close to the allotment, is no more than the demand.

In the answer to the bill in equity of Matthias H. Arnot against the Philadelphia & Reading and allied corporations, the fact was disclosed that the Reading had secured 999 years leases of the properties in question, and that the corporation could thus control virtually to perpetuity an output of 22,000,000 tons annually. Affairs in Pennsylvania are quiet. The collieries shut down regularly in the latter part of the week, and in the greater portion of them work is limited to four days. The somewhat sensational statement that the Pennsylvania Railroad had secured certain collieries preparatory to an aggressive campaign is ridiculed here. It is true that it has secured the output of the collieries of A. S. Van Wickle & Co., but their production is not a factor in the market, being only \$300,000 tons annually.

It had been stated by parties unacquainted with the facts that by A. S. Van Wickle is the son-in-law of the late Ario Pardee, this might have some effect upon the disposition of the extensive output of the Pardee collieries, but as Cox & Bros. have leased three of them and the Lehigh Valley the balance, it would be impossible to turn their product to the Pennsylvania.

It is generally believed, moreover, that amicable arrangements will be made between the Philadelphia and Reading and the Pennsylvania, and that overtures from the former to that effect have already been made.

There seems to be a good demand for all sizes of coal, but particularly for chestnut, the stores of which are extremely low at present. There seems to be a shortage of all sizes in the West, and with this demand and the raise in tables to Buffalo of 25 cents over all lines, there is expected to be a nice profit for the allied lines, although the former rate of \$2 was regarded generally as too low for profit.

**Bituminous.**

The majority of the contracts have been closed, and as a consequence the market is somewhat stagnant, although there is so little business being done that there is no apparent weakness. The cutting by Clearfield and New River operators has injured the market to no little extent this season, and has left it in rather a shaky condition. Other operators are hiding their time, believing that the New River people in particular have overloaded themselves, and threaten to mulct them to the extent of \$1@\$.150 a ton should they be forced to call upon them.

But few contracts remain open, and those of smaller consumers who all through the spring have shown a remarkable degree of hesitancy. The majority of the companies report a very successful season as far as tonnage contracts have been concerned, but a disappointing one in prices. It is rumored that the Pocahontas coal will not be so strong a factor from now on in depressing the market as it has been. The Norfolk & Western Railroad has enabled the Pocahontas Coal Company, to its own cost, to make a strong competitive fight against all other companies, by the more than liberal freight rates, letting the operators name their own rates virtually and guaranteeing them a fixed price at the mines, letting them name their own price to consumers and taking the raw metal, never large, for their own tolls. This system, if reports are true, is to be changed. Fixed tolls, remunerative to the stockholders of the railroad, are to be made.

The Pennsylvania Railroad has named its tolls at last. They are virtually the same as last year. The delay has been attributed to the desire to see the effect of the threatened competition of the Baltimore & Ohio. Although blockades have been rather frequent of late on the Pennsylvania system, cars are rather easy and in fair supply. The blockades are due somewhat to many of the producers keeping large quantities of the coal in cars at the seaboard. It is rumored, however, that the Pennsylvania is inquiring into this matter, and will, if possible, put a stop to it. On the Baltimore & Ohio, as usual, cars are scarce. Ocean vessels are in demand at Philadelphia and are scarce in Baltimore and Southern ports. Ocean freight rates remain the same; 80@85c. from Philadelphia to Boston and 70@75c. to Sound ports.

**NOTES OF THE WEEK.**

The Philadelphia & Reading Railway Company will, on the 16th inst., close its water transportation department in this city. Its barges, tugs and other floating property will on that day be transferred to the Lehigh Valley Railway. This action is, of course, in line with the economies which have been made possible by the recent coal combination. Mr. J. H. Galt, who has been with the Reading Company for seventeen years, and who has been for a long time superintendent in this city of the department which now goes out of existence, has been appointed assistant superintendent of floating equipment of the Long Island Railroad, and will have his headquarters in Long Island City.

The freight rates on anthracite coal were advanced on the 14th inst., at a meeting in this city of all the coal carrying companies, including the Pennsylvania, New York Central, Reading, Lackawanna, Jersey Central, Erie, Lehigh Valley, Ontario & Western, Susquehanna & Western, the Pennsylvania Coal Company and the Fall Brook Coal Company. The rate from the anthracite fields to Buffalo was advanced from \$2 to \$2.25 a

ton. The rate to Chicago was advanced 25 cents a ton, and the rate to Lake Ontario points was fixed at \$2.10, which is an advance of about 30 cents a ton. This action was practically unanimous.

**Boston.** April 14.

(From our Special Correspondent.)

There is not much demand for anthracite coal just at present, but dealers have considerable confidence in the market, believing that the combination will maintain the price.

Prices on anthracite coal are quite firm. We quote: F. o. b. prices net, at New York, stove \$3.75@\$.3.90; egg, \$3.60@\$.3.75; free broken, \$3.50@\$.3.65; chestnut, \$3.40. Lykens Valley: Broker, \$4.90; egg, \$5; stove, \$5.40; chestnut, \$4.50.

About all the contracts for soft coal in this district have been closed. Some large ones, however, still remain open. The Tremont and Suffolk mills closed this week for 10,000 tons of Clearfield coal. As about all the contracts have been closed at \$3.40@\$.3.50, dealers are not apt to cut prices now for what contracts remain and injure their contracts already closed. Soft coal on cars here is worth \$3.75 per ton.

The agreement of the transportation companies, which control about 80% of the vessels and steamers in the coal carrying trade, to advance and maintain rates, has a stimulating effect on the coal market in general, and especially freight rates. We quote: From New York to Boston, 60@65c.; from Philadelphia to Boston, 80@85c.; from Philadelphia to Portland, 80c.; to Bath, 85c.; to Providence, 75c.; from Baltimore to Boston, 85@90c.; Newport News to Boston, 70c.; Sound Points, 70c.

The retailers are doing very little, but are maintaining prices.

We quote: Stove, \$5.50; nut, \$5.50; eggs, \$5.25; furnace, \$5.25; Franklin, \$6.75@\$.7, all sizes; Lehigh egg, \$5.50; Lehigh furnace, \$5.50. Wharf prices 50 cents less than foregoing.

The receipts of coal at this port for the week ending April 9th were 52,377 tons of anthracite and 18,239 tons of bituminous, against 64,427 tons of anthracite and 77,182 of bituminous for the corresponding week last year. The total receipts thus far this year have been 406,546 tons of anthracite and 166,296 tons of bituminous, against 364,860 tons of anthracite and 263,433 tons of bituminous for the same time last year.

**Buffalo.** April 14.

(From our Special Correspondent.)

There has been a change in coal rates for a few days, and the schedule will continue until the 21st inst. The prices are as follows: \$4.35 for grate or broken, egg, stove and chestnut per gross ton to dealers on cars at Buffalo and International and Suspension Bridges; free on board vessels at Buffalo not made at present. Retail prices will be fixed in a few days to take effect about May 1st.

Navigation is open. The first propeller left Buffalo for Toledo on Thursday, April 7th, and returned to this port on the morning of the 11th. Two propellers left Chicago Saturday, April 9th, and arrived here April 12th.

But few coal charters have been reported thus far, at 40c. to Chicago, Milwaukee and Sheboygan, and 30c. to Duluth. The early opening of navigation caught the shipper as well as the carrier, and the result is a comparative light movement of coal to date. The producing interests are, however, getting business into shape.

The coal trade in anthracite is very dull, but bituminous has improved as the demand for propellers and tugs had to be attended to with "immediate dispatch."

The Buffalo Water Commissioners advertised for 17,000 net tons of grate anthracite coal or its equivalent in natural gas. Bids were opened Tuesday last. The coal bids were as follows: Mr. E. L. Hedstrom, \$3.89 per net ton; the Philadelphia & Reading Coal Company, \$3.90 per net ton on canal or \$3.79 on cars. The Buffalo Natural Gas Fuel Company offered sufficient fuel to operate the pumps for one year to May 1st, 1893, on the basis of \$3.51 a net ton for anthracite coal, or to supply sufficient gas to operate the pumps at the rate of \$3.15 per million gallons of water pumped. Last year the coal was offered at 19 cents less than this year and the gas 3 cents lower. The natural gas bid was considered \$7,600 cheaper than the coal bid.

The canals of the State will not be opened before May 1st and may be delayed until the 5th.

The United States appropriation being expended, no improvements will be made to the Buffalo breakwater or harbor this year; but some little work will be done in the channel of Niagara near Tonawanda.

The Philadelphia & Reading Railroad Company is reported to have purchased 2,000 acres of land near our city line on the Niagara River frontage for the purpose of constructing docks, etc.

The following corporations have engaged offices in our city, viz., the Shawmut coal, the Noble coal, and the Brock coal companies. They will be located in the Coal and Iron Exchange.

It is rumored that Mr. William A. Baldwin, vice-president and general manager of the Buffalo, Rochester & Pittsburgh Railroad, will soon retire from that position, and that Mr. George E. Merchant will return to be reappointed as general manager. The latter is president of the Rochester & Pittsburgh Coal and Iron Company and left this city five years since.

The total shipments of coal this season to noon

to-day as reported at the Custom House were 12,150 net tons, viz.: 8,750 to Chicago, 1,800 to Milwaukee, and 1,600 to Duluth.

**Chicago.** April 14.  
(From our Special Correspondent.)

A meeting has been called by the Anthracite Coal Association of Chicago for to-day to consider the condition of the trade, and to which meeting the accredited representatives of the producers at Milwaukee, Lake Superior points, Buffalo and resident agents here have been invited.

In hard coal there is little of special interest to note. Stocks on docks are very badly broken and there is only a limited supply of the smaller sizes, small egg and stove. The surplus, if any, seems to be entirely nut and grate coal. There is very little doing in a wholesale way; orders are small and for immediate shipment and the circular price \$5.25 is firmly and uniformly maintained by all. Retail trade keeps up remarkably well; the cold, raw northwest winds are conducive to a good consumption of coal. Dealers are kept fully employed but without extra help, and deliveries are steady all day long. The only manifestations of uneasiness in the market are those occasioned by the anxiety of shippers to fathom the policy of the producers.

Bituminous coal has been in better demand during the past 10 days or so on account of the cold weather, and the great firmness in anthracite has unquestionably created a stronger feeling in soft coal. There is also some decrease in the surplus, and shipments are being held down or restricted more nearly to the requirements of the market, hence it is, on the whole, in a more satisfactory condition, and prices are more closely held to circular rates. There is an uncertainty in regard to labor in the Iowa coal fields. A mass meeting has been called at Oskaloosa April 14th and 15th to consider the questions of a semi-monthly pay day and various other matters which, if not conceded by operators, may result in serious trouble May 1st. Illinois and Brazil, Ind., block mines are mostly running full on account of the usual short holiday season which obtains among the coal miners May 1st. Some disposition is noticed on the part of the operators in the latter not to tie up their output by low-priced contracts. The opening of navigation next week will, of course, stimulate the demand for all kinds of soft coal.

Coke is in moderate demand and more activity is looked for within 30 days, as foundries are receiving a good influx of orders from all sources. Prices remain steady on standard grades.

Quotations are \$4.65 furnace, \$5.05 foundry crushed, \$5.40 Connellsville; West Virginia, \$3.90 furnace, \$2.10 foundry; New River foundry \$4.90; Walston, \$4.65 furnace, \$5 foundry.

Circular prices are unchanged at the following rates: Lehigh lump, \$6.25; large egg, \$5; small egg, range and chestnut, \$5.25. Retail prices per ton are: Large egg, \$6.00; small egg, range and chestnut, \$6@6.25.

Prices of bituminous per ton of 2,000 lbs., f. o. b. Chicago, are: Pittsburg, \$3.15; Hocking Valley, \$3; Youghiogheny, \$3.25; Illinois block, \$1.90@2; Brazil block, \$2.35.

**Pittsburg.** April 14.  
(From our Special Correspondent.)

**Coal.**—Trade during the week has not been active, but the supply keeps pace with the demand. The lower markets contain an ample supply, as during the early part of the week the Ohio River was in good navigable order; there were sent to Cincinnati 852,000 bushels of coal, to Louisville 1,194,000 bushels; a total of 2,046,000 bushels. Coal in the pools is forwarded to the lower landings as fast as loaded. The harbor at present contains about 1,000,000 bushels, which amount is being daily increased, the water in the Ohio not being sufficient for shipping purposes. River coal operators deny that operations are to be suspended during the next 30 days.

**Connellsville Coke.**—Trade shows no improvement. The average run of the plants for the week was the lowest during the year, being only 4 to 4.7 days. At present there is nothing in sight to indicate a better condition of affairs. A number of active ovens are about to be blown out. At the same time, taking all things into consideration, a fair business is being done. The demand for foundry coke being good helps trade very materially. Of the 17,222 ovens in the region there are only 12,837, or about 27%, in blast of the total number of ovens. The furnacemen are asking for a reduction in the price of coke, which the operators are unwilling to concede. The week's shipments amounted to 117,400 tons distributed as follows: To Pittsburg, 1,925 cars; east of Pittsburg 1,431 cars; points west of Pittsburg, 3,164; total, 6,520, against 6,633 the previous week, decrease 113 cars. Prices are unchanged.

**METAL MARKET.**

NEW YORK, Friday Evening, April 15, 1892.

The New York Metal Exchange has elected the following officers: President, John J. Williams; vice-president, William L. Russell; treasurer, Carl Mayer; members of the board of managers, W. H. Davol, Edmund Hendricks, George Nissen, Nicholas L. Cort, Morton B. Smith, J. C. Burton, Joseph Byrne, Lucius Hart, Julius H. Lobdell,

Wm. H. Wells, Edward A. Caswell, Chas. S. Trench, B. Hochschild, Robert Gentle; Arbitration Committee, J. M. Clark, H. M. Cort, Geo. W. Jaques, S. A. Jennings, Fred. Steiner; inspectors of election, Wm. Hagan, Geo. N. Frecker, J. Z. Damarest.

**Prices of Silver Per Ounce Troy.**

April.	Sterling Exchange.	London.	N. Y. Cents.	Value of sil. in \$.	April.	Sterling Exchange.	London.	N. Y. Cents.	Value of sil. in \$.
9	4.87½	39½	86½	.668	13	4.87½	39½	86	.665
11	"	39½	86½	.671	14	"	39½	86	.665
12	"	39½	86½	.668	15	"	"	86	.665

\* Holiday in London.

The market has been characterized by dullness owing to Easter holidays in London. While there has been a moderate demand from London on India orders these orders have not been executed here owing to small offerings of silver in our market, the Government absorbing our smelting product.

The decrease in shipments of bullion from the West has been more marked this week, with a consequent steadiness in prices.

The United States Assay Office at New York reports the total receipts of silver for the week to be 143,000 ounces.

**Silver Bullion Certificates.**

	Price.		Sales.
	H.	L.	
April 9.....	86¾	87	51,000
April 11.....	87¾	87½	35,000
April 12.....	86½	.....	10,000
April 13.....	.....	.....	.....
April 14.....	.....	.....	.....
April 15.....	.....	.....	.....
Total sales.....	.....		96,000

**Domestic and Foreign Coin.**

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

	Bid.	Asked.
Trade dollars.....	\$ .70	\$ .75
Mexican dollars.....	.68	.70
Peruvian soles and Chilean pesos.....	.67	.70
English silver.....	4.83	.....
Five francs.....	.93	.95
Victoria sovereigns.....	4.86	4.90
Twenty francs.....	3.86	3.90
Twenty marks.....	4.74	4.76
Spanish doubloons.....	15.69	15.70
Spanish 25 pesetas.....	4.81	4.83
Mexican doubloons.....	15.50	15.70
Mexican 20 pesos.....	19.50	19.60
Ten guilders.....	3.96	4.00
Fine silver bars.....	80¾	87¾

**Copper.**—The market for copper is very firm but the business transacted has been rather limited. Negotiations regarding the proposed agreement to restrict production have been resumed and are now being carried on in Europe, where a meeting was held on the 13th inst. and adjourned to the 20th. From what we hear the probability is that some agreement will be perfected, and this may, when it becomes known, influence prices temporarily; but, as already repeatedly remarked, we do not think it will have any influence on the market at large. The demand for copper in this country remains exceedingly good, especially for electrical purposes.

We understand that the Calumet & Hecla is well sold out for some time ahead, and so is the Quincy, both of which companies are practically entirely out of the market. The smaller companies have made some sales, but none of any magnitude, and it is rather difficult to purchase Lake copper in quantities. On the other hand manufacturers are well provided with the quantities they contracted for at prices rather below those ruling just now, and are only buying small quantities when they are offered slightly below the market, which we have to call about 12@12½c. either for spot or for forward delivery. Casting copper is very much more freely offered, and values are rather irregular. We must lower prices to 11½@11¾c., but even thereat sales would be somewhat difficult. The producers of Arizona pig copper are out of the market. Shipments to Europe continue on a rather heavy scale.

From Europe we hear that the recent drop in silver has greatly unsettled the markets and in consequence business for the East Indies has been very irregular. This has had quite a considerable influence on copper and we understand that heavy quantities have been sold by India to be shipped back to London. The consumption of copper in Europe is fair, but this is about all that can be said about it. The market for G. M. B.'s has been firm all through the week and closes higher at £46 2s. 6d. for spot and £46 15s. for futures. The London market will be closed for the Easter holidays until the 19th inst. For manufactured we quote: English tough, £49@£49 5s.; Best selected, £50@£50 10s.; Strong sheets, £58 15s.@£59; India sheets, £55 5s.@£55 15s.; Yellow metal, 5¼d.

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

To Liverpool—	Copper Matte.	Lbs.	
S. S. Bothnia.....	1,763 bags.	184,171	\$13,000
" Connemara.....	3,394 bags.	360,453	25,000
" .....	226 bbls.	224,612	11,500

To Hamburg—	Copper.	Lbs.	
S. S. Moravia.....	12 bars.	692	80
" .....	90 bbls.	112,500	12,375
" Scandia.....	36 casks.	45,000	5,000
To Havre—			
S. S. La Champagne.....	293 bars.	94,668	\$10,413
" .....	23 plates.	2,905	350
To Rotterdam—	Copper.		
S. S. Maadam.....	90 bbls.	112,500	\$11,813
" .....	408 pigs.	112,029	11,000
" .....	51 bars.	8,962	1,000

Tin has been rather strong, and the metal shows an important advance for the week. Spot tin is scarce here as well as in England, and the shipments from the East for the first half of the month amount to but 100 tons to the United States and 650 tons to Great Britain, a total since the first of the year of 7,775 tons, as compared with 9,255 tons for the same period of 1891. The probabilities are that we shall see considerably higher prices before very long. To-day we quote for spot and April 20¼@20.30c., and for later delivery 20.20@20¼c.

**Lead.**—The transactions have been rather restricted, there being little desire on either side to do anything. We understand that the production in the Idaho district has been resumed, and that they will there be in full operation toward the end of the month. We quote 4¼@4.275c.

**Chicago Lead Market.**—Mr. H. R. Post telegraphs us as follows. "The market has been quiet during the past week but values have been firm at 4.10@4.15c. On Monday 100 tons of desilverized sold at 4.10c., and also four cars of soft Missouri, but lately the market was much better at 4.10c. freely bid, with sales of desilverized, April delivery, at 4.12½c."

**Spelter** is very firm but quiet, and consumers are not at all anxious to purchase. The galvanizing trade certainly is anything but brisk, and with the large production going on there is not much prospect of any material advance. We quote 4.65@4.70c.

**Antimony.**—Business has been of a very retail character at about the same prices as last, and we quote for Cookson's 14¼c.; for L. X, 13c., and for Hailett's, 10¾c.

**IRON MARKET REVIEW.**

NEW YORK, Friday Evening, April 15.

**Pig Iron.**—The condition of the iron market is unchanged from last week. Dealers continue to report a freer movement in iron, but it is always in small lots. There is a remarkable sameness in the tenor of the reports received from the various iron centers. It is always that whilst there is no actual improvement in any one direction, yet a better feeling is perceptible in the market generally. Prices remain unchanged, as follows: Northern No. 1 X, \$16; No. 2 X, \$15; Southern No. 1 X, \$15.50@16; No. 2 X, \$14.50@15.

**Spiegeleisen and Ferro-Manganese.**—The market for ferro-manganese and spiegeleisen continues lifeless. No business of any importance is reported. Quotations remain as follows: 20% spiegeleisen, \$26.50@27; 80% ferro-manganese, \$61.50@62.

**Steel Rails.**—Our last week's report might stand for this, so small a change has there been in the market. It is exceedingly dull, and we do not hear of a single transaction worthy of mention. Prices remain \$30 f.o.b. mill and \$30.75 tide water.

**Rail Fastenings.**—This market is absolutely lifeless, and prices are even lower. Quotations nominally are as follows: Fish and angle plates, 1.65@1.70c.; spikes, 1.95@2c.; bolts and square nuts, 2.70@2.80c.; hexagonal nuts, 2.80c.

**Merchant Steel.**—The week under review has been very dull in this market. Manufacturers complain that they can secure no contracts even at the low prices now ruling, consumers being of the opinion that there is no need of any haste since they regard the probability of a rise rather remote at the present time. We quote this week: Mushet's special, 48c.; English tool, 15c. net; American tool steel, 7@8c.; special grades, 13@18c.; crucible machinery steel, 4.75c.; crucible spring, 3.75c.; open hearth machinery, 2.25c.; open hearth spring, 2.50c.; tire steel, 2.25c.; toe calks, 2.25@2.50c.; first quality sheet, 10c.; second quality sheet, 8c.

**Tubes and Pipe.**—There is no change as to prices or volume of business. The usual trade is doing. We quote ruling discounts as follows: Butt, black, 57½%; butt, galvanized, 47%; lap, black, 67%; lap, galvanized, 55%; boiler tubes, under 3 in. and over 6 in., 55%; 3 in. to 6 in., 60%.

**Structural Material.**—The busy season predicted has not come yet, and there has not been much activity during the past week in the market for structural iron and steel. We continue to quote: Beams, 2.30@2.50c.; angles, 1.90@2.10c.; sheared plates, 1.85@2c.; tees, 2.40@2.60c.; channels, 2.40@2.50c. Universal plates, 2.10c.; bridge plates, 2.10c. on dock. In some cases lower prices have been obtained, but on the whole the above quotations are fair.

**Old Rails.**—There is nothing doing in this market. Old rails are quoted at \$20.50, and we do not hear of any sales, even at this price.

**NOTES OF THE WEEK.**

The Queen & Crescent Route has just issued eastbound pig iron tariff No. 1, covering points east of Pittsburg. The new rate went into effect

on the 6th inst., and is for carload lots, tons of 2,268 lbs., as follows:

To Baltimore, rail and water.....	\$3.98*	\$3.86*
To Baltimore, all rail.....	4.15*	4.11*
To Boston, rail and water.....	4.40*	4.36*
To Boston, all rail.....	5.80*	6.09*
To Jersey City, rail and water.....	4.05*	4.01*
To Jersey City, all rail.....	4.65*	4.61*
To New York, rail and water.....	4.05*	4.01*
To New York, all rail.....	4.65*	4.61*
To Philadelphia, rail and water.....	4.05*	4.01*
To Philadelphia, all rail.....	4.35*	4.31*

\*From Dayton, Tenn., and Rockwood, Tenn.  
\*From Rising Fawn, Ga.; Fort Payne, Ala.; Attalla, Ala.; Trussville, Ala.; Birmingham, Ala.; Wheeling, Ala.; East Birmingham, Ala.; North Birmingham, Ala.; Thomas, Ala.; Ensley, Ala.; Woodward, Ala.; Gadsden, Ala., via Attalla.

**Buffalo.** April 14.  
(Special report by Rogers, Brown & Co.)

Although there are now more signs of improvement, owing to curtailed production and increasing consumption, yet prices are still very weak, and buying light. The market is flooded with special lots of Lake Superior charcoal, Southern, Ohio and Pennsylvania coke irons for quick shipment, at prices totally regardless of the market. As can be easily seen, this is the last straw needed to complete the demoralization, and it fulfills its mission most admirably, although buyers are apparently found with difficulty. We quote for cash f. o. b. cars Buffalo: No. 1 X foundry strong coke iron Lake Superior ore, \$15.75; No. 2 X foundry strong coke iron Lake Superior ore, \$14.75; Ohio strong softener, No. 1, \$15.75; Ohio strong softener, No. 2, \$14.75; Jackson County silvery, No. 1, \$18; Jackson County silvery, No. 2, \$17; Lake Superior charcoal, \$17@17.25; Tennessee charcoal, \$18.25; Southern soft, No. 1, \$14.75@15; Alabama car wheel, \$19; Hanging Rock charcoal, \$20.50.

**Chicago.** April 14.  
(From our Special Correspondent.)

Orders, though not large, are more numerous, and there is a better tone to the market. In manufactured iron there is a distinctly better feeling, and mills in this vicinity are fairly well supplied with work up to June. Other well equipped mills reaching this market and capable of taking in a large variety of work are also in good shape, and most, if not all of them, refuse to accept business entailing deliveries beyond July 1. There is a well defined feeling among mill agents that there is going to be a long dispute over the scale at midsummer, and for this reason great care is being taken not to oversell. Structural material is in active inquiry and the outlook good for a heavy consumption in all lines. Plates are in more demand, and some improvement is noted in steel and iron sheets. Implement makers continue to send in large requisitions for soft steel, demand for which is unprecedented. The opening of navigation next week will, it is believed, greatly stimulate business in all directions.

**Pig Iron.**—The Illinois Steel Company expects to receive and has made arrangements to handle 1,250,000 tons of iron ore at South Chicago from Lake Superior. This quantity will be required for its several plants in this vicinity. Another furnace company at that point has made similar arrangements, though for a lesser quantity. Inquiry for crude iron is improving, and there is a better tone to the market, but consumers still insist on minimum prices. Up to date curtailment in output has not been such as to have the least appreciable effect on values. Some Ohio furnaces are well sold up on strong softeners, demand for which has increased of late, as consumers find that cheap grades cannot be used to good advantage in regular foundry practice. Two round lots of Lake Superior charcoal iron, aggregating 2,700 tons, were placed during the week at our inside quotation, and further inquiry is noted. A prominent Southern furnace company is selling No. 2 soft iron here at a cut of 75c. below our quoted price; other furnaces refuse to meet their figures.

Quotations per gross ton f. o. b. Chicago are: Lake Superior charcoal, \$16.75@17.25; Lake Superior coke, No. 1, \$14.50@15; No. 2, \$14@14.25; No. 3, \$13.75@14; Lake Superior Bessemer, \$16.50; Lake Superior Scotch, \$15.50@16; American Scotch, \$17@17.50; Southern coke, foundry No. 1, \$15; No. 2, \$14.50; No. 3, \$14; Southern coke, soft, No. 1, \$14.50; No. 2, \$13.75; Ohio silveries, No. 1, \$17.50; No. 2, \$17; Ohio strong softeners, No. 1, \$17.50; No. 2, \$16.50; Tennessee charcoal, No. 1, \$17.50; No. 2, \$17; Southern standard car wheel, \$20@21.

**Structural Iron and Steel.**—There is a vast amount of inquiry, and, barring labor troubles, brisk activity will rule in all branches this season. Another steel frame building will be let this week requiring some 700 tons of beams, etc. Competition is very sharp. Regular quotations car lots f. o. b. Chicago are as follows: Angles, \$2@2.10; tees, \$2.20@2.30; universal plates, \$2.05@2.15; sheared plates, \$2.10@2.15; beams and channels, \$2.25@2.50.

**Plates.**—Some good inquiries are noted for tank steel and general business is firm. The outlook is more promising. Steel sheets, 10 to 14, \$2.40@2.50; iron sheets, 10 to 14, \$2.20@2.30; tank iron or steel, \$2.10@2.15; shell iron or steel, \$3@3.25; firebox steel, \$4.25@5.50; flange steel, \$2.75@3.25; boiler rivets, \$4.10@4.25; boiler tubes, 2 1/2 in. and smaller, 55%; 7 in. and upward, 65%.

**Merchant Steel.**—The spring shipments from mills are far in advance of last year, though prices have been much lower, and there is still a good demand from consumers and dealers. The total steel trade from warehouse is very fair. We quote: Tool steel, \$6.50@6.75 and upward; tire steel, \$2.25@2.30; toe calk, \$2.40 @2.50; Bessemer machinery, \$2.10@2.20; Bessemer bars, \$1.75@1.90; open hearth machinery, \$2.40@2.60; open hearth carriage spring, \$2.25@2.30; crucible spring, \$3.75 @ \$4.

**Galvanized Sheet Iron.**—There is more activity, inquiry is larger and sales heavier from warehouse and mill, though discounts are less steady at 70% off on Junlata from mill and 67 1/2% off from warehouse, and 67 1/2% and 5% off on charcoal; an extra 2 1/2% or 5% is given on quality orders.

**Black Sheet Iron.**—Sheet steel for roofing purposes continues in fair demand at 290c. Inquiry for iron sheets is still light. Mill lots are quoted 285c. Chicago, basis No. 27; dealers' price 3@3 1/2c., same gauge from stock.

**Bar Iron.**—There is quite a sprinkling of orders, some of which are for 500 to 600 tons, and Valley mill agents are not anxious for large orders just now. Mills in this neighborhood are well sold up for 60 days. Regular quotations are 1'60@1'62 1/2c. Chicago, but shaded on good specification. Jobbing price is now 1'70@1'80c. according to quality.

**Nails.**—Wire nail orders are still light, on account of change in card list, which has advanced rates on sizes above 4d, but greatly reduced them on all below that size. Mills quote \$1.75 here, and jobbers \$1.90 in small lots. Steel cut are in moderate demand at \$1.60 regular average from factory and \$1.75 from warehouse.

**Steel Rails.**—The outlook is considered good for business for late summer delivery. A prompt delivery order would not be accepted at less than \$31.50@32, and would of course be for small quantities only. Splice bars are quoted at 1'80c. for steel or iron, spikes at \$2.05@2 per 100 lbs. track bolts; hexagonal nuts, \$2.65@2.70.

**Scrap of all grades** is still in very poor demand and prices nominal. No. 1 railroad, \$17; No. 1 forge, \$6; No. 1 mill, \$2.50; fish plates, \$18; axles, \$21; horseshoes, \$17; pipes and flues, \$9; cast borings, \$7; wrought turnings, \$9.50; axle turnings, \$10.50; machinery castings, \$10; stove plates, \$8.50; mixed steel, \$11.50; coil steel, \$14; leaf steel, \$15; tires, \$15.50.

**Old Material.**—Further sales of iron rails are reported at \$19, but large holders refuse to sell at less than \$19.50. Wrought iron car axles have sold at \$23.50 gross ton. Old steel rails are dull at \$13 for mixed lengths, and \$14.50 for selected. Old car wheels are dull at \$15.50@16.

**Philadelphia.** April 14.  
(From our Special Correspondent.)

**Pig Iron.**—The marked increase in stocks as announced to-day will probably have no effect on the market, as it was fully discounted. The reduction in production during March, although less than was anticipated, indicates that producers have taken warning, and will not aggravate the situation any further. On the other hand there are not wanting indications of a reviving demand, which will prevent at least any further decline in prices. There are differences of opinion on this point, but the most reliable authorities think that consumption will be of such magnitude as to protect manufacturers against any further decline. Liberal sales are being made of both forge and foundry, but not for future requirements. Makers are not crowding stocks at present, and prefer to let circumstances control. No. 1 continues at \$15.75@16.50, and No. 2 at \$14.50 for Southern to \$13.50 for best Lake ore pig. There is less doing in Southern iron, though liberal offerings continue to be made.

**Muck Bars.**—Quotations have reached the lowest point of the year, namely, \$24.75.

**Steel Billets.**—Small lots are selling, but the market is dull. Lowest sale this week, \$25. Rumors are rife to-day of large transactions being closed in Western Pennsylvania this week.

**Nails.**—Nails are moving more freely, but at \$1.65@1.75 delivered.

**Sheet Iron.**—A great deal of business is coming in, in a retail way, and card rates are being maintained with more ease. Open hearth steel has been bought in several large lots this week.

**Skelp.**—Very little business is being done, but there are a number of inquiries in the market that may result in business next week.

**Plate and Tank Iron.**—Orders aggregating 1,000 tons of plate and tank have been booked, and several more are relied upon to be placed next week. Card rates range from 1'80c. for tank to 2'20c. for steel shell.

**Structural Material.**—No change in prices. Business is badly wanted at mills. Manufacturers and brokers have nothing whatever to report in the way of news.

**Steel Rails.**—A large order was placed in a near-by mill late last week for Ohio delivery. Several small lots were taken in Pennsylvania mills, but there is nothing of importance to note. Quotations, \$30.

**Old Rails.**—Asking price, \$20.

**Scrap.**—Several lots of railroad are held at \$20, but not moving. Car wheels, \$16.50.

**Pittsburg.** April 14.  
(From our Special Correspondent.)

There has been but a moderate degree of activity in some of the branches of the iron and steel trade this week. So far the second quarter of the year does not show the improvement which has been confidently expected. The volume of business falls far short of the producing capacity of the works, and as a consequence a number of mills are running on part time only. Sales of pig iron were confined to limited amounts, indicating that consumers have little confidence in any improvement in values, at least for the present.

There is, however, a firm determination on the part of leading furnaces to insist on full-quoted rates, and in many instances the companies are refusing to book orders far ahead. Of course there remain plants which are in such a weak financial condition that it is necessary to realize on current output, and the pressure to secure business naturally has a depressing influence on the general market. Production continues to show a slight falling off compared with a short time ago. While production still continues large, it is the opinion of the trade that there has not been any very heavy increase in unsold stock. Notwithstanding the firm attitude of some of the consumers, in buying only as they require the iron, there are others that have taken advantage of the low prices of a few weeks back to anticipate their future requirements. These sales have assisted in sustaining the market. The stocking up during the past three months has probably not been so great as expected.

Andrew Carnegie says about the situation: "There is a great overproduction of iron. The making of pig iron has developed faster than the demand for it, resulting in large stocks on hand and low prices. We have trebled our production of pig iron in ten years—that is to say, it has increased from 3,300,000 tons per annum to 9,600,000 tons for 1891. This is a greater increase than in any other staple product of the United States. It puts us ahead of Great Britain as an iron producing nation. There must be a check on production or there will be such an over-supply of pig iron that prices will go lower yet."

The general market for steel rails continues quiet, and only small lots are taken at \$30 at the mills. Since our last report the Tennessee River Towing Company sent out five loaded barges for the South. Other lots will leave in a few days, provided there is sufficient water. There is a decided improvement in the demand for finished material. The buying movement is one of a general character. Competition is exceedingly close, however, and for some special orders prices have been cut more than ever. The demand for steel billets has fallen off. The large transactions during the past few weeks have supplied the market for some time.

**Coke Smelted Lake and Native Ores.**

2,000 Tons Bessemer, May, June.....	\$14.70 cash.
1,500 Tons Bessemer, July, Aug.....	14.65 cash.
1,000 Tons Grey Forge, April, May.....	12.85 cash.
1,000 Tons Low Phos. Bessemer, next 3 m.....	27.00 cash.
1,000 Tons Bessemer, April, May.....	14.50 cash.
1,000 Tons Bessemer.....	14.60 cash.
700 Tons Grey Forge.....	12.95 cash.
500 Tons Grey Forge, April.....	12.90 cash.
500 Tons Grey Forge.....	12.95 cash.
500 Tons of Bessemer.....	13.75 cash.
200 Tons No. 1 Foundry, city furnace.....	15.25 cash.
200 Tons No. 2 Foundry, city furnace.....	14.40 cash.
100 Tons No. 2 Foundry, city furnace.....	14.25 cash.
100 Tons No. 3 Foundry.....	13.25 cash.
100 Tons No. 1 Silvery.....	17.00 cash.

**Charcoal.**

100 Tons Cold Blast.....	26.50 cash.
75 Tons No. 2 Foundry.....	18.50 cash.
75 Tons No. 1 Foundry.....	21.00 cash.
50 Tons Warm Blast.....	18.50 cash.
25 Tons Cold Blast.....	26.75 cash.

**Steel Slabs and Billets.**

3,800 Tons Billets and Slabs, May, June.....	23.00 cash.
3,000 Tons Billets and Slabs, May, June, July.....	23.25 cash.
1,800 Tons Billets and Slabs, April, May, June.....	23.40 cash.
1,000 Tons Steel Billets at Works.....	23.60 cash.
1,000 Tons Steel Billets at Works.....	23.10 cash.

**Muck Bar.**

1,000 Tons Neutral.....	25.25 cash.
750 Tons Neutral.....	25.00 cash.
500 Tons Neutral.....	25.25 cash.

**Ferro Manganese.**

600 Tons 80%, foreign delivery.....	62.00 cash.
50 Tons 80%, foreign delivery.....	62.50 cash.

**Skelp Iron.**

400 Tons Sheared Iron.....	1.80 4m
400 Tons Narrow Grooved.....	1.55 4m
300 Tons Wide Grooved.....	1.69 1/2 4m.

**Steel Wire Rods.**

2,000 Tons American Fives, at Maker's Mill.....	32.75 cash.
450 Tons American Fives at Maker's Mill, May.....	31.85 cash.

**Old Iron and Steel Rails.**

1,000 Tons Mixed Steel Rails.....	16.00 cash.
500 Tons American T's.....	21.75 cash.
200 Tons American T's.....	21.50 cash.
100 Tons American T's.....	22.00 cash.

**Bloom and Rail Ends.**

500 Tons Bloom Ends.....	16.25 cash.
450 Tons Rail Ends.....	16.00 cash.

**Scrap Material.**

250 Tons Mixed Railroad Scrap, net.....	18.00 cash.
150 Tons Coil Steel, gross.....	21.00 cash.
100 Tons Light Steel Scraps, gross.....	13.00 cash.

**Iron Ore.**

Some few sales since our last report at prices lower than sales made during 1891—all Standard Bessemer ores.

NEW YORK MINING STOCKS QUOTATIONS.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Table with columns: NAME AND LOCATION OF COMPANY, April 9, April 11, April 12, April 13, April 14, April 15, SALES. Lists various mining companies like Adams, Alice, Amador, etc.

Table with columns: NAME AND LOCATION OF COMPANY, April 9, April 11, April 12, April 13, April 14, April 15, SALES. Lists various mining companies like Alpha, Alta, American Flag, etc.

\*Ex-dividend. †Dealt at in the New York Stock Ex. Unlisted securities. ‡Assessment paid. §Assessment unpaid. Dividend shares sold, 7,450. Non-dividend shares sold, 12,000. Total shares sold, 19,450.

BOSTON MINING STOCK QUOTATIONS.

Table with columns: NAME OF COMPANY, Apr. 8, Apr. 9, Apr. 11, Apr. 12, Apr. 13, Apr. 14, SALES. Lists various mining companies like Atlantic, Bodie, Bonanza Development, etc.

Table with columns: NAME OF COMPANY, Apr. 8, Apr. 9, Apr. 11, Apr. 12, Apr. 13, Apr. 14, SALES. Lists various mining companies like Allouez, Arnold, Ateck, etc.

Dividend shares sold, 4,029. Non-dividend shares sold, 7,983. Total shares sold, 12,012.

COAL STOCKS.

Table with columns: NAME OF COMPANY, Apr. 9, Apr. 11, Apr. 12, Apr. 13, Apr. 14, April 15, Sales. Lists various coal companies like Cambria Iron, Cameron Coal & I. Co., etc.

San Francisco Mining Stock Quotations.

Table with columns: NAMES OF STOCKS, Apr. 8, Apr. 9, Apr. 11, Apr. 12, Apr. 13, Apr. 14, CLOSING QUOTATIONS. Lists various mining stocks like Alpha, Alta, Belle Isle, etc.

Total shares sold, 395,423.

DIVIDEND-PAYING MINES.

NON-DIVIDEND PAYING MINES

Main table containing two columns: 'DIVIDEND-PAYING MINES' and 'NON-DIVIDEND PAYING MINES'. Each column lists company names, locations, capital stock, shares, assessments, and dividends. The table is organized into two main sections with detailed sub-headers for each data point.

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

STOCK MARKET QUOTATIONS.

Aspen. April 11. The closing quotations were as follows: Agnes C., Argentum Junista, Aspen Deep Shaft, Aspen Contact, Best Friend, Blmetallic, Bushwacker, Carbonate Chief, Della S., Homer & Alta, Justice, Little Annie, Mollie Gibson, Nolan Creek, Park, Mamie & Queen, Pontiac, Sheep Mountain S. & M. Co., Smuggler, St. Joe & Mineral Farm, Yellow Boy.

Baltimore, Md. April 14. Bid. Asked. COMPANY. Atlantic Coal, Balt. & N. C., Big Vein Coal, Conrad Hill, Cons. Coal, Diamond Tunnel, George's Creek Coal, Lako Chrome, Maryland & Charlotte North State, Silver Valley.

Pittsburg, Pa. Prices highest and lowest for the week ending April 14: COMPANY. Allegheny Gas Co., Bridgewater Gas Co., Chartiers Val. Gas, Columbia Oil Co., Consignee Mining Co., Consolidated Gas Co., Fisher Oil Co., Forest Oil, Hazlewood Oil Co., Hidalgo Mining Co., La Noria Mining Co., Luster Mining Co., Mansfield C. & C. Co., Manufacturers Gas Co., Nat. Gas Co. of W. Va., N. Y. & Cleve. Gas Coal Co., Ohio Valley Gas Co., Pennsylvania Gas Co., People's Nat'l Gas Co., People's N. G. & P. Co., Philadelphia Co., Pine Run Gas Co., Pittsburgh Gas Co., Red Cloud Mining Co., Silvertown Mining Co., South Side Gas Co., Sterling Silver Mining Co., Tuna Oil Co., Union Gas Co., Washington Oil Co., W'moreland & Camb., Wheeling Gas Co., W'house E. Light, W'house Air Brake Co., W'house Brake Co., Ltd.

St. Louis. April 13. Closing Prices. Bid. Asked. Adams, Colo., American & Nettie, Colo., Bi-Metallic, Mont., Central Silver, Elizabeth, Mont., Granite Mountain, Mont., Hope, Leo, Little Albert, Montrose Placer, Colo., Micky Breen, Pat Murphy, Colo., Small Hope, Colo., Silver Age, Silver Bell, Yuma, Ariz.

Deadwood. April 9. Bid. Asked. Ballou, Caledonia, Calmet, Cambrian, Carthage, Deadwood Terra, De Smet, Double Standard, Elk Mountain, Emmett, Equitable, Florence, General Reward, General Merritt, Harmony, Hester A., Homestake, Hermit, Iron Hill, Isadorah, Maggie, Monitor, Rainbow, Retriever, Ross Hannibal, Ruby Bell, Ruby Wilks, Seabury-Calkins, Silver Queen, Stewart, Tornado, Troy, Uncle Sam.

Helena, Mont.

(Special report by SAMUEL K. DAVIS.) Prices highest and lowest for week ending April 9, 1892: Bald Butte (Mont.), Benton Group, Mont., Bi-Metallic, Mont., California (Castle), Mont., Castle Crescent, Champion (Oro Fino), Mont., Combination (Phillips), Mont., Copper Bell (Cataract), Mont., Cornucopia, Mont., Cumberland (Castle), Mont., Elizabeth (Phillipsburg), Mont., Florence (Nelhart), Mont., Fourth of July, Wash., Glengary (Butte), Mont., Helena & Victor, Mont., Ingersoll, Mont., Iron Mountain (Missouia), Mont., Iron Mountain Ex., Mont., Jersey Blue (Butte), Jumbo (Castle), Mont., Lone Pine Consolidated, Mac (Unionville), Mont., Moulton, Mont., None Such (Unionville), Mont., Poorman (Coeur d'Alene), Idaho, Queen of the Hills (Nelhart), Southern Cross (Deer Lodge), Mont., Yellowstone (Castle), Mont.

Trust Stocks.

Special report by C. I. Hudson & Co., members New York Stock Exchange. The following are the closing quotations April 8: CERTIFICATES. Am. Cotton Oil, Com., Am. Sugar Refineries, Com., Distillers' & Cattle Feeders', Linsseed Oil, National Cordage, National Lead Co., Standard Oil, W. U. Beef Co.

Foreign Quotations.

London. April 2. Highest. Lowest. Alaska Treadwell, Amador, Cal., American Belle, Colo., Appalachain, N. C., Can. Phosphate, Can., Colorado, Colo., Cons. Esmeralda, Nev., De Lamar, Idaho, Dickens Custer, Idaho, Eagle Hawk, East Arevalo, Idaho, Eberhardt, Elkhorn, Mont., Elmore, Idaho, Emma, Utah, Esmeralda, Flagstaff, Utah, Garfield, Nev., Golden Feather, Golden Gate, Cal., Golden Leaf, Mont., Golden River, Cal., Guston, Jay Hawk, Mont., Idaho, Josephine, Cal., Kohinoor, Colo., La Luz, Mex., La Plata, Colo., La Valera, Mex., Maid of Erin, Colo., Mammoth Gold, Ariz., Mount McCiellan, Montana, Mont., Mona Lake Gold, New California, Colo., New Consolidated, New Eberhardt, Nev., New Gold Hill, N. C., New Guston, Colo., New Hoover Hill, N. C., New Russell, N. C., New Viola, Idaho, Old Lou, Colo., Parker Gold, N. C., Poorman, Plumas Eureka, Richmond Con., Nev., Ruby, Nev., Sam Christian, N. C., Sierra Buttes, Cal., Pumas Eur. Cal., Silver King, United Mexican, Mex., West Argentine, Colo., Yankee Girl, Colo.

Paris. March 31.

Francs. East Oregon, Ore., Forest Hill Divisio, Cal., Fore'n River, Cal., Laurium, Greece, Lexington, Mont., Nickel, New Caledonia, Rio Tinto, Spain, Tharsis, Spain, Vieille-Montagne, Belgium.

CURRENT PRICES.

These quotations are for wholesale lots in New York unless otherwise specified. Acid-Acetic, No. 8, pure, 1,040, Hydrocyanic, U. S. P., Sulphate, Am. S. P., Alcohol-95%, Absolute, Ammoniated, Alum-Lump, Ground, Powdered, Aluminum-Lump, Aluminum Chloride-Pure, Amalgamating solution, Sulphate, Ammonia-Canadian, Carbonate, English and German, Muriate, white, in bbls., Aqua Ammonia-(in clys) 18%, Antimony-Oxymur, Regulus, Argois-Red, powdered, Arsenic-White, powdered, Red, Yellow, White at Plymouth, Asbestos-Canadian, Italian, Ashes-Pot, 1st sorts, Pearl, Asphaltum-Prime Cuban, Hard Cuban, Trinidad, refined, Egyptian, Californian, at mine, Barium-Carbonate, pure, Chlorate, crystal, Chloride, commercial, Carb. lump, f. o. b. L'pool, No. 1, Casks, Runcorn, No. 2, bags, Runcorn, Bichromate of Potash-Scotch, American, Bichromate of Soda, Borax-Refined, San Francisco, Concentrated, in car lots, Refined, Liverpool, Bromine, Cadmium Iodide, Chalk, Precipitated, China Clay-English, Southern, Chlorine Water, Chrome Yellow, Chrome Iron Ore, Francisco, Chromalum-Pure, Commercial, Cobalt-Oxide, Copper-Sulph. English Wks, Vitriol (blue), ordinary, extra, Nitrate, Copperas-Common, Best, 100 lbs., Liverpool, in casks, Corundum-Powdered, Flour, Cryolite-Powdered, bbl. lots, Emery-Grain, Flour, Epsom Salt, Feldspar-Ground, Crude, Fluorspar-Powdered, No. 1, French Chalk, Fuller's Earth-Lump, Glauber's Salt-in bbls., Glass-Ground, Gold-Chloride, pure, crystals, s. v., 15 gr., c. v., 15 gr., g., Chloride and sodium, Gypsum-Calcined, Land Plaster, Iodine-Resublimed, Iron-Nitrate, 40%, Kaolin-See China Clay, Kieserite, Lead-Red, White, American, in oil, White, English, in oil, Acetate, or sugar of, white, Granulated, Nitrate, Lime Acetate-Am. Brown, Litharge-Powdered, English flake, Magnesite-Crude, 1,015 kilos, Calcined, 1,015 kilos, Brick, 1,015 kilos, Manganese-Ore, per unit, Oxide, ground, per lb., Mercuric Chloride-(Corrosive Sublimite)

Powdered, Marble Dust, Metallic Paint-Brown, Ordinary rock, Mineral Wool-Ordinary slag, Naphtha-Black, Nitric Acid, Nitrate, Nitre Cake, Ochre-Rochelle, Washed Nat Ox'rd, Lump, Washed Nat Ox'rd, Powder, Golden, Domestic, Oils, Mineral-Cylinder, light filtered, Dark filtered, Extra cold test, Dark steam refined, Phosphorus, Precip., red, white, Plumbago-Ceylon, American, Potassium-Cyanide, Bromide, domestic, Chlorate, English, Chlorate, powdered, English, Carbonate, Caustic, Iodide, Nitrate, refined, Bichromate, Yellow Prussiate, Red Prussiate, Pumice Stone-Select lumps, Original cks., Powdered, pure, Pyrites-Non-cupreous, p. units, Quartz-Non-cupreous, Rotten Stone-Powdered, Original cks., Rubbing stone, Sal Ammoniac-lump, in bbls., Salt-Liverpool, ground, Domestic, fine, Common, fine, Turk's Island, bush, Salt Cake, Saltpeter-Crude, Soapstone-Sodium-Prussiate, Phosphate, Stannate, Tungstate, Hyposulphite, in casks, Strontium-Nitrate, Sulphur-Roll, Flour, Sylvinit, 23% 27%, S. O. P., per unit, Tale-Ground French, Terra Alba-French, English, American, No. 1, American, No. 2, Tin-Crystals, in kegs or bbls., Muriate, single, Double or strong, Oxy, or nitro, Tin Plates, charcoal, best coke, ermillon-imp, English, Am. quicksilver, bulk, Am. quicksilver, bags, Chinese, Trieste, American, Zinc White-Am., Dry, Antwerp, Red Seal, Paris, Red Seal, Muriate solution, Sulphate crystals, in bbls.

THE RARER METALS.

Arsenic-(Metallic), per lb., Barium-(Metallic), per gram, Bismuth-(Metallic), per lb., Cadmium-(Metallic), per lb., Calcium-(Metallic), per gram, Cerium-(Metallic), per gram, Chromium-(Metallic), per gram, Cobalt-(Metallic), per lb., Didymium-(Metallic), per gram, Erbium-(Metallic), per gram, Gallium-(Metallic), per gram, Glucium-(Metallic), per gram, Indium-(Metallic), per gram, Iridium-(Metallic), per oz., Lanthanum-(Metallic), per gr., Lithium-(Metallic), per gram, Magnesium-(Metallic), per lb., Manganese-(Metallic), per lb., Molybdenum-(Metallic), per oz., Niobium-(Metallic), per gram, Osmium-(Metallic), per gram, Palladium-(Metallic), per oz., Platinum-(Metallic), per oz., Potassium-(Metallic), per lb., Rhodium-(Metallic), per gram, Ruthenium-(Metallic), per gram, Rubidium-(Metallic), per gram, Selenium-(Metallic), per oz., Sodium-(Metallic), per lb., Strontium-(Metallic), per gram, Tantalum-(Metallic), per gram, Tellurium-(Metallic), per lb., Thallium-(Metallic), per gram, Titanium-(Metallic), per gram, Thorium-(Metallic), per gram, Tungsten-(Metallic), per lb., Uranium-(Oxide), per lb., Vanadium-(Metallic), per gm., Vanadium-(Metallic), per gram, Zirconium-(Metallic), per oz.