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THE Columbian Exposition in Chicago is making wonderful progress. It is planned on a scale that will require an enormous amount to complete, but the marvelous enterprise and energy shown by its managers will, we believe, carry it through to success. The whole country should join in making this all that the plans call for, that is to say, beyond all comparison the finest exposition the world has ever seen.

The mineral industry in every department, and in all parts of the world and more particularly in every part of this country, should take prompt and efficient measures to be fittingly represented there, and those who can aid in bringing this about, or can make valuable suggestions for the benefit of the management of this department should communicate with Mr. F. J. V. SKIFF, chief of Mining Department, Columbian Exposition, Chicago.

The whole world now looks to this country for the highest development of the mineral industry, and for the most advanced practice in mining, metallurgy, and the mechanic arts connected therewith, so that we are bound, by our own interest, to show the millions who will come here what we have and what we are doing. The return for this work will come in a vast influx of foreign capital which, fearful of the risks due to a war, always impending in Europe, will seek safe and profitable investment in our peaceful and productive country. Let us then make such a display at Chicago as will convince all who come of the vast abundance of our resources and of the superior skill in mining and metallurgy which the wonderful development of our mineral industry both demonstrates and induces. Rivers of gold will flow this way as these facts become fully appreciated. Such an opportunity to bring them home to the intelligent representatives of the capital of all countries should be utilized to the utmost.

THE SO-CALLED McARTHUR-FORREST PROCESS.

Two years ago this much lauded method of reducing refractory ores was first heard of, yet during this brief period it has obtained at least a notoriety, unparalleled in the history of processes, fecund as this country has been in the development of mystical and peculiar methods of reduction.

Messrs McARTHUR-FORREST, or their representatives, have had no diffidence or false modesty in praising their supposed discovery; in fact they have claimed much for it that it has been unable to fulfill. The history of its application since its first presentation, through the McARTHUR-FORREST channels to the public is interesting and instructive since it teaches metallurgists and process-venders much that should be shunned even by ambitious and confident inventors.

Looking over the progress of the process it is at once known that whatever reputation it has was not obtained in this country, although it has its most enthusiastic and possibly interested advocates here. In South Africa it has proved in certain cases, notably that of the Robinson Gold Mining Company, Limited, a very efficient method of treatment of tailings, after they have passed through battery and plate amalgamation. In an early issue of this JOURNAL we will publish a full account of this application.

In New Zealand, where strenuous efforts were made to introduce the process at the Mount Morgan Works, which at that time, at least, treated large quantities of high grade gold ores by the chlorination process, it was rejected by the managers after a series of exhaustive tests, which were conducted by those in no way inimical to this process or any other which would prove metallurgically economical. This has been the case in other portions of Australia, according to official reports from that country.

In the United States reports are daily heard of its progress; it is, according to certain newspapers, achieving much success; yet, when we make inquiries, it is impossible to obtain actual working results, though we get vague statements that it has worked wonders.

By the promoters of this American company it is stated that mills are are almost daily being put up to work the process, yet inquiry has failed to locate them. It has been claimed that a McARTHUR-FORREST plant was in existence in Deadwood, S. Dak. This the Deadwood papers characterized as an absolute falsehood. The facts are that the process had been tried at the Golden Reward Works, which are now using, with great technical and commercial success, the barrel chlorination process, as introduced and developed at these works by Mr. JOHN E. ROTHWELL, and that cyanide had proved a failure.

It is claimed by the assayer of the Mercur Mining Company, of Utah, that over 80 per cent. is extracted from its ore, whereas when amalgamation was used the percentage did not rise above 20 per cent., and at the same time the expenses were much lighter. The officers of the Revenue Mining Company, of Revenue, Montana, claim as much for the application of the process at their works, although their statements are somewhat weakened owing to their financial interest in the process company, and the absence of any specific working results. The Excelsior & Eureka mine, in Oregon, experimented with the cyanide process and succeeded in recovering only 60 to 65 per cent. of the gold—the process was therefore rejected. Outside of these places mentioned, it has been impossible for us to obtain any information of value.

After this resumé of the application of this process it is interesting to speak of the discovery of it. It would seem that Messrs. MCARTHUR-FORREST were somewhat tardy in their investigations, for before they had applied for a patent in their own country, Great Britain, one patent covering exactly their ground had been issued in this country to JEROME B. SIMPSON, of Newark, N. J., and two applications for patent, one from New Mexico and the other from Utah, had been forwarded to Washington. The experiments, in one case at least, were described in THE ENGINEERING AND MINING JOURNAL of December 29th, 1888, prior to the issuance of the MCARTHUR-FORREST English patents, and to their American attempts. These facts are stated without prejudice to Messrs. MCARTHUR-FORREST's originality, but merely to settle the priority of investigation.

In view of these prior claims, particularly those of Mr. SIMPSON, it would seem impossible for the syndicate which has purchased the American rights to this process to maintain its claim to the somewhat extravagant royalty of \$1 a ton or indeed to any royalty whatever.

In regard to the merits of the process it may be said that while favorable testimony is scarce, the process has certain but limited applications. On some ores it has been proved to be of value, but that it or any other process is a universal solution of the problems presented, every intelligent metallurgist knows is unfounded.

Ores containing arsenic and tellurium have proved obstinate to its charms, while those containing fine free gold, the so-called 'coated' variety, and auriferous iron pyrites, have been successfully treated. This latter statement, however, should be carefully investigated before placing implicit confidence in it.

The ENGINEERING AND MINING JOURNAL, while gladly recording every metallurgical innovation that possesses the elements of success, also warns "process" promoters that actual working results properly authenticated are necessary to secure the confidence of engineers, and should also be necessary to enlist the co-operation of capital. The success of the cyanide process is not yet demonstrated in this country, though on certain ores it seems probable it will come, but the claims of Messrs. MCARTHUR-FORREST to the use of the cyanide process are probably, if not certainly, untenable.

MR. GOODMAN'S PATENT DIVINING BOTTLE.

As a companion piece for Mr. FELL's way of extracting gold from wheat, which I described last week, I may offer the bottle of Mr. GOODMAN, which is the subject of a British patent, No. 1919, dated February 2d, 1889, and granted for an "Improved Means of Detecting the Presence of Gold and Silver Underground." The complete specification is as follows:

I, SAMUEL ADAMS GOODMAN, JR., of Tyler, in the County of Smith, and State of Texas, United States of America, farmer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:

The object of this invention is to enable precious metals to be discovered by a process commonly known as divination; and it consists in a composition which has a strong attraction and affinity for gold and silver, the attraction resembling somewhat that of magnetism.

In carrying my invention into practice, I place the composition in a vial or flask, seal it tightly, and suspend it by means of a string. The composition referred to is made up of gold, silver, quicksilver and copper, the ingredients being placed in a small vial or flask, together with a quantity of dilute nitric or tartaric acid, or pure alcohol.

Reference is to be had to the accompanying drawing, forming a part of this specification, in which I have given a side view of a flask, representing the same as it appears when arranged for use in connection with my gold and silver finding composition.

In the drawing, 10 is a vial or flask in which my composition is placed, the cord or string, 2 being secured to the neck of the flask and the cork or stopper being sealed tight as by wax 3. The cord or string should be about 20 in. in length.

In using my gold and silver finder the instrument is held, preferably, by the thumb and forefinger of the right hand and steadied with the left hand; it should be held steady but not cramped. Then, if there are any precious metals in the immediate neighborhood the flask will be attracted by such metals and will move toward them at first and will then vibrate, thus indicating the presence of the metal sought for.

To protect and conceal the contents of the flask I cover it with paper, cloth, or tin.

Having now particularly described and ascertained the nature of the said invention, and in what manner the same is to be performed, I declare that what I claim is:

1. A gold and silver finder, consisting essentially of a composition made up of gold, silver, quicksilver, copper, and acid or alcohol.
2. A gold and silver detector flask provided with a stopper secured to place by sealing and a cord secured about the neck of the flask, substantially as described.

The accompanying drawing represents the entire apparatus in full size. I would ask the ENGINEERING AND MINING JOURNAL to have it engraved if it really added anything to the notion conveyed by the text. But it is in fact only the picture of an ordinary bottle, with an ordinary sealed cork, and an ordinary neck, to which an ordinary string is so attached that the bottle may be suspended as a pendulum. The contents of the bottle are indicated as a clear fluid ("dilute nitric or tartaric acid or pure alcohol") and a mass of solid chips of the attractive composition, the appearance of which gives no hint as to the cause of its alleged properties—in fact, rather contradicts than explains the statement of the text; for the stuff does not look attractive.

It is hardly worth while to ridicule the British Patent Office for granting this patent. It is no more absurd than that of Mr. FELL, discussed last week. In fact, it is less absurd: because it does not deliberately contemplate the finding of gold where gold is not. And as to the novelty of this particular form of divining apparatus, I am not sure that the records of patents would disprove it, though it is quite certain, as I shall

show, that the whole idea is old. Moreover, under the general principles of patent law, in England or in this country, I doubt whether our worthy Texas farmer could enforce claims to royalty under this patent; for the theory of the law is that an inventor possessed of a discovery which he might keep to himself as a trade-secret, and which might in that case die with him and thus be lost to the community, is induced by the grant of a limited monopoly to reveal the secret, so that after the expiration of a certain term, it shall be possible, as well as permissible, for any operator skilled in the art referred to, as it was known before the said invention, to practice the same successfully. Farmer GOODMAN's patent is undoubtedly "void for vagueness," in spite of the particularity with which he has distinguished, described and depicted his bottle, cork and string.

As to the history of the matter, the divining-pendulum is almost as old as the divining-rod. It is mentioned by AMMIANUS MARCELLINUS, the last of the Latin historians, who died A. D. 390; and in the classic period of the literature of divination, in the 17th and 18th centuries, it shared with the rod the attention of such savans as SCHOTT, FORTIS, GERBOIN, RITTER and AMORETTI—of whom the latter, at least, belonged to a family noted for skill in divination. RITTER, a professor at Munich, published his report on the subject in 1807, after having had the benefit of the advice of the famous VOLTA. Of course, the new science of electricity was at that time supposed to explain great numbers of imagined, as well as observed, facts. RICHTER connected both the pendulum and the rod with this mysterious force, and considered the rod as simply a doubly pendulum, requiring more force to move it than the single pendulum, and hence less sensitive.

Professor GERBOIN, of Strasburg, in his elaborate treatise (1808), recorded 253 experiments with the pendulum, and deduced a complicated theory of "organo-electric force"—"expansive," "compressive," "passive perturbatory" and "active perturbatory." Successful pendulum operators, he says, are those who exercise the passive perturbatory, which is a high degree of the expansive. But the active perturbatory, a powerful compressive, produces only negative results.

For further references on this subject the reader may consult my paper on the Divining Rod (Trans. Am. Inst. of M. E., xi., 411), where CHEVREUL's complete demonstration of delusion (1833 and 1854) is likewise cited. Mr. GOODMAN, of Texas, is not in the van, but at the tail of the procession. He has merely got hold of the alphabet of the immense literature of error created by his illustrious predecessors. If he has introduced anything new into his rudimentary revival of the art, it is the suggestion of alcohol as an optional liquid in his bottle; and it is a serious question whether alcohol would prove an "expansive," and hence useful, or an "active perturbatory," and hence injurious.

Whether he ever applied for a patent in the United States, I do not know; but I have ascertained that some patriotic satisfaction that no United States patent has ever been issued to him for this invention. His American fellow-citizens can go on combining bottles, corks and strings with pure alcohol or any other ingredients, without fear of infringing upon his rights.

I have found, however, a recent United States patent for an "electric divining-rod," issued in 1883 to an English subject (who had previously patented it in Great Britain); and of this device, which is not truly a divining rod at all, since it lacks the essential element of the conscious or unconscious co-operation of the human will and muscles, I will speak at another time. R. W. R.

BOOK RECEIVED.

Annual Report of the City Engineer of the City of Providence, R. I. By J. Herbert Shedd, City Engineer. Published by the City. Providence, 1892. Pages 105. Illustrated.

Geological Survey of New Jersey. Annual Report of the State Geologist for 1891. Published by the State. Trenton, N. J., 1892. Pages, 270. Illustrated.

Precious Stones and Gems. By Edwin W. Streeter, F. R. G. S., M. A. I. Published by Messrs. Streeter & Co., London, 1892. Pages 355. Illustrated. Price, \$6.

Report of the Rapid Transit Commission to the Massachusetts Legislature, April 5, 1892. Published by the Commission, Boston, Mass., 1892. Pages, 296.

Valve Gears for Steam Engines. By Cecil H. Peabody. Published by John Wiley & Sons, New York, 1892. Pages, 128. Price, \$2.50. Illustrated.

Alloy of Antimony and Iron.—According to Prof. Francisco Comelli, in *Il Progresso*, an alloy is obtained by the melting of 400 grammes of fresh iron filings with 200 grammes of antimony, which, when rubbed with a coarse file, has the curious property of emitting red and white sparks. He supposes that the friction produced develops enough heat to ignite the antimony, the iron merely giving sufficient hardness to the alloy to produce the heat.

Corean Mining Industry.—The development of this industry in Corea may be despair of, although silver, lead and gold veins, only the latter of which are worked, are known to exist. The silver veins are in an eruptive formation, in rock somewhat resembling Trachyte, but have no depth and are of extremely low grade. In the lower part of the peninsula in the interior, some little distance from Fusau, gold is found in slates.

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.

EDITOR ENGINEERING AND MINING JOURNAL :

SIR : Can you inform me if a gas furnace or smelter is made that will successfully smelt silver lead ore with fuel gas made from crude oil? If so, who makes such furnaces? I want to know if it is a success, how the cost of operation compares with that of a coke burning furnace, and if sufficient heat can be obtained, and if it can be so arranged for the use of gas as to get the heat, not burning out the pipes, etc. Any information you can give will be appreciated.

J. W. EASTWOOD.

KANSAS CITY, Mo., May 9, 1892.

[We shall be glad to receive any information upon the sub ject.—ED E. & M. J.]

The Elizabethton, Tenn., Co-Operative Town Company.

EDITOR ENGINEERING AND MINING JOURNAL :

SIR : Permit me to make a statement in reply to an interesting, though in some respects misleading, article in your issue of April 30th, in relation to the Co-Operative Town Company of Tennessee, contributed by your Roanoke correspondent. The article in question contains much that is true, mixed with some statements that are erroneous, and others which are unfair to the projectors and managers of the enterprise. For example, when the writer says that "the management of the Co-Operative Town Company is entitled to the largest credit for the good sense and judgment displayed in the selection and location for its enterprise;" that "with the exception of a single tract of less than 150 acres, the whole of the valley of the Watauga for a distance of between four and five miles, through the middle of which flows the superb Watauga River" is included in the purchase; that "it would be impossible to find anywhere a fairer scene than the Watauga Valley;" that "as a site for the building of an industrial town it is simply perfect," he makes a clear statement of what the managers of this "splendid estate" know to be absolutely true.

The statement, however, that "the eleven directors have issued to themselves the astounding amount of 5,280 shares, or \$528,000 of fully paid stock," without modification is unfair and very misleading. It is true that 5,280 shares of stock similar to Series "A" has been issued to the directors to pay for two years' services—that is 480 shares for each director. The value of this stock at the present time, or in the future, is simply what the management of the company, by their labor and influence in the affairs of the company, is able to make it.

Section 12 of article 3 of the By-Laws distinctly provides that said directors' shares shall draw no dividends until cash dividends are declared on shares of series "A." Now, as stock of series A having been sold at the lowest prices, will be the last series to draw a cash dividend, the board of directors of the enterprise cannot receive any sort of a dividend until a cash dividend is paid upon all outstanding stock.

The directors' stock is in no sense a part of the purchase price of the lands bought, nor is it in any sense "promoters' profit," but it is all the compensation which the directors will receive for valuable services performed for a period of two years. The subscribers to stock in series A pay \$10 per share, not \$100. Generally it may be said they pay this in money. In the case of the directors they pay it in services and the total instead of being \$528,000 is \$52,800. There has been no attempt to conceal from subscribers or others the compensation to be paid the directors. On the contrary the by-laws, which are shown to all subscribers, provide expressly and clearly what this compensation is to be. The board of directors has held numerous meetings during the past year, several members of the board traveling long distances to attend these meetings and paying their own expenses. The directors and officers have also purchased largely of the company's stock and they are paying considerable sums of money into the treasury every month.

Below is a statement of the shares of stock sold up to May 3d, 1892, and a summary of resources and liabilities :

STATEMENT FROM THE BOOKS OF THE CO-OPERATIVE TOWN COMPANY, MAY 3D, 1892.	
	Cash value.
Series "A" 20,283 shares subscribed for by sundry parties from February 3d to April 30th, 1891, inclusive, at \$10 per share.....	\$202,830.00
Directors' stock, 5,280 shares, issued in pursuance of section 10, article 3 of by-laws of the company, at \$10 per share, basis of series "A".....	52,800.00
Series "B" 5,283 shares subscribed for by sundry persons from May 1st, 1891, to May 3d, 1892, inclusive, at \$25 per share.....	132,075.00
Stock paid to par value 116 2/3 shares, subscribed for by sundry persons in part payment for real estate bought of them by it at Elizabethton, Tenn., at \$100 per share.....	11,656.66
From which deduct:	\$399,371.66
Series "A" 4,245 shares sold in accordance with company's by-laws for arrears, at \$10 per share.....	\$42,450.00
	\$356,921.66
Lots sold to date \$51,000. Balance unsold lands (estimated) \$600,000....	\$651,000.00
	\$1,007,921.66
Above statement includes directors' stock. Deducting this there would remain total, including lands, of.....	\$955,121.66
The total amount of "Bills Payable" is.....	\$271,315.77
Leaving balance in favor of company of.....	\$683,805.89
This balance found on valuing the lands at about \$100 per acre would seem to be moderate in view of the prices obtained for lots.	
RECEIPTS.	
Treasurer.....	\$115,076.43
Stock on land account.....	11,666.66
	\$126,743.09
EXPENDITURES.	
Payments on land.....	\$83,279.87
Advertising.....	4,705.21
Furniture and fixtures.....	1,921.00
Salaries.....	11,202.02
Rent.....	931.48
General expenses.....	6,580.22
Balance on hand.....	18,120.29
	\$126,743.09

The large number of shares of series "A" upon which payment was stopped is explained by the fact that several thousand shares were taken

by persons interested in various sites. Only the initial fee was paid for many of these shares, and in some instances, one payment. This delinquent stock was sold at public sale, in accordance with the company's by-laws. It is only just to state that no such proportion of delinquent sales is likely to occur in the present or subsequent series of stock, as the subscribers have embarked in the enterprise in good faith, and pay their monthly installments regularly, the proportion of delinquents being very small.

As will be seen above, the financial condition of the company needs no glossing with rose color at any point, as able accountants and actuaries have already shown that condition is such that a dividend even now on series A and B would be certainly justified. A lack of familiarity with the working details of the co-operative scheme—which is admittedly so full of power and resource, and a superficial view of the progress already made by this company in its grand undertaking, might suggest to some that it could be damaged by adverse criticism or weakened by attack. This view could not be maintained for a moment. The company is incurring no debt beyond its ascertained resources, and it could liquidate its affairs now at thirty days' notice by a sale of its properties that would pay a handsome profit on the money put into it by its stockholders.

An adverse criticism of the company because the illustrated prospectus speaks of 5,200 acres of townsite land, and the price paid per acre when compared with the aggregate amount paid for land (\$389,614.66) indicates an acreage but little short of 6,000 acres cannot be sustained. The prospectus was sent to press before the company's surveys were fully completed and before some additional properties were purchased. The surveys, it now transpires, run several hundred acres ahead of the number of acres stated in the purchase deeds, which is an advantage to the company, as the purchase in each case was for so many acres "more or less."

Another point of criticism is that "no attempt was made to ascertain that a quorum (10,000 shares, as called for by the by-laws), was present." As the president and directors held proxies themselves aggregating 9,804 shares, and as the committee appointed on proxies assured us that the 200 stockholders present held a number of shares exceeding 2,000, it will be seen that the fact of a quorum was known to the presiding officer and to the directors. Even had there not been 10,000 shares, the meeting would not have been illegal, the original by-laws of the company to the contrary notwithstanding, as the laws of Tennessee are paramount, and the restriction, which was an oversight in the original draft of the by-laws, as Mr. Butterworth stated, might have prevented a meeting of the stockholders until the "Second Advent" had it been illegal, for had fewer than 10,000 shares been sold no meeting could have been held.

The money in sight to carry out "the splendid scheme" of this company is represented in its continuous sales of stock and the monthly influx of capital thereon.

The total sales of stock in April of series "B" aggregated 880 shares, representing a fully paid up value of \$88,000, or a cash value of \$20,750. In view of the superb site, the great natural resources of the surrounding country, the splendid supply of purest water, "the perfectly fair price paid for the land," and of the fact that active building operations have already been begun, and the prospect of locating several small but important industries during the next few months, it is more than probable that the sales of stock will increase during the present year. It is hoped and believed that a sufficient sum of money will be realized in this way to pay the current expenses of the company and to meet all payments on land. Although it was positively understood that there would be no regular sale of lots at the shareholders' meeting, the sales upon that day realized in available assets to the company over \$50,000. Upon the completion of the railroads projected and partly built, and upon the establishment of several industries which we have a reasonable hope of securing, the further sale of land, together with what may be realized from the franchises of the company, will undoubtedly enable the Co-operative Town Company to fulfill all its promises to the stockholders.

With the exception of the debt incurred for the purchase of land, the company is absolutely free from debt, and so long as the present conservative management has control no other liability whatever will be incurred without the company has the available resources to meet it promptly when due.

It is undoubtedly true that the scheme of the Co-operative Company is "one of vast intrinsic merit and organized upon a proper financial basis could be made the feature of this industrial age." And the writer is correct when he says that to carry it out, "there is no place offering the peculiar inducements and advantages of the Watauga Valley."

The directors of the Co-Operative Town Company, all of whom are responsible men, earnestly believe in the soundness of the financial basis upon which the structure of the company is built, and look forward to a profitable outcome of the enterprise to the stockholders. We are satisfied, and in this your correspondent entirely accords, that we have the best location for such a town, and we believe that our method of raising the necessary money to build an industrial city is a good one. At the meeting the by-laws were amended with a view to improving the organization. If other defects should be brought to light by subsequent experience, I have no doubt the shareholders will not hesitate to further strengthen and improve the organization. Like your correspondent, the gentlemen who are interested in this association, now representing about 2,300 persons in various parts of the United States, believe in the truthful presentation of the South's resources, and are prepared to make proper and successful expenditure of money to develop the "splendid resources of her fertile fields," and take advantage of her "marvelous climate," her "exquisite scenery," and in this particular instance, her "superb water supply and power."

ROBERT P. PORTER,

President of the Co-Operative Town Co.

WASHINGTON, D. C., May 7th, 1892.

Old Placers in Bosnia.—Along the rivers of Upper Vrbas, the Lasva, Fojnica au Zeleznica, says Herr V. Foulon in *Verhandl. der K. K. Geol. Reichsanstalt*, many old placer washings have been found, some of which were worked by the Romans, the others during the middle ages. Some of these placers have been found at an elevation of 1,700 metres. The country-rock is for the most part of Palaeozoic age, resting upon slate broken through in various places by quartz porphyries. No gold is found in the porphyry, but the slates contain numerous gold bearing veins, and over 60 shafts have been sunk. Cinnabar and gray silver ore is also found in these localities.

CARBON DEPOSITS IN FIRE BRICK.

Written for the Engineering and Mining Journal by A. D. Elbers.

The following extract from a recent essay on "The causes of the destruction of fire brick in blast furnace linings" (*Stahl und Eisen*, March 15th, 1892) is noteworthy:

Cause No. 4.—Bursting, from the formation of carbon deposits, within the brick, on particles of iron derived from pyrites.

This hypothesis—analogue to that of lumps of ore bursting in the blast furnace by reason of their impregnation with deposited carbon,—is accounted for as follows: "The ferric disulphide (pyrites) changes at elevated temperatures to ferrous sulphide, the latter is changed by the blast furnace gases, to metallic iron, and on this iron the carbonic oxide gas, in permeating the brick, deposits carbon according to the reaction: $2\text{CO} = \text{CO}_2 + \text{C}$. The particles of iron, which are quite diminutive, thus become coated with carbon, and this deposition continues until the coated particles grow to lentil, pea or even to hazel-nut size and then—burst the brick!"

The assumed but undefined reaction by which the blast furnace gases are supposed to "change" ferrous sulphide to metallic iron, serves, in this instance, to support an apparently fallacious theory, for at the temperature at which FeS or Fe_2S_3 can lose the remainder of their sulphur, no deposition of carbon takes place. In other words, if the brick in any particular spot of the furnace is hot enough to render the complete oxidation of the sulphur possible, then that brick is too hot for the carbonic oxide gas that enters its interstices to split up into carbonic acid gas and solid carbon.

Nevertheless, deposits of the latter do form in the brick linings of blast furnaces, where the brick is not too hot. These formations must, however, not be ascribed to the presence of particles of iron which are derived from the ferric hydrate obtained in the clay, or also to chips from the crusher in which the clay was ground. That the accumulations of carbon on these particles cannot increase to the extent of exerting a "breaking" strain on the brick in which they are lodged is almost self-evident, because the pressure which they exert within the brick cannot be greater than that of the air or gases inside the furnace, and also, because the deposited carbon is of no greater density than the brick components are. Nor is there such a difference in the coefficients of expansion of impregnated carbon and brick substance to render it possible that the carbon should expand at an increased temperature sufficient to burst the brick, or that the brick should break at a lower temperature on account of the unequal contraction of the respective substances.

But what can happen very frequently is, firebrick bursting on account of the sudden expansion of its free silica at high heat. Cracks may then open in the brick wide enough to let even carbon lumps of hazel-nut size drop into them from the descending burden; and when, at a receding temperature, these cracks become partly closed, then the carbon lumps that have dropped in will be held so tightly as to give rise to the supposition that the brick had been ruptured by their expansion. This belief is apt to be strengthened when other (but smaller) aggregations of carbon are found to obtain in *unfractured* parts of the same brick, into which they could not have dropped, from without.

The conditions for the complete desulphurization of contained pyrites obtain sometimes in the firebrick kiln, but not in the blast furnace lining; and the blast furnace brick may contain impregnated carbon that has been formed within, as well as carbon that has dropped in, but neither are likely to cause the rupture of the brick.

SILVER ORES OF THE ISLAND OF MILOS.

For a long time says Dr. Alex. Gobautz, Royal Mine Inspector of Greece, in the *Oesterr. Zeitschrift für Berg und Hüttenwesen* no matter has so engaged the attention of the inhabitants as the news of the discovery of discovery of rich silver deposits in Milos. The deposits are found in liparite, an oligoclase quartz trachyte, which lies unconformably with pyroxene-sanidine and pyroxene-sanidine-biotite trachytes. The formation of the trachytes took place in the Eocene, while that of the liparite-Miocene. This liparite is the most important ore-bearing rock in the island. In the northwest and southeast veins of galena blende and copper ore are found in it.

At Kap Vani an important manganese mine is found in this same rock. Most important of all, however, is the recent discovery of silver at Pilonisi, Triades, Pikridon, Mirobilia and Vani, associated with barytes.

The baryte occurs in a crystalline or compact form, sometimes as a loose sand, but in any case it is silver bearing.

Analyses show the sands at Pikridon and Kastana to contain from 16.6 to 7.66 oz. of silver per ton, while the crystalline baryte commonly contains 9.96 oz. per ton. At Mirobilia the crystalline baryte contains 20 oz. per ton, which is, however, an exceptional case. The dense compact baryte of a specific gravity of 3.75 is the richest of all, averaging from 13.3 to 20 ozs. per ton. The examinations and analyses made show, however, that the silver occurs not only in the baryte, but in the underlying clays and liparite. At Triades the baryte rests upon a black clay 8 to 12 metres thick, underlying which is liparite, more or less decomposed, containing from 33 to 330 oz. of silver per ton. The color of the clay, which is nothing more than decomposed liparite, arises from the decomposition of pyrites. In general the clay is richest near its contact with the baryte.

At Mirobilia the liparite appears directly under the baryte, there being no intervening clay. The silver varies from 23 to 66.6 oz. per ton. At a depth of 26 metres in the half decomposed liparite, assays showed 36.6 oz. per ton. In some places, as at Mirobilia, the baryte is exposed, but in general it is covered or capped by other formations, sometimes by tufa, as at Pilonisi, then again breccia or chalk of Pliocene age.

At Vani a bed of manganese ore overlies the baryte and in it fossils of the *cytherea carvigata* have been found which would place the deposit in the Miocene age.

At present a large quantity of ore is in sight containing on the average 16.6 oz. of silver per ton.

THE COAL FIELDS OF MONTANA.—II.

Written for the Engineering and Mining Journal by Walter Harvey Wood, E. M.

CINNABAR COAL FIELD.

The Cinnabar field is an isolated, inter-mountain area, occupying an upper valley of the Yellowstone, on the northern boundary of the Yellowstone Park. Although of small extent, the field merits attention on account of the quality of the coal, which is the best yet discovered within the State. The field embraces a strip of coal-bearing rocks on the east side of the Yellowstone a quarter of a mile wide and three miles long; the northern portion of Mt. Evarts, within the Yellowstone Park, some four or five square miles being coal bearing, and the long flat-topped north spur of Electric Peak which terminates in the knob known as Cinnabar Mountain.

The field thus lies wholly in the upper valley of the Yellowstone River; the coal-bearing rocks occur in detached faulted blocks, whose connection with the same strata elsewhere is obscured by faulting and by the great thickness of volcanic material forming the northward extension of the Gallatin range of mountains. To the southward, Electric Peak, the highest point within the Yellowstone Park, reaching an altitude of 11,100 ft. above the sea, is the culminating point of the coal-bearing rocks of this field. These strata, dipping gently to the northeast, occupy a syndinal trough between areas of Archaean gneisses. The east side of the mountain and its coal-bearing spur is bounded by a fault, so that the mass of Sepulchre Mountain, composed of many thousands of feet of volcanic material resting upon the coal series, is interposed between the coal-bearing strata of Electric Peak and Mt. Evarts. To the east a profound fault brings the Archaean rock directly in contact with the Cretaceous coal series, so that the strip of coal land east of the Yellowstone River is narrow and cannot hope for any great future. This part of the field shows the strata dipping steeply 45° toward the fault; the seams and inclosing sandstone are capped by a thick covering of basalt, whose debris covers the coal measure outcrops in many places. Several attempts have been made to mine the seams of really excellent coal in this part of the field, but for lack of capital and the rather poor showing for the future nothing of consequence has been done except at the northern end of the strip, where the Bowers mine is operated on a small scale and furnishes an annual output of about a thousand tons of very good coal.

The Mt. Evarts area, lying within the boundaries of the Yellowstone Park, is not worked. A short drift was opened and a few tons of coal extracted by the hotel company of the park, but the work has been discontinued. The chief mining operations of the field are in the extreme northeast portion of the Electric Peak block of strata, where the various openings of the Horr Coal Company are situated. The relation of this coal to the older rocks may be easily seen in the most beautiful section exposed in the upturned strata of Cinnabar Mountain. Resting upon archaean gneisses and granites, there is some 2,500 ft. of heavily bedded Paleozoic limestones; these are overlaid by the vermilion red sandstones forming the Devil's Slide, and giving the misleading name of Cinnabar to the field. Above these red slides there are dark gray shales and limestones full of fossil shells of Jurassic types, and some 350 ft. above these beds the heavy conglomerate of the Dakota, a readily recognizable bed. Above this there are some 3,300 ft. of sandstones and shales beneath the coal beds, generally readily distinguishable from the coal-bearing, rock, by this gray color, greater abundance of clay and shaly appearances though, really harder than the coal-bearing sandstones. The coal rocks are light buff or white sandstones, generally somewhat friable and incoherent, massive in appearance, but weathering into thin slabs. Sections of the strata show three workable seams, whose relative position is shown in the accompanying figure.

The Horr Coal and Coke Company own the northerly portion of the Electric peak block. The workings have thus far been confined to the relatively small faulted blocks that form the extremity of the ridge, but the present mining is in a better part of the property, and yields fully as good a fuel. The accompanying figures show the partings of the seams. The mining presents no features of especial interest. The coal dips at an angle of 20 to 40° toward the southwest, and it worked by a level, the opening being some 800 ft. above the coke ovens and washer, and the cars being run along a level to an incline, where they are lowered by a cable and grip to the level of the washer, hauled by mules and dumped over the screens. The lump and nut coal is loaded directly on the cars, and the slack washed and hauled to the coke ovens. The miners are paid 75 cents per ton, and ordinary labor costs \$1.75 a day. Coking is an important part of the business, as a firm, hard prismatic coke is produced, that is fully equal to the Eastern product. Sixty ovens were in operation the past summer.

The greater part of the coal-bearing strata of the Electric Peak spur are not so readily available. There are a number of prospect entries on Cinnabar Creek, and a systematic attempt was made to open up the most accessible portion, at the so-called Craig mine, in 1889-90, but the product did not prove equal to the Horr coal, in quality and the haulage of the product some nine miles to the railroad was very costly. Nevertheless, if capital can be obtained to build a branch of the railroad up Cinnabar Creek this part of the field will prove very valuable.

THE GALLATIN FIELD.

In the inter-mountain valley of the Gallatin River, one of the three forks of the Missouri, there is an area of coal-bearing rocks that will be of importance when railroad facilities are afforded. There are a number of seams inclosed in sandrock strata, similar to those of the Cinnabar field and of similar age. Some prospecting has been done, but the field is too remote for present development, and its future is linked with that of the gold leads of the neighborhood, and the hope that the Gallatin River may be the future route of a railroad to the Yellowstone Park.

North of the three forks of the Missouri River there is a synclinal basin in which an attempt has been made to work the coal, but neither the quality nor quantity of the coal warrant the working of the seams under present conditions. The same statement also applies to the coal found on the Ruby River, near Virginia City, where coal-bearing strata are also found, and some prospecting done on the outcrops.

THE JUDITH COAL FIELD.

This field, embracing the Judith basin and the foothills of the Little

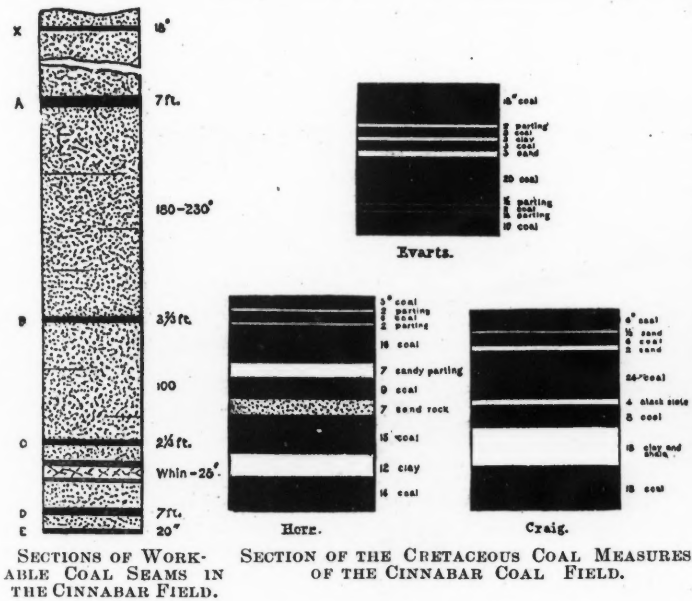
Belt and Judith Mountains, deserves mention because it promises to be of considerable importance in the near future, when the country is opened up by a railroad. It is geologically an extension of the Great Falls field, which lies to the westward, and the rocks are of the same age, the Laramie coals of the Bozeman field being either poor in quality or absent altogether. The coal seam has been tested by opening made at a number of points, and promises a fuel in every way the equal of that of the Great Falls field, but its development must depend upon a demand for the coal as a railroad fuel.

THE GREAT FALLS COAL FIELD,

The Great Falls coal field, although the last to be worked, promises a production exceedingly large in the near future, as the fuel, though of medium quality, can be cheaply mined, and is near the great smelters of Great Falls, and competes successfully with the Bozeman and Red Lodge coals at Butte and Helena. Embraced within this area, we include the district extending from the Judith country on the east, along the flanks of the mountains to the Missouri River, and on with slight interruption to the Canadian line. Throughout this great extent of country a belt from a mile to two or more miles in width is underlaid by a coal seam that is generally workable.

Although the value of this field was known as early as 1880, when it was examined by the experts of the Northern Pacific Railroad, no mining was attempted until the building of the Montana Central Railroad, when Col. Broadwater, that far-sighted Montana capitalist, had somewhat extensive prospecting done, and acquired control of the property now owned by the Sand Coulie Coal Company. My thanks are due to him and to Mr. Cocker, the president of the company, for many favors. For many years previous to the building of railroads here, a small quantity of coal had been mined from the Belt Creek exposures and carted to Fort Benton, but this part of the field has remained practically unworked in recent years save a small output for local supply.

Throughout its entire extent this field is an open grassy plateau or prairie country, rarely presenting low mesas or buttes left in the wearing



The works were at the time of my visit mined by hand, but experiments were being made with the Harrison machine, looking to its general introduction.

An average exposure of the seam as shown throughout the mines, shows the following section: Top coal, 23-28 in.; parting, 1/2 in.; coal 10 in.; in.; parting, 1 in.; coal, 24 in.; parting, 6-8 in.; coal, 24 in.; floor.

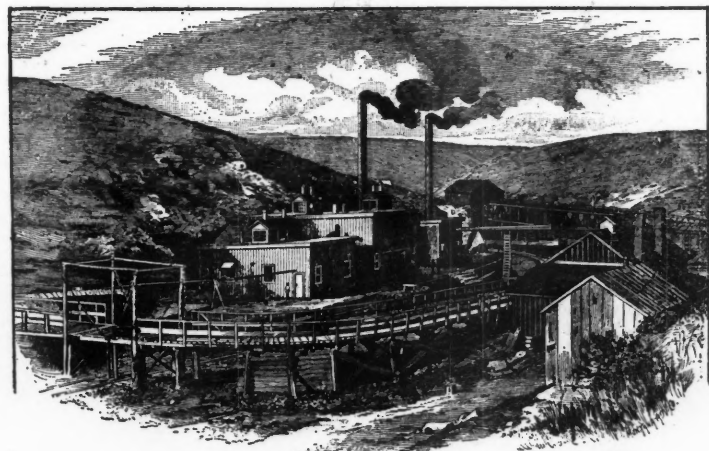
Throughout the mine the seam varies in thickness from 3 1/2-7 ft. The top bench shows 10-15 in. of dull and quite hard coal, locally called anthracite, at the top, with streaking of bright coal in the lower part. The second bench, below the 1/2-in. parting, and the 24-in. bench beneath it, are formed of a bright bituminous coal. The bottom coal is a good coking coal, which will no doubt at some future day be separated from the other coals.

An average analysis of the Sand Coulie coal, published by the company and agreeing fairly with those made for the United States Geological Survey, is as follows: Vol. carbon, 35.15%; fixed carbon, 57.05%; water, 3.98%; ash, 5.83%. Like the Bozeman and Red Lodge coals, this coal carries considerable sulphur, which here occurs in balls of various sizes. It is but fair to the able manager of the mines, Mr. H. Burrell, to say that the so-called "dirtiness" of this coal must be charged to the fuel itself, and not to careless mining and the admixture of parting slate.

The dip of the seam is usually less than 3°, and but little timbering is necessary, as the coal is hard and the pillars hold the roof up well. With extensive working, however, a larger amount of timber will be needed. The daily output is from 1,000 to 2,500 tons, of which a considerable part is used on the Montana Central, the Great Northern divisions of the Great Northern Railway, by the Great Falls and Butte smelters, and for domestic use.

The Belt Creek workings at Armington and the town of Belt show the seam to possess practically the same character, and these properties will no doubt soon be extensively worked.

Specific Heat of Metals.—The specific heat of some metals, copper, silver, aluminum, zinc and lead, at constantly rising temperatures is not, says M. Le Verrier, in *Les Comptes Rendus*, represented by a curved line, but by a broken one. The reason of this is to be found in the fact that the specific heat will remain almost constant for a period of 20° in-



SAND COULIE COAL MINES, GREAT FALLS, MONT.

down of higher rocks, and cut by numerous coulies, seldom occupied by streams of any considerable size. Southward the Belt Mountains rise abruptly, forming a rugged range, whose higher slopes are dark with pine forests, and whose foothills are bright with groves and parks. Trees there are none, in the coal field proper, except in the largest valley bottoms, where cottonwoods and alders form a pleasant contrast to the monotonous grasslands. Northward toward Fort Benton the rugged peaks of the Highwood Mountains rise abruptly from the plain, beyond the limits of the field, monuments of an erosion that has uncovered the coal-bearing strata. The coal measures are generally but little disturbed, and show only occasional variations from their general low dip away from the mountains. Thus the greater part of the field is available for economical mining if the thickness and quality of the seam warrant work. Usually the coal lies about midway in the series of sandstones and shales making up the tableland.

Throughout the field but one workable seam has been found. Very rarely a second seam occurs, but it is nowhere as yet discovered of sufficient thickness to warrant mining.

The present production of the Great Falls coal field is limited to that of the Sand Coulie mines, situated some 12 miles from Great Falls and reached by a spur of the Neihart & Great Falls Railroad. The mines are located in a branch coulie tributary to Sand Coulie, about three miles south of the main line of this railroad. South of the town the coulie narrows until the steep walls are but a few hundred feet apart, and the bottom affords scanty room for the railroad tracks and a single row of miners' houses. The coal seam outcrops beneath a ledge of yellowish sand rock; that is the only rock showing upon the grassy walls of the coulie. The plateau summits on either hand are level grass lands, occasionally marked by shallow drainage hollows. It has been found that such drainage channels, dry as they are nine-tenths of the time, and forming but inconspicuous features of the topography, exercise a marked deleterious influence upon the coal seam beneath them.

Largely because the early mining was done in an area in which the coal was of comparatively poor quality, due to this cause, the Sand Coulie coal was for a while looked upon with disfavor, which the quality of the present output has overcome.

crease of temperature and then suddenly change. When the metal is near the temperature at which the phenomenon takes place, its condition is not solely a function (*result*) of its temperature; it changing with the manner in which it has been treated. The molecular work during the change undergoes a certain retardation, and the same total heat is not found during reheating and cooling. Thus, if the metal be treated to a temperature passing that at which its specific heat remains constant, and then, beginning again at a low temperature, should be reheated past the point and recooled to the starting point, a closed cycle is obtained. Zinc especially is remarkable for its anomalies in this respect. At 200° it undergoes a pronounced molecular change from the mechanical point of view, and becomes malleable and remarkably ductile.

Masrium, a New Element.—According to the *Chemiker Zeitung*, of April 27, Drs. Richmond and Off have announced the discovery of a new element, to which they have given the name Masrium. The new element is found in small quantities in a mineral formerly called Johnsonite, which was supposed to be a manganese alum, but further researches proved the presence of 0.2% of some substance whose chemical reactions do not identify it as any of the known elements. The metal itself was not isolated on account of the small quantity of material at the disposal of the investigators. The following reactions of its salts were obtained: In solutions acidulated with HCl, H₂S gives no precipitate, if the free acid is acetic acid a white precipitate forms. (NH₄)₂OH, (NH₄)₂S, (NH₄)₂CO₃, and Na₂HPO₄ throw down white precipitates insoluble in excess of the reagents and ammonia. Ferro cyanide of potassium gives a white precipitate insoluble in excess of the reagent or dilute HCl, but soluble in masrium chloride. Potassium chromate gives a yellow precipitate soluble in excess of masrium chloride. Potassium tartrate gives a white precipitate soluble in excess of the reagent, from which the masrium hydrate is not precipitated by ammonia. The only good crystals obtained were from the sulphate having the formula Ms So₄ + 8 H₂O. A rough estimation of the atomic weight gave 114 or some multiple of it. If the new metal is divalent its atomic weight would be 228. The law of periodicity of Newlands and Mendeljeff shows a break in the Beryllium group which would be filled by an element having the atomic weight—225.

SECRET PROCESS FOR WORKING COMSTOCK ORE.

Written for the Engineering and Mining Journal by Dan De Quille.

Simultaneously with the mania for patenting and putting on the market amalgamating pans of novel construction came the "secret process" rage or craze. Hundreds of men began making experiments in the hope of hitting upon some chemical or combination of chemicals by means of which all, or very nearly all, of the silver contained in the ore would be saved. Only about one in ten among those making these experiments had the least knowledge of chemistry. They poured into their batches of pulverized ore all manner of things promiscuously, ignorant of the fact that one ingredient often neutralized the action of the other—acids and alkalis were all the same to them. This search for a "universal silver solvent" proved to many a very fascinating pursuit. Miners who were wholly ignorant of metallurgy and the nature and action of chemicals became smitten with the prevailing mania. They ceased to prospect, and permitted the mines they had already located to lie unworked, dropping all else to go in pursuit of the "great secret," which all conceded would bring to the lucky discoverer a fortune of untold millions.

Many cabins of miners scattered among the hills would for days be found securely locked and the windows darkened. One might knock at the door of a cabin so closed for an hour without eliciting any response, and but for the black smoke rolling out of the stone chimney would be likely to conclude that the place was tenanted. However, within, perspiring over a hot pitch pine fire, was a frowzy-headed and soot-be grimed "savant" toiling over a mess in his big bake-kettle that in nastiness would have far surpassed the contents of the cauldron of "Machbeth's" witches.

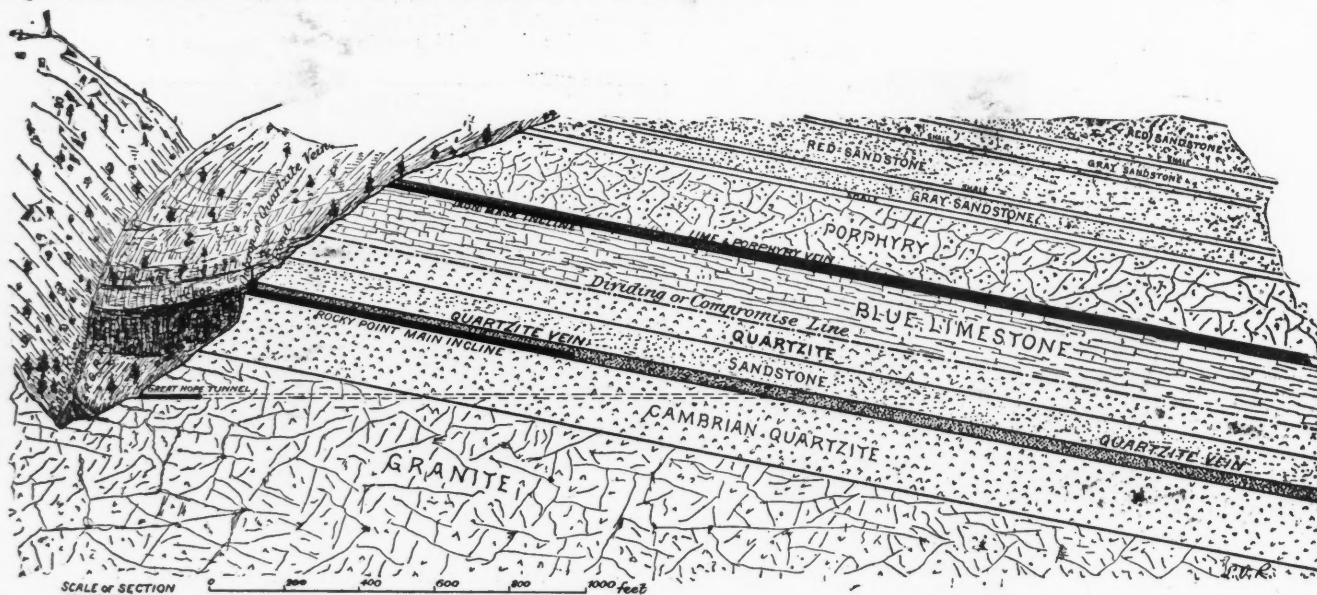
It being known that about 30% of the silver contained in the ore was lost by even the very best processes then in use, each man that began experimenting hoped to hit upon "the great secret" and become a millionaire at a single stroke. It was a sort of revival of the search for the "philosopher's stone." The cabins in the cañons and hidden away among the hills were the habitations of a new race of alchemists. They

in the business of evolving processes. There was the process of Dr. Veatch used in a number of mills, the Gould & Curry Mill in particular. This was claimed to be an improvement on the Freiberg barrel process and in working it wooden tubs with cast iron bottoms were used. The Gautier process, invented by Dr. Gautier, was in use in the Gautier mill, on the Carson River. A process was invented by Dr. Lanszweert was used for a time in several mills.

Some of the processes required the use of wooden tubs, paved with stone and having stone drags—really arastras—as no iron could be used. This was probably owing to acids being added to the charge of pulp. Some of the processes required the use of Hungarian bowls, in amalgamating; others Bartola pans with wooden mullers, others again Chile mills or Brevoort's grinders.

In the processes were used not only all known mineral salts, as bluestone, sulphate of iron, saltpeter, borax, caustic potash, alum, soda and the like, with all known acids, but also several kinds of astringent vegetable decoctions. At one time a strong tea made of cedar bark was thought to greatly promote amalgamation; also a strong decoction of sagebrush was tried and said to operate well, probably by purging the particles of quartz of their argentiferous contents. The drug stores drove a thriving trade with the mill men and the many miners who were in search of the "universal solvent." Not only were all kinds of acids and mineral salts in demand, but also several kinds of gums from tropic regions.

In one process the crushed ore was made into bricks of the same size as if for building and burned in a kiln as are ordinary bricks. Sawdust was mixed with the pulp in making the bricks, which made them porous and friable; also it was supposed that the gases escaping from the particles of sawdust and passing out through the bricks had a good effect, while the charcoal might be of some use. The bricks called for a second crushing under the stamps, and finally the material was amalgamated. Much was claimed for this process, but it proved a failure. I am not sure, but believe that this process called for a certain amount of salt and bluestone, as well as sawdust, in mixing the pulp to be made into bricks.



CROSS SECTION THROUGH BATTLE MOUNTAIN AT INCLINE OF POLAR-ROCKY POINT GROUP OF MINES.

had their mortars and pestles, their crucibles and Florence flasks, test tubes and blow pipes, and of some we might say that, like Ben Jonson's "Alchemist," they had "their alembics and aludels, their vessels for infusion, for decoction, for sublimation, fixation, lixiviation, filtration and coagulation." Also, like the alchemists, these men were always upon the point of "projection," but owing to some little oversight or unforeseen accident never quite reached that point. However, very many—unwilling to lose their labor—brought out "processes" of the wonders and advantages of which they boasted.

Soon the country was full of "process peddlers" with vials of magical solutions in their vest pockets. These men besieged the mill owners and offered the secret of their solutions at prices ranging from \$1,000 to \$20,000. They became at last a nuisance and a terror to mill men, who were obliged to put up notices announcing that, "No processes are wanted here."

The mill men themselves were prolific of processes, and very many of them had secret processes of their own. These they guarded with jealous care, mixing their chemicals in a private room and giving them out to the workmen in charge of the amalgamating pans as thoroughly disguised as possible, yet the men in the amalgamating department were not long in discovering every ingredient used. They would then post some friend on the outside and send him forth to peddle the process under some new and high-sounding name. Not only were some of the best processes in use in the mills, as the Hatch and Veatch processes, stolen and sold among the mill men, but were also taken to San Francisco and sold to parties there as new and wonderful discoveries, when the San Francisco buyers would come rushing across the mountains in the expectation of making a fortune among the mill men of "Washoe."

Among the processes in actual use in the mills of the country from 1861 to 1863 may be mentioned the following: The Hatch, the Sage-Brush, the Thayer, Jeffery, "Novelty Company's Silver Process," the Johnson Process, the Hurd, Hayden, Norton, and "Atmospheric Process." The "atmospheric" was a process by means of which ore was to be worked without heating. There was great talk about it for a time, it being reported that it was to be put into all the big reduction works, but soon all this "blowing" ceased, and it would seem that the process was suddenly resolved back into its native thin air. The doctors took a hand

Heap roasting was attempted at some of the mills, but the high price of wood (once all the surrounding mountains were denuded of their growths of nut pine and cedar) ended this open-air roasting. While this was practiced, ore, ashes and charcoal all went under the stamps together. The ashes were thought to be very beneficial in amalgamation.

In several of the mills of the early days the Mexican patio process was used for a year or two in connection with pans and other amalgamating apparatus. It was thought for a time to be the best method of working low grade ores. Thus at the big mill of the Ophir Company, in Washoe Valley, where 100 tons of ore were daily crushed, and where the Freiberg barrel process of amalgamation and also amalgamation in pans was in use, they still thought the patio best for their poorer ores. The patio was constructed in a room in which were in operation 80 amalgamating pans. This was in order to obtain a good working degree of heat at all seasons, the 80 pans giving out so much heat as to render the room very warm. Mr. Palmer, who had much experience at the Real del Monte mines in Pachuca, Mexico, was superintendent of the Ophir at that time. He did very good work, but—even with the artificially heated room—the process proved too slow for our people. Even the German barrel process was soon voted too tedious.

At present the mills working Comstock ores amalgamate in large iron pans holding a charge of about 3,000 pounds of pulverized ore. Water is added until a pulp is formed that is sufficiently thin to be easily stirred by the mullers. These mullers or "shoes" revolve upon plates of chilled iron in the bottom of the pan and therefore grind as well as stir the pulp. The pulp is ground for about two hours in the steam-heated pan, when the charge of quicksilver is added (about 300 lbs. to 3,000 lbs. of pulp), also salt and bluestone. At times, when the quicksilver requires cleaning, soda or caustic potash is used. The time of grinding and working in the pan varies from three to five hours. In that short time the operation of amalgamation is completed and the whole charge is drawn off into a larger pan called a settler, from which the amalgam is drawn off, strained (drained of fluid quicksilver) and sent to the retort, where the remainder of the quicksilver is driven off by heat, leaving the silver in lumps ready to be melted and molded into bars.

Many millmen who use this American process are unable to explain the action of the salt and bluestone used in connection with quicksilver and

the metallic contents of the ore operated upon. Although practically perfect in the use of their materials, they are unable to give the rationale of the process they use.

THE MINES ON BATTLE MOUNTAIN EAGLE COUNTY, COLO.

The mining camp of Gilman is situated on Battle Mountain, three and one-half miles from Red Cliff, the county seat of Eagle County. Red Cliff is distant 22½ miles from Leadville and 299.9 miles from Denver by the Denver & Rio Grande Railroad. This road runs at the foot of Battle Mountain and along the Eagle River. The elevation of Red Cliff is 8,671 ft. above sea level, and that of Gilman 8,950 ft.

Mr. Eben E. Olcott, of New York, mining engineer, visited the district in December, 1891, and later in March, 1892, and reported upon the Polar-Rocky Point group of mines. I quote from his report describing the geological formation of the mountain:

"The study of the geology of Battle Mountain and its veins is intensely interesting. The lowest rock is a reddish granite of Archæan formation, which rises 150 ft. above the river. The granite contains several fissures

carrying the gold, silver, lead, etc. The marked difference in chemical composition between the ore deposits in the limestone and those in the quartzite would lead to the hypothesis that they must have been of a different origin, though both have apparently come from veins intersecting the two ore-bearing strata at a much lower point than that already attained in the mine development.

"The veins, mentioned above as traversing the granite, are apparently confined to this rock and do not enter the quartzite immediately above it."

Among the mines whose principal workings are on the quartzite vein are to be mentioned the well-known Ben Butler, which has produced some rich ore. To the south of the Ben Butler are the Star of the West, Tip Top, etc. Adjoining the Ben Butler, to the north, is the Polar and Rocky Point group, consisting of the Polar, Accidental, Bob Ingersoll, Rocky Point, Wilmot claims, all of which are located on the outcrop of the quartzite vein. To this group belong also the Veteran, T. V. Powderly, Great Hope and St. Elmo claims, which are locations on fissure veins in the granite. This group has produced some \$350,000, as far as official records show, but considerably more than this is supposed to have been



VIEW LOOKING DOWN EAGLE RIVER CANON, SHOWING THE STAR OF THE WEST AND BEN BUTLER MINES AND THE POLAR-ROCKY POINT GROUP BEYOND.

striking approximately northeast and southwest; this is followed by about 100 ft. of hard non metaliferous quartzite, probably of Silurian formation. On this lies conformably the iron stained bed of quartzite, some 30 ft. thick, which carries gold and silver in workable quantities. The ores of the precious metal are largely carried in clay and talc, which lie as interstratified deposits or veins in the ore-bearing quartzite. Above this quartzite there are 80 ft. of shady sandstone followed by a 70 foot bed of quartzite on which lies some 200 ft. of blue and grey limestone, near the top of which there is a thick and valuable deposit of gold, silver and lead ore, associated with much iron oxide. Characteristic mines of this strata are the Iron Mask Group, the Belden and the Cheeseman-Clayton mines. Above the limestone there is a bed of porphyry at least 100 ft. thick, which is followed by beds of red sandstone and carboniferous limestone. The strata have a northwest and southeast strike, dipping to the northeast at about 15 degrees. The structure of the mountain will be more clearly seen by reference to the accompanying section.

"There seems to be no connection between the limestone and quartzite formations, but both bear evidence of having been extensively eroded and cut into caves by thermal water from depth, the action of which has probably been aided by carbonic acid or other solvent agents. These cavities have subsequently been filled by aqueous depositions of the minerals

taken out, all returns not having been preserved. There have been driven over 12,000 ft. of drifts on this property, exposing many blocks of good ore.

Mr. Olcott describes these as follows: "The ore chutes vary from 50 to 200 ft. in width, and the ore is from 2 ins. to 2½ ft. in thickness. The physical condition of the ore makes it easy to mine. In places, the gold and silver are carried in soft clay; in others, in loose ferruginous earth. There is also a black manganese ore containing some free gold. Caves and openings are a feature of the quartzite deposit, and from these the ore can be cheaply extracted. Outside of the caves the ore lies principally in chutes or channels with rolls of quartzite between them. In the bottom of the mine there are pyrites and undecomposed ore, and under the Rocky Point claim some galena has been extracted. There is every promise that the sulphuret ore will hold in depth, and will be mined profitably for years to come. The ground is always firm, and very little timbering is required, the ore being easily followed in low stopes.

The average yield of ore taken from the Polar-Rocky Point group is \$60.36 per ton; nearly one-half of the value of the product has been in gold. The ore is shipped and sold directly to smelters in Leadville. With freight at about \$2 per ton, and average price of treatment \$11.30 per ton, and deducting cost of mining, administration, etc., the ore nets at least \$30 per ton. Miners get about \$3 per day. LEO VON ROSENBERG.

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS.

San Francisco Meeting.

The first meeting of the American Society of Mechanical Engineers it ever held on the Pacific Coast commenced on Monday last at San Francisco, under the presidency of Mr. Robert W. Hunt. A large number of papers were read, not a few of which were of interest to mining engineers.

NOTES ON A PROBLEM IN WATER POWER. BY JOHN RICHARDS.

Mr. Richards stated that on the Pacific Coast high pressure impulse water wheels are more in favor than inclosed turbines, though the reverse is usual everywhere else. He claimed that it had been proved conclusively by experiment that one is as efficient as the other, and that the first cost of an impulse wheel is only half that of the inclosed turbine. Most manufacturers and scientists do not believe in impulse wheels except for low heads, but on the west coast there are many working at high pressure with the best results.

AN EXPERIMENT WITH ALUMINUM. BY W. WALLACE CHRISTIE.

Two years ago the writer made some experiments on the effect of aluminum on iron and steel castings. He prepared two mixtures as follows, and tested them:

Mixture No. 1:	
Wrought iron turnings.....	10 lbs.
Cast-iron turnings.....	10 "
Steel-rail chips.....	10 "
Ferro-silicate of iron and aluminum.....	2 "
Test No. 2:	
Wrought iron turnings.....	10 "
Cast-iron turnings.....	5 "
Steel-rail chips.....	15 "
Ferro-silicate of iron and aluminum.....	2 "

The melting was done by a well-known brass founding firm in their brass furnace. A very high temperature was required to melt the mixture on account of the presence of the wrought iron, so the crucible was covered with a carbon lid and the coal heaped upon it. Even then about three hours' time was required to melt it, and after being melted the ferro-silicate of iron and aluminum, which had been left out, was added and thoroughly stirred through. The castings were made $\frac{1}{4}$ in. diameter by 14 ins. long, and in green sand without any charcoal facing. After the skin of sand had been removed from the castings they were very smooth and clean.

No. 1 was very fluid when hot and white, but had to be poured quickly, as it soon cooled. No. 2 was not as fluid or as white as No. 1.

No. 1 made a very homogeneous casting; No. 2 not nearly so much so, and its fracture was duller than No. 1, which, in fact, was very bright. Pieces of both mixtures have been kept since April, 1890, when they were cast, and they have retained their original brightness. This speaks well for the small percentage of aluminum in them.

No. 1 could not be touched by a specially tempered cold chisel without its edge being entirely destroyed. A tool maker used an hour's time cutting a small piece off a bar of No. 2, and during that time the tool required about five or six sharpenings. When heated to a high red heat they both crumbled on being struck with a hammer. But when heated to a dull red heat No. 1 was placed under a steam hammer and, though quite resisting it, allowed itself to be flattened to about $\frac{1}{4}$ in. thick before crumbling; it, however, gave better results when annealed over one night; No. 2, when heated in the forge to a dull red heat, could be flattened to about $\frac{1}{4}$ inch thick.

The writer remelted a piece of No. 1 and cast it into the usual shape for tension tests. This piece, though but $8\frac{1}{2}$ in. long, was put in a Fairbanks testing machine at Cornell University. As it was uncertain just how it would act, no extensometer was used for fear of the test piece breaking suddenly. Breaking occurred at a scale reading of 13,860 lbs. The piece broke, however, in the jaws of the machine, and in the larger section of the piece, as there was a cinder flaw in it. For fear of breaking the jaws of the machine the test ended here. After breaking the smaller section in the impact machine, the area was obtained by a planimeter as 0.31 sq. in. This makes the tensile strength per square inch at the time of breaking 44,710 lbs. This would have been higher, probably considerably higher, but for the flaw and untrue grip of the jaws, which caused a combined transverse and torsional strain. The area of smaller section was less than that of the sound portion of larger section, hence its use. When placed on a Heisler impact machine, between supports 6 ins. apart, a weight of 25 lbs. falling $1\frac{1}{2}$ in. was required to break a circular section of 0.31 sq. in. Two uses for this metal have suggested themselves to the writer; one for floor plates in a boiler or engine room where great strength is not required, but where wear is; the other as bearing for pivots. Of course, it is not desirable to use it for work requiring finishing, as it is too hard for that, except when done on a grindstone. No. 1 is much harder to grind than No. 2, and both present very smooth surfaces. The ferro-silicate of iron and aluminum used was an ordinary commercial article, purchased in the open market, and the composition of it the writer was unable to learn.

THE ELASTIC CURVE AND THE TREATMENT OF STRUCTURAL STEEL. BY G. C. HENNING.

In the construction of the Henderson bridge, crossing the Ohio River at Henderson, Ky., a considerable amount of medium and high structural steel was used for tension and compression members of the trusses. As the knowledge of such material was very limited at the time of the building of this structure in 1884-85, it was deemed advisable to investigate the steel in several ways, and to determine the state or condition in which the material was actually used in the bridge. It was assumed that the material covered the specification requirements, if they were met, not by the rolled shapes in which the material was to be actually used in the bridge, but by the billet test. The results of tests clearly show how erroneous this position is as regards uniformity of material as used in structures. In regard to the effects of annealing the writer states that built sections—box shape with two or three webs—can be annealed without injury or distortion; that he does not emphasize this fact with sufficient clearness or force in order to contradict statements based on opinions only, and not upon experience or observation. He calls attention to the fact that all corrosion can be prevented absolutely by annealing in a sealed furnace charged with illuminating or other proper and convenient

gas. He gives the results of tests, tabulated in such a manner that a ready comparison of the properties of the material in its various shapes or conditions can be made at a glance. Before this, however, he describes the shape of the test pieces and the methods used in making the tests.

A SELF-LUBRICATING FIBRE GRAPHITE FOR BEARINGS. BY JOHN H. COOPER.

This bearing material, the invention of P. H. Holmes, of Gardiner, Me., is composed of natural graphite, which has been finely divided and freed from all foreign matter, to which is added wood fibre mixed in water in various proportions according to the purpose to be served, and then solidified by pressure in molds. The bearings are then thoroughly dried, then saturated with a drying oil, and finally subjected to a current of hot, dry air, for the purpose of oxidizing the oil and hardening the mass. When finished they may be machined to size the same as metal. It is stated that this material has been used with great success.

Other papers were read on "Machine Molding," by Harris Tabor; "A Novel Flywheel," by C. H. Manning; "Compounding Centrifugal and Load Governing by a Rotary Piston Valve," by W. S. Aldrich; "Summary of Results of Principal Experimental Measurements of the Performance of Refrigerating Machines," by J. E. Denton and D. S. Jacobus; "The Steam Distribution in a Form of Single Acting Compound Engine," by F. M. Rites; "The Electric Railway as applied to Steam Roads," by B. J. Dashiell; "The Experimental Locomotive at Purdue University," by W. F. M. Goss; "The Density of Water at Different Temperatures," by A. F. Nagle; "The Economy and Efficiency of the Steam Engine," by C. H. Peabody; "Some Tests of a Portable Boiler," by W. O. Webber; "The Measurement of Power," by Thomas Gray; "Autographic Recording Apparatus for Use on the Testing of Materials," also by Thomas Gray; "The Utilization of the Power of Ocean Waves," by Albert W. Stahl, and "Two Cylinder vs. Multi-Cylinder Engines," by S. M. Green and G. I. Rockwood.

COAL, IRON AND STEEL PRODUCTION OF THE GERMAN EMPIRE IN 1891.

The production of coal, iron and steel in the German Empire during 1891, as given by Dr. Rentzsch in *Stahl und Eisen* shows but a slight increase over that of 1890. Indeed, the output of pig iron has decreased 112,423 tons while that of coal has increased 5,143,976. This year, however, the output for the first quarter is 150,686 tons larger than that of the corresponding quarter of 1891, the increase being for the most part in spiegel and Thomas pig.

	1890. Tons.	1891. Tons.
COAL:		
Pit coal.....	70,039,046	73,640,618
Lignite, peat.....	19,012,481	20,554,585
ORES:		
Iron ore.....	11,409,625	10,657,502
Copper ore.....	596,114	587,409
Pig IRON:		
Charcoal pig.....	24,141	4,524,816
Coke and mixed fuel pig.....	4,613,098	
Total pig.....	4,637,239	4,524,816
To foundries.....	618,635	702,984
To ingot iron.....	2,192,616	2,220,798
To malleable iron.....	1,875,240	1,553,835
To cast iron, one melting.....	32,811	36,964
To scrap and cinder iron.....	7,937	10,235
Total.....	4,637,239	4,524,816
Castings, two meltings.....	981,853	973,807
MALLEABLE:		
a. Forge-blooms.....	66,669	68,401
b. Cement steel.....	464	223
c. Manufactured.....	1,386,998	1,363,263
Total malleable.....	1,454,131	1,431,887
INGOT IRON AND STEEL:		
a. Ingots.....	144,827	171,586
b. Half manufactured blooms and billets.....	469,539	496,091
c. Manufactured.....	1,547,455	1,684,398
Total.....	2,161,821	2,352,074
COPPER:		
Ingot and rosettes.....	23,717	24,301
Copper ore sold.....	793	?

Gold in Malacca.—The gold mines of the Peninsula of Malacca are, says *Le Bulletin des Mines*, exciting considerable attention. M. Isnard, a French mining engineer, reports very favorably upon the future of these deposits. He examined two veins to a depth of 40 ft. and obtained a yield of 3 oz. per ton. In the state of Pahang, an Australian company, working with 10 stamps, is said to have taken out \$50,000 worth of gold in a month.

Ventilation of Tunnels.—In the *Revue Scientifique* there is an extended report upon the Saccando system of tunnel ventilation, recently tried at the tunnel of Pratolino, Italy, which has a length of 3,600 metres. In this system all ventilators are done away with, the sole reliance being upon compressed air. The compressed air, which is obtained outside the tunnel, and is brought in by special conduits and allowed to escape at various points, carries away the vitiated air.

Petroleum in Italy.—It has been known for a long time, says *Le Moniteur Industriel*, that petroleum deposits occurred in the Provinces of Pavia and Bologna, parallel to the Apennines, but it was supposed that they were of insignificant value. Recently some important discoveries have been made, and wells varying from 358 to 583 metres have been sunk. These borings have brought about the discovery of various sources of natural gas, which it is proposed to employ in heating and lighting.

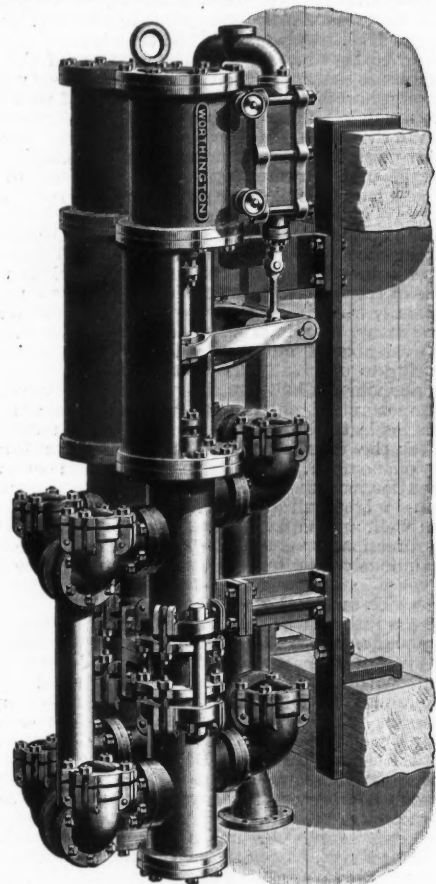
Production of Zinc in Europe.—According to the *Revue Industrielle* of April 16, Europe produced in 1891, 284,775 tons of zinc, against 283,245 tons in 1890. The production was divided among the following countries:

	1890.	1891.
Belgium and Rhenish Provinces.....	137,630	139,695
Silesia.....	87,475	87,080
Great Britain.....	29,145	29,410
France and Spain.....	18,240	18,360
Poland.....	3,620	3,760
Austria.....	7,135	6,470
Totals.....	283,245	284,775
Increase, tons.....		1,530

THE WORTHINGTON SINKING PUMP.

Of all the situations in which steam pumps are required to work, none are, in all probability, so exacting as where they are used in sinking mine shafts and recovering flooded mines. The work is rough, severe and continuous, calling for great care in the selection of the materials of its construction, and a design combining great strength with simplicity and compactness, and, what is also very important, employing the least possible amount of shaft space. The necessity for an efficient steam pump, embodying the above requirements, which should be positive in operation and quiet in its action, has long been felt, and the sinking pump shown has been designed in order to meet all the conditions mentioned, and possesses some additional features which are new and cannot fail to be appreciated by mining men and others who use pumping machinery of this class.

In the first place, the pump is duplex, and being fitted with the well-known Worthington valve motion, its operation is positive; therefore, it is always ready to start, and when running there is an entire absence of the concussive action which results from the use of single sinking pumps, and often causes serious trouble and annoyance by bursting the column pipe. Being self-contained and working with perfect smoothness, the strain on supports and hanging irons is naturally reduced to a minimum. The use of the Worthington valve motion obviates any possibility of the pump refusing to start from the action of condensation water in the steam pipe, or from the formation of ice, where compressed air is used. The steam cylinders are fitted with dash relief valves for regulating the stroke; the two water plungers are double acting, working through exterior stuffing



boxes and adjustable packing, experience having proven that the outside packed plunger is much superior to any other form for sinking work. The water valves are inclosed in heavy pots, and are made accessible for examination or repairs by means of swing bolt covers to the valve pots.

The suction opening is at the lower end of the pump, the most convenient place for attaching the suction hose. The discharge connection to the column pipe is on the side; the discharge steam and exhaust pipes are placed inside next the shaft; the valve motion, which is very simple, is also inside next the shaft, and is protected by the heavy cradles, as shown. Means are provided for either suspending the machine at the link at the ends of the steam cylinders, or of hanging it on suitable timbers on the side of the shaft by means of hanging irons. These machines are built in several sizes by Henry R. Worthington, Nos. 86 and 88 Liberty Street, New York City.

Estimation of Arsenic in Iron Minerals and Metallurgical Products.—The estimation of small quantities of arsenic in iron is quite difficult on account of the sulphur thrown down when iron solutions are treated with sulphuretted hydrogen. This difficulty is overcome, says *La Revue de Chemie Industrielle*, by proceeding as follows: To the filtrate from the silica, which is removed in the usual way, ammonia is added, which throws down ferric hydrate, carrying with it the arsenic and phosphorus. The precipitate is dissolved in nitric acid, and phosphorus and arsenic are precipitated in the usual way with ammonium molybdate. This precipitate is dissolved in ammonia and magnesia mixture is added to the solution obtained. Again the mixed precipitates are dissolved, this time in nitric acid. Ammonium hyposulphite is now added, and the arsenic is precipitated as sulphide. It is filtered off, dissolved, and reprecipitated as ammonia-magnesian-arseniate in the usual way. If ammonia is added to the filtrate from the sulphide, the phosphorus will be precipitated as ammonia-magnesian-phosphate.

A CONTRIBUTION TO THE GEOLOGY OF THE DAKOTA TIN MINES.

Written for the Engineering and Mining Journal by Titus Ulke.

As is well known the tin bearing rocks of the Black Hills cover many square miles in the Archæan formation surrounding Harney Peak and Nigger Hill.

These rocks, which are all granitic, exhibit an interesting series of phases. I have found it most convenient to classify them in the following ten groups, according to the predominancy of their constituent: 1, quartz (as an example the quartzite of the Cowboy mine); 2, orthoclase or red feldspar; 3, albite or white feldspar; 4, mica; 5, graphite; 6, spodumene (as an example the "spodumene granite" of the Nevada mine); 7, orthoclase and mica; 8, albite and mica; 9, muscovite and quartz (as an example the "Greisen" of the Coats mine); and 10, mica, quartz and feldspar (granite proper). Each of these classes characterizes a distinct group of veins, those belonging to 1, 5 and 9 being relatively richest in tin ore.

In structure they vary from schistose to massive, and from a fine-grained to a huge crystalline structure. In the Harney Peak district some of the largest crystals in the world have been found. A spodumene crystal 30 ft. long is to be seen at the Etta mine with quartz and feldspar masses tons in weight. A single mass of columbite weighing a ton has been taken out there. Wolframite crystals of great size, beryls a foot in width, and mica several feet in diameter, and cassiterite over 100 lbs. in weight, have been reported.

The number of mineral species found is also great, being upward of 150 including some very rare ones. It is the only locality from which hydrous copper bearing tin stone (cuprocassiterite) has been discovered. Contrary to what might be expected, the Black Hills cassiterite never occurs, to my knowledge, in contact with other minerals than quartz, albite, orthoclase, mica, spodumene, graphite, pyrite, arsenopyrite and cuprocassiterite. The fewer minerals visible in the granite, the higher we usually find the average percentage of tin.

Phosphates (apatite, triplite, heterosite, triphylite), almandite, wolframite, beryl, zinc blende, columbite and tourmalines occur in the tin veins, but their predominance means the disappearance of the tin generally. The knowledge of this fact is of great importance to the prospector and miner. The absence of fluorspar, zinwaldite, bismuth, stannite, hematite, hornblende, molybdenite and topaz distinguishes the Black Hills tin veins mineralogically from those of Cornwall, Saxony, Bohemia and other localities. In Oregon, too, they differ. To my mind the tin-bearing granites of the Harney Peak and Nigger Hill districts are "dikes" resulting from igneous eruptions, not volcanic. That they are in most cases parallel to the apparent bedding of the surrounding archæan schists is undoubtedly due to the fact that they were fractured more easily in that direction. The dikes are lens-shaped and vary much in length and breadth, although some have been traced for many hundreds of feet with remarkable uniformity in width. The cassiterite never appears evenly distributed throughout, but lies segregated in pockets and zones nearer either wall or near to the narrowest part of a lense, with long barren stretches intervening. The line of demarcation between the granite and the enclosing schists is not always distinct, but the latter are frequently hardened next to the wall.

The following facts have been observed concerning these tin bearing dikes: 1, the comparative rarity of true "horses"; 2, the slight evidence of metamorphism in the adjacent schists and slates, and 3, the rarity of selva and slickensides. These facts do not prove, in my opinion, that the tin stone is of any other than igneous origin, but do prove that the granite must have come up in a comparatively cool, inert, pasty condition. Moreover, the country-rock shows considerable evidence of the effects of eruptive action, but none of having been the source of the tin stone. The upheaval of the granite massive of Harney Peak and the tin bearing dikes, probably took place contemporaneously.

The Use of Gaseous Fuel in Puddling Processes in England.—At the annual meeting of the South Staffordshire Institute of Iron and Steel Works managers, held at the beginning of May, Prof. Thomas Turner mentioned that two new gas furnaces have recently been adopted at Staffordshire puddling works with very good results. The first is the new Siemens furnace, which only uses 6 cwt. of fuel to the ton of puddled bar, instead of the 20-30 cwt. usually consumed there. The other is the Pietzka furnace, already described in the *ENGINEERING AND MINING JOURNAL*, a German invention. Exact figures for this have not yet been obtained. It is certain that it consumes less than half the ordinary amount, though it is expected that the consumption will be less than one-quarter of the amount. Professor Turner also mentioned that the Pettibone-Loomis furnace is about to be introduced from America into England. This furnace averages 6 cwt. of fuel to a ton of puddled bar.

Australian Coke.—It has been stated, on professedly expert authority, that Gippsland coal would never make coke suitable for smelting, on account of its containing a high percentage of sulphur. But recent experiments carried out by Harrison's patent process, in which Gippsland black coal was used, have proved conclusively says *The Colliery Guardian*, that it can be made into silver-smelting coke equal to the best quality imported from England. By Harrison's new process the coal is first of all ground to an impalpable powder, and thoroughly washed and separated from all impurities; then the sulphur and iron pyrites are extracted by a chemical process and leave scarcely a trace behind. It is then separated from the water and pressed into blocks by a hydraulic ram, and by an automatic movement it is passed into the oven, where it is carbonized. One of the principal characteristics of the coke thus manufactured is its hardness and stability, it is capable of supporting, when in the smelting furnace, any weight of ore desired without breaking down. In the blocks in which it is molded and carbonized it can be handled in course of transit either by ship or rail without any fear of deterioration through crumbling, and can be broken up easily when required for use. Another remarkable feature of this coke is the marvelously low cost of manufacture. When the plant has been fixed and ovens made ready the actual cost it is claimed of manufacture is but 20 cents per ton of coke. The coke is steel gray in color and it is close in grain and particularly clean.

FAULTING IN VEINS.

Written for the Engineering and Mining Journal by S. F. Emmons.

In your issue of April 9th, Mr. A. Williams, Jr., assumes that fissure veins have a more regular course along their dip than along their strike, and explains the assumed greater regularity as arising from the fact that the greater number of veins are fault crevices, assuming again that faults are generally up-and-down movements and that their planes are therefore more regular in an up-and-down direction.

In your issue of April 30th, Mr. Church criticises Mr. Williams' views, substantially, 1st, by denying the first assumption that dip is more regular than strike, and 2d, by expressing a doubt as to the correctness of his statement that veins are generally fault-fissures, and his disbelief that smooth walls, clays and slickensides are necessary evidences of faulting.

Mr. Williams' first assumption is, as far as I know, not supported by any actual statistics; hence each person's opinions on the subject would be simply the reflex of his individual experience and more or less careful habit of observation. Personally I should be at a loss to say whether I have found the plane of veins generally more irregular along the dip or along the strike, but I can see a very good reason why irregularities on the strike should appear more prominently to one going through a mine or examining its maps than those on the dip, in that the main drifts or levels are always driven along the strike. In so far I agree with Mr. Church, but while not subscribing to Mr. Williams' statement "that faulting means a movement in an up-and-down direction more than in any other," I entirely disagree with Mr. Church's views, or rather doubts, as to the necessary connection of veins with faulting. In my own experience I have not yet seen a vein which was not originally a rock fracture on which there had been some displacement—in other words, a fault plane. The movement of displacement may have been very slight, and in many cases the evidence of movement that one first looks for, viz., striated surfaces, may be wanting, for all rock materials do not preserve this evidence. But there are many other evidences of fault movement, the principal of which are broken off and dragged-in fragments of the wall rock and a sheeting of the country rock parallel to the principal plane of fracture. In my idea a certain slight movement of the walls upon each other is necessary to fully break the cohesion between them and to establish such water channels as would permit of comparative freedom of circulation, and hence tend to concentrate the percolating solutions from the surrounding rocks, and thereby induce a deposition of their contents in and along its walls, which is the ordinary process of ore deposition.

I am surprised to hear a man of Mr. Church's knowledge and experience say that "no one has given the least proof that the slow movement, which rocks are supposed to have, could produce a polish." Nature so abounds in such proofs that geological experiments, which involve costly apparatus, have not, so far as I know, been applied to demonstrating so self-evident a fact. The striated surfaces produced by the slow movement of the great ice sheet may be seen over half our continent. Whether such surfaces take a polish depends primarily on the character of the rock; this and other conditions influence the preservation of the polish, but instances in nature are sufficiently abundant to show that under great pressure a slow and regular movement may produce an even finer polish than Mr. Church's bootblack. The polish is, however, only an incidental, not an essential, part of the phenomenon—it is the striation or scratching which furnishes the evidence of movement and pressure, for pressure is also necessary, and it must be borne in mind that phenomena of this kind which we now observe in mines were originally produced at great depths below the surface many times that at which they are now found, hence under pressure greater than it is practical to reproduce experimentally. If some of our 14-story buildings were to be shifted an inch or two on their foundations by the undulatory movement of an earthquake, some striations would doubtless be found on the foundation rocks along the plane of movement. Under the pressure of a weight nearly a hundred-fold greater than that of such buildings, it is easy to conceive that a movement, however slight, within the rock masses where veins were formed would produce molecular deformation and striated surfaces. The instances in nature are so abundant where there is direct evidence that these phenomena are the result of movement and pressure, that it is perfectly justifiable to reverse the reasoning and consider them a proof of movement and pressure, even when it may not be possible to find the direct evidence of movement in discrepancy of structure lines, etc., for there is no other cause known to geological science which will produce them. If, as he seems to imply, Mr. Church is cognizant of another demonstrable cause, he should make it known.

The weak points in the reasoning both of Mr. Williams and Mr. Church appear to be the result of an insufficient knowledge, either theoretical or practical, of what might be called the mechanics of faulting.

While it is true that instances are found of repeated movement along the same general fault plane, they are not so frequent as to justify their being qualified as recurrent, still less of being compared to methods of artificial polishing of stones. Repeated movement on the same plane is much less frequent than has been generally supposed, for many of the effects which have been taken as evidences of it may be explained as the result of a torsional strain, as first experimentally demonstrated by Daubrée (*Géologie Experimental*, Dunod, Paris, 1879, pp. 279-384). For instance, cross-courses which even appear to throw a vein, may have been produced contemporaneously with the main fracture, as the result of a torsional pressure. Among the great faults or dislocations, those in stratified rocks, whose planes cross the strata nearly at right angles, are the most readily observed, and probably the most common. The movement on such planes can only be measured by the discrepancy between given bedding planes on either side, which gives the amount of what Mr. Williams calls up-and-down movement, when the fault plane is nearly vertical. But this does not show the total movement, for there may also have been a lateral displacement, for whose movement we have no datum points like the bedding planes. That a certain amount of lateral movement is generally associated with the vertical movement is attested by the oblique direction of the striations or slickensided surfaces, and it was upon this lateral movement that those who conceived large open spaces along a vein a necessary condition of ore deposition, largely depended.

Fault planes do not, however, always run across the bedding planes, but may be nearly or quite parallel with them, and are then often called thrust planes. Such faults are less easily detected than the former class, and hence, as accurate and detailed examinations become more frequent, their proportion will probably increase. Faults are found of every degree of magnitude, from the great faults which form important orographic features and have displacements of thousands of feet, down to those which are so small that they can only be detected by the microscope. Whether slickensided or polished surfaces can be found upon their walls depends, as I have said, upon the nature of the material of these walls, whether it is of a character to receive a polish in the first place, and whether conditions are such as to preserve it in the second. If Mr. Church has never seen such surfaces on bedding planes, it is not because they do not occur in nature, nor are they confined, as he seems to think, to steeply upturned beds. I will cite a few instances.

The great porphyrite mass, or laccolite, of Gothic Mountain, in Colorado, which rests upon nearly horizontal black shales of the Cretaceous, has been moved on its base (how much there is no means of determining), and if one cares to climb its steep slopes about 700 ft. above the town of Gothic to the contact plane between shales and porphyry he will find the under surfaces of the latter, where it has been exposed by the undermining of the shales, striated by this movement. Again the gold veins which cross the stratification of these same shales near Breckenridge, Colo., have been faulted by a movement subsequent to the formation of the veins along the stratification planes of the shales. But thrust planes do not necessarily follow stratification lines, even where their divergence of angle is so slight as to be hardly perceptible to the eye, as may be observed in Smuggler Hill, at Aspen, Colo., where a fault of this nature along the steeply upturned beds has changed the relations of the silurian and carboniferous strata so as to make their apparent thickness vary very greatly in comparatively short distances. The coherence of rock masses is not necessarily very much less along bedding planes (which are merely indications of changes in the conditions of sedimentation) than along any other plane, unless they mark such very decided and abrupt changes in character of material that the pressure resulting from a great weight of sediments accumulated above would be likely to produce such a molecular deformation along them as is indicated by slaty cleavage.

Faults of great displacement or the great structural faults have been, as far as my experience teaches, but rarely the loci of mineral deposits. It is the faults of minor displacement, and more especially those forming zones or systems of fracture (what Daubrée calls *causures conjuguées*) that have more generally become mineral veins. But these differ from the former in degree rather than in kind. They present the same or similar phenomena as evidences of movement and pressure, but on a smaller scale. In picturing to one's self the working of the causes which have produced these phenomena, however, it is necessary to bear in mind that pressure is as important, if not a more important function than movement. It is the neglect of the importance of this function that would seem to have been the cause of many of the misconceptions of earlier writers on vein phenomena, especially that which led them to consider that the vein matter was the filling of a considerable open fissure into which fragments might fall freely from the walls as they might be dropped down a well, and with two distinct and well defined walls beyond which in either direction no vein matter would naturally be looked for.

A fissure continuously open for any considerable distance is inconceivable under the conditions of pressure which must have prevailed at the great depths at which most veins have been formed.

A fault fissure is rather to be regarded as a zone of crushed material along a fracture plane, produced by movement and pressure combined, whose width may vary, from the mere knife edge of small fissures of imperceptible displacement, to the 50 or 100 ft. of crushed material often found along the faults of great displacement. The original fractures, which determine the direction and location of these zones, were probably suddenly produced by some violent force in the nature of an earthquake shock or a volcanic explosion. But such fractures would not necessarily result in a visible fissure without a subsequent compressive strain which would produce a differential movement along the broken parts. They would at first be merely latent or potential cracks along which, although the cohesion of the original rock mass had been broken, some movement, however slight, was necessary for the production of an actual fissure; as we can conceive a mass of brittle material like glass, firmly inclosed by strong bands, to be struck a blow of sufficient violence to shatter it, if free, and yet to show few if any visible cracks until, after the removal of the bands, a differential movement had been produced among the parts.

Such fractures are not necessarily plane surfaces. The fractures produced by Daubrée in a plate of glass, by subjecting it to a torsional strain, though fairly straight and generally parallel to each other on the strike, were curved on the dip or across the plate. In nature they are generally found to be irregularly curved in both strike and dip, though they are apt to be drawn as comparatively straight, because it is impracticable, or not worth while, to show all their minor irregularities. Such irregularities are made use of in treatises on vein formation to account for the supposed open spaces in which the ore is deposited. The graphic illustration of this explanation is generally a sinuous line assumed to represent the intersection of the original fracture with a horizontal surface. If we divide a sheet of paper or a board along such a sinuous or curved line, and move one part laterally upon the other, projecting points of either side will alone be left in contact, and between such contacts will be open spaces of varying size and form. But in this case the board or sheet of paper is unconfined, and the lateral movement has produced an actual prying apart of the two portions, so that after the movement the board is wider than it was before.

In rock fractures at great depth there is not this freedom of movement, and the pressure of gravity would be opposed to such prying open. In my examinations of veins I have always looked with particular care for places that bore evidence of having once been open cavities, but have never found any that I felt sure had actually been open in the way the theoretical illustration supposes, for the reason that the surprising capabilities of the action of replacement, as actually demonstrated, render it difficult to distinguish what is actual filling of open spaces from what is simply a metasomatic change of material already in the fissure.

We can only be sure that vein materials are such a filling when, by a

banded or concentric structure similar to that seen in vugs or in the successive layers deposited around fragments of country-rock, as in the Bull-Domingo and other well known mines, they show evidences of having been deposited by freely moving solutions. Even in the comparatively rare instances of comb structure, most of which I know only by the description of others, I am inclined to think that some of the layers of mineral may be the replacement of squeezed and altered bands of country-rock material which, by the mechanical alteration due to pressure, combined with a decomposing action of percolating waters, had been rendered peculiarly susceptible to chemical attack by mineral-bearing solutions. My own observations have led me to doubt if pressure will admit, as a rule, of any openings being left within a fault fissure other than relatively small irregular spaces between bands and fragments of dragged-in material.

I have already given* somewhat at length my views as to the most rational method of regarding ore deposits, which include a description of the various effects of faulting as seen in fissure veins and will not, therefore, discuss them again here. I will only repeat that, in order to avoid the misconceptions which some engineers seem to entertain in regard to the causes of vein phenomena, it is first important to bear in mind that the fault phenomena are the result of movement and pressure combined, and that what appears to be the filling of vein fissures is, in a measure, the more or less complete replacement of material already there.

Now, slaty cleavage has long been recognized to be the result of intense pressure in a comparatively plastic rock material, combined probably with a certain amount of intermolecular movement. As geological studies in the internal structure of rock masses become more thorough, more of the larger features of schistosity in originally harder rocks are found to result from the same cause; what were once supposed to be the bedding planes of large areas of metamorphic rocks are now found to be the result of pressure, and of certain resulting changes in internal structure and mineralogical composition, and to be entirely independent of original bedding.

The sheeting of rock material along a fault fissure is a development of the same process, localized along a given zone, and being generally in less plastic rocks, not as a rule so regular, and the movement gives it a greater extent parallel to the fracture than laterally. Nevertheless, in faults of great displacements a sort of sheeting of the country-rock is often developed for considerable distances on either side of the main fissure by a series of parallel fractures, on which the movement of displacement is not infrequently in part distributed, producing what are known as step faults. These secondary fractures are probably produced in larger measure by movement than by shock, for when the displacement is slight they are less frequent. Even if there be no perceptible displacement, however, provided the pressure be sufficient, the phenomena of striation and crushing may be produced, as Daubrée has shown experimentally (Géol. Expér., p. 376).

Although under suitable conditions of pressure the most rigid rock masses may develop a certain amount of plasticity, the effects of movement and pressure will necessarily vary very much with the relatively rigid or plastic nature of the rock material and with the amount of displacement to which they have been subjected. The crushed material may under favorable conditions be drawn out into long attenuated sheet-like masses, or it may only be irregularly broken and squeezed. In fault-fissures, which have become mineral veins, it is much more difficult to recognize the original character of the material in the fissure than in other fault-fissures, because they are those that for some reason or other have become favorite channels for the circulation of chemically acting solutions, and this material is therefore more widely changed from its original condition. Hence it often requires an eye specially trained in the observation of structural phenomena to correctly interpret the observed conditions. The features of certain veins, which Mr. Church cites in disproof of the fault origin of the fissures, are to the structural geologist so many direct proofs of such origin. It seems singular that, in the case where he makes the apt comparison of the quartz slabs to figs pressed in a box, it had not occurred to him to call in pressure to account for the phenomenon. Whether the material was quartz at the time the pressure was exerted seems doubtful. I have often seen quartz which had filled a narrow seam, either by infiltration or replacement, and had so perfectly preserved the striations on the clay walls of the fissure as to appear itself to have been striated; yet there was no doubt that the quartz had been deposited subsequently to the movement which produced the fissure. In one such case the mine foreman pointed to the superior quality and definition of this quartz wall as a reason why he had never cross-cut on that side of his vein. It was a fault-fissure, in a somewhat altered eruptive rock of relatively plastic nature, which was so finely "sheeted" that while there were abundant walls, and clay selvages of exceptional definition and regularity, it was difficult to tell where mineralization ceased laterally, and the foreman not long after found his richest body on the other side of the wall he had so long regarded as the best defined limit of his vein.

Faults, like flexures and other deformations of the original rock masses which make up the earth's crust, are the result of dynamic movements within that crust. Such movements are accompaniments of orographic disturbances at different periods in the earth's history, which have been most frequent in mountainous regions; hence the older the rocks in which veins occur, the greater the number of dynamic disturbances they are liable to have been subjected to. Each disturbance by no means necessarily produces new fractures or faults; it may result in further compression, or in a deformation in the nature of flexure. Further compression might produce some differential movement in the already broken parts of a vein, and this movement would be more readily effected on easily lubricated surfaces like clay selvages, or it might simply produce, what I have called for want of better term ready at hand, intermolecular movement; that is a slight relative displacement of small particles within a given mass without a movement of the mass itself in relation to adjoining masses.

An instance in point, which occurs to me, is the anthracite bed near Crested Butte, which lies nearly horizontally and is but slightly faulted, and yet the coal breaks readily into small irregular fragments, all of whose

surfaces, many of which are curved, bear evidence of compression in striation and polish. The bed as a whole has evidently been intensely compressed, and yet only intermolecularly deformed.

As an instance of apparent flexure, I have in mind a great silver vein (the Bluebird, of Butte, Mont.) in granite, which has been so deformed that its line of dip has in certain parts of its course an S curve. When a new lower level (100 ft. below the previous one) was run to strike it at the commencement of this curve, it was not found on its normal dip, but by cross-cutting it was recovered 240 ft. away in the hanging wall, going down at its normal angle. At first it was supposed to have been faulted, but in tracing it back above the cross cut it was found to run up 80 ft. above the level, then descend gradually toward the foot wall, nearly down to the level of the drift, and curve up again in normal position a few feet above where it had been looked for. In all this distance the vein matter was continuous, but drawn out and attenuated, as coal seams are often found to be in abrupt flexures.

The subject of fault phenomena, which interests me extremely, can hardly be adequately discussed within the limits of a newspaper article; but I fear I have already unduly trespassed on your time and space, and will therefore close by saying that on geological grounds, some of which I have touched upon above, I think we are hardly justified in assuming, *a priori*, that a vein is likely to be more regular on its dip than on its strike. U. S. GEOLOGICAL SURVEY, WASHINGTON, D. C.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

Department of the Interior.

PRIVATE ENTRY—NON-MINERAL AFFIDAVIT—PAYMENT.

1. An application to make private entry should not be accepted, and held, with time allowed for the applicant to examine the land and file the requisite non-mineral affidavit, but in the absence of any intervening adverse claim such action does not defeat the right of entry.

2. The non-mineral affidavit may be made by any person well knowing of the facts to be sworn to other than the applicant.

3. Money deposited in a bank or other institution used as a United States depository is a sufficient tender of money in payment for government lands.—*Mendenhall v. Howell et al.* [Decided May 4th, 1892.]

COAL LAND—ALIEN SETTLEMENT ON—N. PAC. R. R. GRANT—WITHDRAWAL.
1. The settlement of an alien on coal land affords no claim thereto under the coal land acts of July 1, 1864, and March 3, 1865, as against the withdrawal of such land on the general route under the grant to the Northern Pacific Railroad.

2. Lands withdrawn for the benefit of the above grant are not subject to settlement or purchase under the coal land law.

3. The word "mineral" when it occurs in Section 3 of the grant to the railroad company shall not be held to include iron or coal. Commissioners' decision reversed.—*Northern Pacific R. R. Co. v. Collins.* [Decided May 7, 1892.]

HOMESTEAD ENTRY—MINERAL LAND—RESIDENCE.

The sufficiency of a residence under the homestead entry law is not affected by the fact that the house of the entry man was erected upon a portion of the entered land that was subsequently adjudged to be mineral in its character, and was excluded from the homestead entry. Commissioner's decision affirmed.—*Sanderson v. Taylor.* [Decided May 7th, 1892.]

WORLD'S PRODUCTION OF BASIC STEEL IN 1891.

The total make of steel and ingot iron from phosphoric pig iron during the year 1891 amounts to 2,880,535 tons, being an increase over the make for the previous twelve months of 277,452 tons, and making the total production of basic steel to this date 16,328,500 tons. Of the above mentioned make of 2,880,535 tons, there was made by the basic Bessemer process 2,375,779 tons, and by the basic open-hearth process 504,756 tons. Of the basic Bessemer make 1,700,300 tons, and of the basic open-hearth 346,358 tons contained under 0.17% carbon.

The makes of the various countries for years 1890 and 1891 were as follows:

	Total.	With under 17% C.	Total.	With under 17% C.
England.....	436,231	360,318	503,409	351,404
Germany and Luxemburg.....	1,779,779	1,314,781	1,493,157	1,138,241
Austria.....	221,212	95,907	202,315	114,857
France.....	255,401	173,880	240,638	175,550
Belgium, Russia and the United States.....	187,882	111,172	163,573	111,963
	2,880,535	2,046,558	2,603,083	1,892,015

With this 2,880,535 tons of basic steel, there was produced some 700,000 tons of slag, containing about 36% of phosphate of lime, nearly the whole of which was used as a fertilizer.

PATENTS GRANTED BY THE UNITED STATES PATENT OFFICE.

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

TUESDAY, MAY 17TH, 1892.

474,807.	Continuous Kiln.	Max A. Th. Boehncke, Centinela, Cal.
474,829.	Process of Concentrating Ores.	Charles B. Hebron, Denver, Colo., Assignor of five-sevenths to Carrie J. Everson, same place; Mamie W. Hutchinson, Topeka, Kan., and Charles T. Brown, Chicago, Ill.
474,838.	Carburetor.	John W. Lambert, Ohio City, O.
474,885.	Stone Lifter.	Emile T. Viet, Charleston, S. C.
474,922.	Brick Kiln.	Stephen J. Plant, Momenca, Assignor of one-half to the Tiffany Pressed Brick Company, Chicago, Ill.
475,182.	475,183, 475,184, 475,185, 475,186, 475,187, 475,188, 475,189, 475,192, 475,194, 475,195.	Method of Electrical Metal Working.
		George D. Burton, Boston, Mass., Assignor to the Electrical Forging Company, of Maine.
475,203.	Fuel Feeding Device.	George H. Colton, Hiram, O.
475,214.	Apparatus for Cutting Off Angle Iron.	Martin Gilgenberg, Cologne, Germany.
475,232.	Converting System for Electric Metal Heating.	George D. Burton, Boston, Mass., and Arthur H. Eddy, Hartford, and George T. Briggs, Windsor, Conn., Assignors to the Electrical Forging Company, of Maine.
475,237.	Brick Kiln.	William Crumlic, Decatur, Ill., Assignor of one-half to J. G. Shea, same place.
475,251.	Hydraulic Air Compressor.	George H. Sherman, Detroit, Mich., Assignor of one-half to Paul C. Daultz, same place.
475,267.	Brick Kiln.	Anton Dimpf, Munich, Germany, Assignor to Amedee Poletti, West Hoboken, N. J., and Jacob Kohn, New York, N. Y.
475,284.	Crushing Mill.	Charles E. Philes, Stockton, Cal., Assignor of one-half to James Jerome Smith, same place.

* "Structural Relations of Ore Deposits" (Trans. Amer. Inst. Mg. Engrs., vol. XVI., pp. 815-839).

PERSONALS.

Mr. Irving M. Scott, president of the Union Iron Works, of San Francisco, Cal., is in this city.

Mr. Charles Kaufman, mining engineer of St. Louis, has been examining properties in Sierra County, New Mexico.

Mr. W. de L. Benedict, mining engineer, has returned from California, where he has been on professional business, and has opened an office at 18 Broadway.

Mr. James Simpson, a heavy stockholder and one of the directors of the Sheridan Consolidated Gold Mining Company, of Telluride, Colo., will visit the company's property shortly.

Mr. George W. Goetz, mining engineer, of Milwaukee, Wis., has placed an experimental plant in his laboratory to demonstrate the Siemens electrolytic copper process, for which he is the American representative.

Mr. A. J. Howe, of Shanghai, China, president of the Belmont Consolidated Gold Mining Company, of Telluride, Colo., who has spent several weeks at the mines, will leave this city for London, whence he will return to Shanghai.

Mr. W. B. Kunhardt, Mining Engineer of this city, has left, via Canada, for Nevada, where he will assume charge, during the summer, of the properties of the Osceola Gravel Mining Company, and not of the affairs of the Osceola Copper Mining Company, Michigan, as erroneously stated in our issue of the 14th inst.

A prize has been offered by an alumnus of the School of Mines of Columbia College of \$100 for the best essay on transmission of power by electricity that may be presented by a graduate of the school. The essays must be sent to Prof. W. P. Trowbridge on or before Nov. 1, 1892. President Seth Low will appoint a committee to examine the essays and award the prize. The successful essay will be published in the "School of Mines Quarterly."

Wm. Allen Smith, mining engineer, Lecturer in Mining at the Columbia College School of Mines, will take charge of the Summer School of Practical Mining of that institution, which assembles at Houghton, Mich., June 4th. The school will work at the Atlantic mine for about three weeks. Prof. J. F. Kemp, of the School of Mines, will then give the students field work in geology, after which the class will visit other mines. Mr. T. T. P. Luquer, E. M., will act as assistant at the Summer School.

Mr. Monroe T. Schreffler, District Superintendent of the Locust Gap division of the Philadelphia & Reading Coal and Iron Company, has been appointed division superintendent of the company's collieries, to have charge of the entire field between Shenandoah and Shamokin, Pa. He takes the place of ex-Division Superintendent John J. Williams, of Shenandoah, who recently resigned to accept the position of general superintendent of the Union Coal Company's collieries at Shamokin. Mr. Phillip Brecker, inside foreman at the Locust Gap colliery, succeeds to Mr. Schreffler's former position of division superintendent of the Gap district.

Prof. Jacob Schurman, of Cornell University, was elected president of that institution on the 18th inst., filling the vacancy caused by the resignation of President White. Prof. Schurman was born in Prince Edward Island, and is about 40 years old. He took his first degree in Acadia College, Nova Scotia. In 1875 he won the Gilchrist scholarship in the university, and afterward studied in London, Paris, Edinburgh, Heidelberg, Berlin and Gottingen. Returning from Europe in 1880 he became professor of literature in Acadia College, and later was a professor in Dalhousie College. For the last eight years he has occupied the chair of Christian ethics and mental philosophy at Cornell, being dean of the Susan E. Linn School of Philosophy. He is a remarkably brilliant and able man, and has long been regarded as a future president of Cornell. Although his relations to the school of philosophy have not yet been defined, it is thought that he will continue the dean of the school and perform the duties of that office in addition to those of president. His selection gives great satisfaction to all, as he is without doubt the most popular professor that Cornell has had.

SOCETIES.

At the Royal Society conversazione held at Burlington House, London, on May 4th the most interesting novelties exhibited were a new pyrometer invented by M. Le Chatelier and an apparatus invented by Prof. F. Clowes for detecting the presence and measuring the amount of small admixtures of fire-damp in the atmosphere of mines, which has been described in the Engineering and Mining Journal. In the new pyrometer the light emitted by the body whose heat is to be measured is compared with the light of a standard lamp. The light from both passes through a red glass screen, through two apertures side by side, and through a telescope to the eye. The aperture through which the light of the hot body passes can be expanded or contracted until the light appears equal in luminosity to that of the standard lamp. A scale connected with the expanding shutters indi-

icates the temperature of the hot body; it is graduated empirically, preferably by means of a platinum-rhodium pyrometer.

The annual convention of the American Society of Civil Engineers will be held at the Hygeia Hotel, Old Point Comfort, beginning on Wednesday, June 8th, at 10:30 o'clock. The hotel rate has been fixed at \$3.50 per day. The uniform rate for the round trip of one and one-third times one regular passenger fare to the place of meeting has been granted from all points covered by the New York and Boston Lines Passenger Committee, the Trunk Line Association, the Southern Passenger Association, and the Central Traffic Association. If a sufficient number signify their intention of going over its lines, a special train will be furnished by the Pennsylvania R. R. Company over the Cape Charles route on Tuesday, June 7th, arriving at Old Point at 19:10 o'clock. The boats can be taken either at Desbrosses or Cortlandt Streets, New York, at 8:45 o'clock. A dining car will be attached for dinner. The total cost for the round trip from New York, including car service and dinners, will be about \$17 for each person. Members can take this train at Philadelphia, Wilmington, and possibly at other points if special request be made in time. Members coming from the West are requested to concentrate at Cincinnati in time for the 18:10 o'clock train on Monday, June 6th, which leaves for the East over the Chesapeake & Ohio Road, and will reach Old Point at 18:35 o'clock the next evening. The officers of this road promise special arrangements on this train, and should the number be large enough to warrant it, a special train will be run. It is hoped that arrangements may be made on the return trip to stop off at Charleston, W. Va., long enough to examine the interesting work done by the U. S. Engineers, in improving the navigation of the Kanawha River near that point.

INDUSTRIAL NOTES.

The Reading (Pa.) Iron Company will begin the erection of a new tube mill in a short time.

The Tennessee Coal, Iron and Railroad Company will erect two large model basic steel plants in the Birmingham district.

The transportation rates on phosphate from all Florida ports to England have been reduced nearly 50% during the past year. The present rate is 16 shillings.

The Joseph Dixon Crucible Company, of New York, has issued an illustrated catalogue descriptive of its various products. The book is interesting and instructive.

The St. Louis Steel Foundry Works were destroyed by fire on the 17th inst. The loss is estimated at \$75,000, this amount being partly covered by insurance.

The West Superior Iron and Steel Company, West Superior, Wis., is now turning out over 100 tons of Bessemer plates daily for the "Whaleback" shipyard at that place.

The Lunkenheimer Brass Manufacturing Company, of Cincinnati, O., has recently issued a new catalogue illustrating and describing its extensive line of valves, pipe fittings, improved oilers, etc.

The Trenton Machine Tool Works, of Philadelphia, has issued its descriptive catalogue for 1892, a compilation of matter occupying 140 pages devoted to descriptions of lathes, drills, grinders and other machine tools.

A company has been formed, it is said, at Spokane, Wash., which will build an electric railroad line, 28 miles in length, connecting Spokane and Coeur d'Alene City. Engineers are in the field making the preliminary survey.

A charter has been granted to the Bessemer Iron, Mining and Manufacturing Company, at Galveston, Tex. The capital is \$1,000,000. R. W. Campbell, of Galveston, and others are the incorporators. The company will erect furnaces and rolling-mills.

The Seybold Machine Company, of Cincinnati, has purchased from Carnegie, Phipps & Co., the Columbia Bridge Works, located at Dayton, O., and will at once improve the property, equip it with new and modern machinery, and permanently locate at that place.

The Brown, Bonnell Iron Company, of Youngstown, O., have been granted a charter of incorporation, with a capital stock of \$1,200,000, for the purpose of engaging in the manufacture of iron, steel, and articles composed of such material, mining coal, iron ore, etc. The incorporators are Henry Tod, Chas. C. Baldwin, Jno. I. Williams, Robert McCurdy and Cecil D. Hine.

Fraser & Chalmers, Limited, held their annual meeting in London on May 6th. It is stated by the chairman that owing to the general depression of trade during last year the company had only a few orders and had to take them at a smaller margin of profit than the previous year. In the latter half of the year, however, there was some improvement. It is determined to erect a new boiler shop and foundry in Chicago on the ground already purchased. The contract for the English works has been made, and it is expected that it will be completed before

the end of the year. Some small work is being done in the shop already built and fitted up. A dividend of 5% virtually earned in 1890, however, was paid during the year. It is estimated that in spite of the dullness of trade 5% was earned in 1891. The intention was announced of levying two assessments of 5s. each to raise funds for the completion of works, which it is estimated will cost £85,000.

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.

2,673. A machine to manufacture conveyer flights. Pennsylvania.

2,674. A second-hand steam feed for an 8-in. saw mill. Virginia.

2,675. An engine, a boiler and a drier for drying soft phosphate. Florida.

2,676. Prices of machinery for manufacturing sash, doors, spokes, buckets, etc. Mississippi.

2,677. A general outfit for distilling, including boiler, pumps, pipes, etc. Arkansas.

2,678. Four hundred and fifty yards 12 to 16-lb. T rails for tramway; also two clay cars to take clay from bank to mill. Florida.

2,679. Logging, box and flat cars, and perhaps a small locomotive for wooden rail; all 3-foot gauge. Virginia.

2,680. A light dummy engine for a street railway. Virginia.

2,681. Iron saw tables and saws; machinery for cutting and shaping soapstone for stationary laundry tubs; channelers, gadders, or rock drills for blocking out stone; gang saws; an engine from 30 to 40 H. P., and a boiler 40 to 50 H. P. Virginia.

2,682. A pair of bending rolls not less than 6 ft. 6 in. between the housing; new or second-hand. Tennessee.

2,683. A bending machine for bending ox bows; also a bolting saw for bolting small timber. Mississippi.

2,684. Eighty to one hundred tons second-hand steel rail equivalent to 60 lbs. steel when new. Connecticut.

2,685. Machinery to make soft coal into briquettes or eggettes. Texas.

GENERAL MINING NEWS.

ALABAMA.

Talladega County.

The Talladega Gold Mining Company.—This company is negotiating stock to operate its mines, which lie about six miles south of Talladega. They claim ore worth about \$30 per ton. The stock has been about one-fourth taken.

ARIZONA.

Mohave County.

Blake.—The shaft is now down to a depth of about 20 ft., and the ore coming from the bottom shows up well in free gold. The ledge is fully 4 ft. in width and gives every evidence of permanency. Wherever opened the ledge shows the same grade of ore averaging about \$13 in gold. The owners, Messrs. Russell, Ziener, Flannigan and Peters, have named the ledge the Blake. They will sink the shaft 50 ft. as soon as possible and then run off drifts each way from the bottom. One of the ledges in the vicinity shows a vein fully 20 ft. in width, but so far no work has been done on it. Should the ledges prove valuable with depth, reduction works can be put right at the mines, as an abundance of water can be obtained at a slight depth from the surface. The railroad runs within a mile of the properties, insuring cheap fuel. Taking everything into consideration, \$10 gold rock should be made to pay.

Yavapai County.

Hillside, Prescott.—This group of mines has been sold to Mr. H. H. Warner, of Rochester, N. Y., for \$500,000.

Yuma County.

La Paz Mining Company.—This company, after erecting a mill near Ehrenberg and spending about \$20,000, has shut down.

CALIFORNIA.

Butte County.

Banner.—Colonel Frank McLaughlin has leased this mine for a term of two years, with the privilege of buying it during that time. That mine yielded in pioneer days about \$700,000 from surface diggings and has never been prospected to any depth. The Colonel now has a force of men, with L. H. Ayer as superintendent, cleaning out the shafts, and is preparing to sink several hundred feet, or as deep as is deemed necessary.

(From our Special Correspondent.)

A mining disaster occurred on the 12th inst. at Cherokee, 12 miles from Oroville. J. Powers, Jr., J. C. Hall, and L. P. Hall were mining in an old tunnel when it caved, killing all three of them. The men have been very successful lately, taking out in one spot \$1,600.

Mono County.

Bulwer Consolidated Mining Company.—South drift from No. 6 upraise was extended 12 ft. The seepage water in No. 6 upraise has made it necessary to do considerable timbering, to prevent the ground from caving, which work is now being done. South drift from No. 5 upraise was extended 18 ft. East cross-cut from main north drift, 100 level, was extended 7 ft. The ground was very hard, and we now have passed through the foot-wall. The face is now in vein matter of a favorable character.

Mono Mining Company.—We are stoping out on north and south from No. 1 winze below 700 level; the ore stopes are looking about the same as last reported. The mill has been kept running steadily. Average battery samples \$39.62; tailings, \$7.27.

Nevada County.

Maryland Gold Mining Company.—The annual meeting of the stockholders of this company was held in Grass Valley recently. Directors for the ensuing year were elected as follows: Wm. W. Young, of San Francisco; S. P. Dorsey, L. V. Dorsey, C. H. Mitchell and R. Shoemaker, of Grass Valley. S. P. Dorsey was elected president and superintendent, and L. V. Dorsey secretary and treasurer. There is a good prospect that an arrangement will soon be made by which Maryland ground will be worked through the Idaho shaft. The Idaho and Maryland claims adjoin, the pay-shoot of the former extending into the latter.

San Bernardino County.

Menifee.—This mine, at San Jacinto, is reported sold for \$20,000, and the new owners announce their intention to thoroughly develop the property.

San Diego County.

(From our Special Correspondent.)

The Stonewall Mine, Julian.—Private advices report the sale of this property to a syndicate of Chicago capitalists, it is said, for something over \$2,000,000. This amount was refused by the late Governor Waterman. The mine has been yielding generously during the last year and the profits have been large. The sale includes the Cuyamaca grant of 21,000 acres of land, sawmills and other improvements, the money to be paid when the title passes. The mine has been in charge, for some years past, of Walter Waterman, the ex-governor's eldest son, and the sale when completed will enable the heirs to make partition of the Waterman estate.

Sierra County.

(From our Special Correspondent.)

Bald Mountain Extension Drift Mining Company, Downieville.—This company has declared a dividend of 5 cts. per share.

COLORADO.

Action has been begun in the United States Court at Denver by the American Smelting Company against the Denver & Rio Grande, the Burlington & Missouri River, and the Chicago, Burlington & Quincy Railroad companies to recover damages for the alleged violation of the Inter-State Commerce law. The plaintiffs allege that the defendants refused to transport bullion as freight at a fair and just rate from the mines at Leadville.

Colorado Grand Canyon Mining and Improvement Company.—At the annual meeting of this company the following officers were elected: President, Franklin Morey; vice-president, C. L. Lightburn; secretary, Henry B. Illius; treasurer, Alexander H. Garfield. The Board of Directors will be Alexander H. Garfield, C. L. Lightburn, Franklin Morey, L. H. Flanders and Messrs. Pratt and Snath, of Hartford, Conn. The company is preparing to do considerable work this season on its placers and mines in addition to what has already been done. It reports considerable ore already taken out and a large amount in sight running from 50 to 60% copper and 20 to 60 oz. silver per ton. Arrangements will soon be made for shipping some of the ore now taken out.

Boulder County.

Alpine, Sugar Loaf.—This mine has been sold to a Denver syndicate. Mr. H. James, of Salina, will be placed in charge.

Buckeye, Magnolia.—A strike has been made at Wagner's ranch in the Buckeye lode, just above Magnolia, by J. A. Teagarden, George Lytle and Messrs. Morris and Gardner. It is stated a large body of good ore has been exposed.

Puzzler, Ward.—A strike has been made in this mine in the second tunnel level. A winze is being sunk on the chute which has opened out to eight inches of telluride ores well sprinkled with free gold. This is the first tellurium ever found in Ward mining district. The ore is said to run 82 oz. gold and 337 oz. silver per ton.

White Crow, Sunshine.—Additional news has been received of the strike at this property. In the 280-ft. level a 20-ft. winze was sunk. The rich streak has from this winze been developed 715 ft.; it is from 8 to 24 ins. wide and runs to the surface, a distance of 300 ft. The shaft is being sunk below the 500-ft. level.

Chaffee County.

(From our Special Correspondent.)

The Hill Top district, Chaffee County, is still booming, and locations are daily being made by prominent Aspen and Leadville mining men. There have been 20 locations made within the past 24 hours. The new diamond drill for the Aspen outfit has come. It seems that when the camp was first located, some 10 years ago, the country was found covered by masses of white porphyry, which, on erosion, left about 2 ft. of broken-up matter lying on a stratum of blue limestone. This ore then impregnated the upper plane of the limestone, and while of a grade that permitted of profitable shipments, it is said, did not carry a large amount of silver. This being considered the upper ore-bearing strata, not much attention was paid to it, and it was not until some energetic Aspen men came into the camp that any attempt to cut through this was made. When this was done it was found that the regular Aspen contact could and would be found there, and they are now finding in a territory 4 miles square the blue limestone at a depth of less than 8 ft. from the surface, the maximum depth of the former stratum not being above 25 ft. And under this ore, the minimum assays from which, it is claimed, are about 13 oz. of silver and 60 per cent. of lead to the ton. ***

Bristol, Winfield.—A cross-lead has just been struck in this property, carrying some very fine galena ore running well in silver. The outcrop of the main Bristol vein is about 15 ft. in thickness, and the junction of this big vein and the lately discovered cross-lead is likely to prove valuable. ***

Swiss Boy, Winfield.—All work has been of late concentrated upon the No. 3 tunnel, which will cut the No. 2 ore chute within the next 60 ft. of driving, the tunnel having already attained a total length of 700 ft. ***

Clear Creek County.

Stanley Mining Company, Idaho Springs.—This company owns eight lodes in all, two of which have been extensively developed, as follows: Golden Link, Stanley, Cregar, Powell, King, Folwell, York and Batton. The drifting and sinking which has already been done on the Stanley and Golden Link lodes aggregate over 2,500 ft. Every level and shaft is said to be in good ore. The smelting ore runs from 1 to nearly 4 ft. in width and is said to carry about \$80 in gold and silver to the ton. The officers of the company are as follows: James T. King, president; John York, vice-president; Samuel H. Cregar, secretary and treasurer; Charles A. Gehrman, managing director.

Dolores County.

Black Hawk, Rico.—The accumulations of ore on the dump and in the ore houses are being moved. All the ore is being shipped to Durango.

Uncle Ned, Rico.—The tunnel on this property has reached the vein, and it shows up 4 ft. of fair grade ore. The ore is not high grade, but it is said to be good smelting ore. It mills 15 oz. in silver and high in lead. As soon as the mine is put in shape shipments of ore will commence.

El Paso County.

Legal Tender & Labelle, Cripple Creek.—Messrs. D. H. Moffat and L. D. Roubush have closed a deal for the purchase of the Legal Tender & Labelle lodes and 80 acres of placer on Wilson Creek, the consideration being \$100,000 cash. All of these properties are close to the Victor, purchased by Moffat and E. C. Smith a few weeks ago for \$65,000. The Victor shows a 3½-ft. vein of rich ore at a depth of 50 ft., which runs about 8 oz. of gold to the ton. The Victor will be shipping soon.

Garfield County.

(From our Special Correspondent.)

Oasis Mining Company, Glenwood, has just been incorporated to work the Bonanza group, consisting of four contiguous claims. The tunnel has attained a total length of 127 ft., and has caught the contact. Officers and directors not yet elected. Capital stock 100,000 shares, par value of each \$1. ***

Gunnison County.

Shipments of coal and coke from Crested Butte for the week ending May 11th were: 1,029 tons of coal and 777 tons of coke; total, 1,806 tons.

A mining suit was filed in the United States Circuit Court Clerk's office at Denver on the 14th inst. Edward B. Parvin is the plaintiff and Charles T. Martin defendant. Both are prominently identified with Colorado's mining interests. In April, 1890, the complaint states, Mr. Martin held contracts with W. M. Fulton, J. F. Pearson, E. B. and R. G. Farvin, Max Baer and E. B. Taylor regarding the sale of the Sacramento group of mines, and the or-

ganization, with 830,000 shares of stock, of the Sacramento Consolidated Mining Company, the corporation to own the mines. In consideration of an agreement between Messrs. Martin and Parvin, the former, it was alleged, promised to assign 95,000 shares of stock of the company to Parvin. This he failed to do, according to Mr. Parvin, who sues for \$47,250, the balance of the stock.

Big Chief, Tin Cup.—A strike is reported to have been made on Gold Hill by Jerome Noakes in this group of mines on the second line contact. After drifting 150 ft. through a body of lead ore, a 3-ft. vein of chlorite was encountered assaying \$300 in silver to the ton and 30% in lead.

Huerfano County.

Silver Mountain Mining and Milling Company, La Veta.—At a special meeting of this company on the 14th inst. the capital stock was increased to \$500,000. The Troy and Blanche claims, belonging to the group of mines owned by this company, are making a good showing. Ore taken recently from the Troy will run, it is said, 100 oz. to the ton.

Jefferson County.

Colorado Honestone Company, Morrison.—This company is opening up a new quarry in Morrison; the product is said to be identical with that found at its other quarry, two miles south of that city on Turkey Creek.

Lake County.

Bimetallic Smelting Company.—Work has been commenced on the plant of the company at Leadville. D. H. Moffat, the president of the new company, said the plant would occupy the site of the old La Plata works in Lower California Gulch. But one furnace, an Austin water-jacket, is being constructed at present, but more will be put in as the company finds a supply of ore and good market. Mr. Moffat claimed that ores running as low as 5 oz. silver could be treated profitably, the aim being to treat the immense quantities of sulphides of the Carbonate camp, which run anywhere from 5 to 20 oz. silver. For years tons and tons of this ore have been piled upon the dumps of the mines, simply for the reason that it was impossible to handle them on account of high smelter and railroad tariffs.

(From our Special Correspondent.)

Eliza, Leadville.—Here a new lease and bond has been given to Mr. Amos Henderson, general manager of the Reed-National Company's property, who is now placing machinery upon it. In the bottom levels of this mine some very fine copper ore has been discovered, though of late the entire attention of the management has been turned to the working of a rich streak of chloride ore.

Fanny Rawlings Mining Company, Leadville.—The mine operated by this company is the one from which the company derives its name, and is being thoroughly opened and prospected. A shaft has been sunk to a depth of a little more than 300 ft., from the bottom of which a drift was run out to the south, cutting the formation on its dip in that direction. After passing through the regular series of beds, at about 100 ft. from the shaft, dolomite was encountered in which some fine lead carbonate ore was discovered. The geological conditions at that point are slightly complicated, however, but it is thought that with the data furnished by the Eliza, adjoining, the mine can be successfully brought to a paying basis. ***

Maid of Erin Mines, Limited, Leadville.—While the work of retimbering the mines of this company, including the leased ground, has progressed rapidly, and an entire resumption will doubtless take place in these workings, the Austin or pyritic process, at present located in the buildings of the old La Plata, has been purchased by it, and will at once resume operations.

Ouray County.

La Plata Mines, Limited.—The annual meeting of this company was held in London on the 5th inst. It was stated that the profits at Leadville amounted during the year to £2,321 18s. 9d., as against £1,156 10s. 5d. in the year 1890. The manager, Mr. Philip Argall, reported as follows regarding the La Plata itself: "The La Plata Mine is looking fully as well as it has at any time for the past six months. All the blocks are being vigorously worked with the full complement of men. The Montgomery claim is being developed under lease with very encouraging results. Ore has now been discovered in two places; but it is almost too low in silver to pay just at present. No doubt better ore will be discovered in the deeper workings in the limestone, as is usually the case in the Rock Hill mines. As to the smelting works, I am pleased to say that the trial or test run of the pyritic smelting at our works has been a brilliant success. There is no doubt in my mind but that it will revolutionize smelting in a short time. The outside portion of the slag dump, estimated at about 200,000 tons, has been sold on advantageous terms. Delivery of the slag is expected to begin in August. Other parts of the dump have been leased on the former system, of picking out the pieces of matte and bullion. At White Clond an attempt was made to sink a winze on one of the mineral bearing quartzose shoots below the 275-ft. level, but the water was too much to cope with without machinery at the winze. The ground in the bottom of the winze had changed considerably, and at a depth of 16 ft. looked extremely favorable for ore. The main drift is now being driven southerly, toward the Gnston, on a quartz vein that is separate and distinct from the main quartzose reef, in and along which the prin-

cipal prospecting has been conducted. This new vein is about 8 ft. in width, is well mineralized, and contains occasional bunches of yellow copper, with a little gray copper. We have found copper ores in all the drifts we have made into, and along the quartzose reefs. We have an abundance of iron pyrites in all the drifts, and as these minerals are associated with and carry rich silver ores in this district, it is evidently but a question of depth to find pay ore in large quantities in the White Cloud claim. If you can raise the money to sink the mine there is every reason to suppose that the mine will be in pay in from four to six months. I inclose map of White Cloud to date, so that you can follow this letter intelligently. The south drift has been turned westerly, and yesterday cut into the quartz 40 ft. south of the west cross-cut; the quartz looks well." The proposition was carried that the capital of the company should be increased to \$105,000 by the creation of 20,000 new shares of 5s. each, said shares being preferential, entitling the holders to a 10% per annum dividend, and being of equal rank after the 10% has been received with the common shares in the division of further profits.

New Guston Company, Limited.—The annual meeting of this company was held recently in London. The revenue account for the year 1891, including £13,938 4s. 7d. brought forward from Jan. 1st, 1891, amounted to £134,865 3s. 7d. This sum was dealt with as follows: £88,000 was paid in dividends; £1,106 18s. 5d. was expended in mine development; £4,460 10s. 10d. was written off in the indebtedness, and a reserve fund of £10,000 was created, leaving a balance, including reserve fund, of £41,000. It was stated that this reserve fund was created to allow of enlarging the plant and of doing some necessary development work, especially in sinking a new shaft, the capacity of the present shaft being about 5,000 tons of ore per month. It is estimated that the cost of sinking the shaft with the necessary machinery will amount to between \$40,000 and \$50,000. The superintendent reports, under date of March 31st, as follows: "We have a considerable quantity of valuable ground opened up, and can, I believe, make a first-class showing through the coming summer and for some time to come."

Pitkin County.

Bushwacker Mining Company, Aspen.—The books of the County Recorder show that this company has at last a clear title to all its territory by a deed from Charles Burns of all his interest in the property as original owner. The interest was about one twenty-fifth and the consideration is understood to be about \$25,000.

Franklin Mining Company.—The suit of Frank X. O'Brien against this company has been transferred from Pitkin County to the District Court of Arapahoe County, and is now on trial before Judge Rising at Denver. O'Brien claims a one-fifth interest in the Dr. Franklin mining claim in Roaring Fork mining district, and represented by 9-65 acres of land. The claim was originally located by James Farley, John K. Conning, James Fitzgerald and McClure in March, 1884, from whom O'Brien secured his interest. The claim passed through various hands. Finally, in 1887, the Franklin Mining Company was organized, with David H. Moffat, Walter S. Cheesman, Eben Smith, David R. C. Brown and Henry P. Cowenhoven as directors. O'Brien maintains that he never conveyed his interest, which he alleges to be one-fifth, to the company or any person. For being expelled from the property O'Brien claims \$5,000 damages. He says the company has removed \$300,000 worth of ore, at a net profit of \$200,000. He demands that the company be forced to render an accounting, and pay him one-fifth of the profits, and that his interest shall be established in the property.

Holden Lixiviation Works, Aspen.—These works are still handling over 100 tons of ore per day, the greater portion of which continues to come from outside points. The owners of the mill have also in contemplation the addition of a refinery to the plant, at a cost of \$20,000. The ore would be reduced to bullion before leaving the premises.

Mollie Gibson Consolidated Mining and Milling Company, Aspen.—It is reported that another compromise has been made between J. J. Hagerman and parties suing him to set aside the sale of certain Mollie Gibson stock. This time the compromise was with B. E. Shear, but the terms, as in the Gillespie compromise, are not obtainable. W. W. Cooley, Mr. Hagerman's attorney, admits the adjusting of the matter and the withdrawal of the suit, but refuses to give further information.

San Miguel County.

Sheridan Consolidated Mining and Milling Company, Telluride.—This company's mill at Pandora, which was compelled to shut down, is now running steadily at the rate of about 100 tons per day. It is now run entirely by water power. A large quantity of ore is on hand. All ore from the Sheridan and Mendota mines is now brought down over the tramway and all supplies are taken up in the same way. The mines are now connected by tunnels, so that they are practically one.

Belmont Consolidated Gold Mining Company, Telluride.—The Belmont Amalgamation mill is running, but no clean-up has as yet been made, so that no estimate can be made of its product.

Summit County.

Diamond B., Robinson.—Advices received from Robinson state that both the Diamond B and Jessie mines are shut down. The lessees of the Diamond B. have forfeited their lease. They claim that the ore body has left the Diamond B. property entirely. Ground has been broken for the new low grade smelter at Kokomo.

Robinson Consolidated Mining Company, Robinson.—Advices from Robinson report that large quantities of good grade ore are being shipped from this property.

IDAHO.

Silver King.—This mine has been running three shifts all winter, and a 350-ft. shaft has been sunk. As the cost of marketing the ores is enormous, Mr. Hyndman, the owner, will concentrate them. He has already spent \$25,000 in opening up his mine, and it now promises to bring good returns.

Owyhee County.

Ruth.—A strike in this mine, owned by W. F. Leech, has been made. The ledge is 12 ins. wide, and the ore is said to be rich. The strike is unexpected.

De Lamar Mining Company, Limited.—The manager's report for March has been issued: 2,231.26 tons of an assay value of \$21.14 in gold and \$20.16 in silver were crushed during that month; 75.07% of the gold and 86.31% of the silver was saved, yielding 39,864 oz. of fine silver and 1,850 oz. of pure gold. The total production for the month, including a surplus realized on the bullion estimates of the previous month, the estimated value of \$15,000 of 45.57 tons shipped, the value of the slags on hand, and certain miscellaneous receipts, amounted to \$92,405.15; expenses amounted to \$41,664.69, which leaves an estimated profit of \$50,740.16. The mine is reported in excellent condition, many new and promising developments having been made.

Trade Dollar.—The owners are stoping in tunnel No. 1 on a 5-ft. ledge of \$100 ore. Winze C in tunnel No. 2 has a ledge 5 ft. between walls that carries 2 ft. of \$300 ore. The Blaine tunnel is now in nearly 1,100 ft. The company has in place a 60-H.P. Corliss engine used in driving the air drills, also a No. 5 fan attachment and all the latest improvements known to mining. The Blaine tunnel is 8½ x 8 ft., double track, and is being advanced at the rate of 7 ft. a day. The Blaine ledge varies in width from 6 ins. to 6 ft., mostly low grade ore. Some of the ore runs \$160 to the ton, however. The Trade Dollar employs about 50 men. In tunnel No. 1, now in 500 ft., the ledge varies in width from 2 to 6 ft., while the rich ore on the hanging walls is from 6 to 16 ins. thick. In tunnel No. 2 a distance of nearly 800 ft. has been reached. Here the pay streak is 2 ft. wide. Winze C of this tunnel is sunk 637 ft. from the mouth. In the bottom of this winze the ledge is 4 ft. wide with 25 ins. of ore that will run, it is said, from \$500 to \$1,000 per ton. The new mill, estimated to cost \$75,000, will be completed about the 1st of September.

Shoshone County.

The United States District Court in session at Boise City has granted the Mine Owners' Association an order restraining the Coeur d'Alene Miners' Union, as well as a number of individual members of the union, from interfering in any way with the operation of the mines. Several weeks ago the manager of the Union mine at Burke brought in five non-union miners. Three of these men joined the union, and two who refused to do so were escorted by a committee out of town, and told to leave the State. The Mine Owners' Association based their application for an injunction on this affair, and the sequel shows it was ample. As a result, in case the non-union miners are interfered with by the union miners, it will be contempt of an order of court, and the United States Marshal will have to see that the order is obeyed. In this way the owners will shift their contest, if any there be, to the shoulders of the national government, and the union will have to deal with the United States authorities. It is pretty generally understood that the owners have made all their arrangements for the importation of men. The union has kept well posted on the affairs of the association, and the latter can scarcely make plans that the former do not know about in a few hours. The Coeur d'Alene union seems to feel that it could not win the fight alone, and it has enlisted on its side the miners' unions in Montana. It was expected that 100 non-union men would leave Michigan for Idaho last Saturday, and the Butte people were expected to meet the party and endeavor to have them turn back. Already the Montana unions have sent to the Coeur d'Alene union \$5,000 in cash, and the latter have started a general store. The mine owners have publicly stated that they will not employ a member of the union, and the Montana unionists feel that the issue has now become as much their concern as it is that of the men directly affected. The officers of the Coeur d'Alene union say the members of that body will not use violent means to win the fight, but they cannot be responsible for the acts of sympathizers who are not members. The situation is the most serious one that has ever confronted the mining industry in the northwest, and both employers and employees realize that much in the future depends on its outcome.

Veto.—The lead in this property near Mullan is said to be 12 ft. in width. This lead is traceable for 4,500 ft. on the surface up the mountain. A dis-

tance of 180 ft. in the tunnel cross-cut has been run for 20 ft., and here is where a new discovery of 30 ins. of solid galena is to be seen. This property is all the more valuable on account of its locality, being situated on a level and only 3,000 ft. from the railroad track.

KANSAS.

Cherokee County.

During the week ending May 14th the output of ore from the mining districts of Galena and Empire City was: Rough ore, pounds milled, 2,270,370; rough ore, pounds sold, 1,884,460; zinc ore, pounds sold, 1,191,110; lead ore, pounds sold, 399,270. Sales aggregated a total value of \$20,983.

MICHIGAN.

Copper.

Quincy Mining Company.—This company has won its suits in the Pewabic case. A dispatch from Don. M. Dickinson says that every point in the Pewabic appeal, in the Marcus appeal, and in the Shaw equity suit has been decided in favor of the Quincy Co. The Pewabic suit was to set aside the sale to Messrs. Mason and Smith of the Pewabic property. The Marcus suit was to reopen the sale, and the Shaw suit grew out of the issue of 10,000 shares of Quincy stock in payment for Pewabic property. All suits were appealed to the United States Supreme Court, with the above stated results.

Wolverine Copper Manufacturing Company.—This company has levied an assessment of 50 cts. per share, payable June 15th, 1892. Since the start, Sept. 1st, 1891—500,700 lbs. of fine copper were produced. The assets are \$32,504; liabilities, \$31,974; balance, \$431.

Iron—Marquette Range.

Iron Center.—The drift at this mine is now in 20 ft. and the ore has been struck. The ore is said to be a Bessemer quality carrying about 62% metallic iron. This new deposit is situated on the old "Brass Wire" property and was one of the first to be explored for iron in Marquette County. The description of the land is the southeast ¼ of the southwest ¼ of section 2, town 47-37. The Negaunee & Ishpeming Electric Railway runs across the north side of the property and passes the shaft about 100 ft. to the north.

Iron—Menominee Range.

Lamont Iron Company.—This mine is producing 200 tons of ore a day, and will, just as soon as things are put in shape, increase the output to double that. A meeting of the directors of the company was held in the Chicago office recently, and the following officers elected for the ensuing year: E. E. Crepin, president; A. C. McKinzie, vice-president; H. Pirmilly, treasurer; R. F. Clinch, secretary; Frank Scadden, general manager.

MISSOURI.

Jasper County.

(From our Special Correspondent.)

Joplin, May 16th.

The past ten days has been trying to the mine operators of this lead and zinc belt, as the rain has been almost continuous, and the mines are flooded, causing all the small operators to close down and wait for fair weather. The large streams have overflowed the valleys, making the roads impassable. The present output has been greatly reduced. The price of zinc ore has averaged at \$24 per ton. Lead ore has remained at \$24.50 per thousand. Following is the output from the different camps from the week ending May 2d to 16th, three weeks: Joplin mines, 3,597,275 lbs. zinc ore and 871,615 lead, value \$65,364.60; Webb City mines, 1,245,366 lbs. zinc ore and 144,640 lead, value \$18,713.90; Carterville mines, 5,290,040 lbs. zinc ore and 283,870 lead, value \$70,749.30; Zimeite mines, 510,110 lbs. zinc ore and 14,660 lead, value \$6,787; Oronogo mines, 1,600 lbs. zinc ore and 26,191 lead, value \$606; Carthage mines, 965,650 lbs. zinc ore, value \$11,985; Burch Center mines, 41,861 lbs. lead, value \$215.50; Galena, Kans., mines, 3,156,360 lbs. zinc ore and 706,180 lead, value \$51,657. District's value for the three weeks, \$226,078.30. Aurora, Lawrence County, mines, 612,110 lbs. zinc ore, 2,135,800 lbs. silicate and 720,000 lead, value \$36,476; lead and zinc belts' total value, \$262,554.30. The above output cannot be estimated as an average output for the past three weeks from our mines, but shows what can be done in the face of difficulties. The Rex Mining and Smelting Company, of Joplin, locally known as the 1,000 acres, is still attracting much attention owing to the strikes which are being made. The Crossman Bros. & Porter mine on this land have just completed and started their new concentrating mill, which is making a clean and high grade product. The Regina Land and Mining Company, recently organized, purchased 40 acres adjoining the Rex M. and S. Company on the north, and platted the same into town lots and mining lots. The place is called Rex City. The Kansas City, Fort Scott & M. R. R. are now extending their line through Rex City and into the Rex M. and S. Company's land, and putting in switches to the principal mines. This will be a great improvement and save the hauling of the ore by wagons. Joplin, Carterville and Webb City are all agitating the need of zinc smelters, and each place is scheming to consummate a smelting deal for the benefit of the district.

MINNESOTA.

Iron—Mesaba Range.

McKinley Iron Company.—The principal work at the McKinley has been near the center section eight. Here there are seven shafts, in six of which the ore has been discovered. No. 1 is down in 20 ft. of clean ore and is bottomed in ore. No. 2 is down in 55 ft. of clean ore and is bottomed in ore. No. 3 is bottomed in ore. No. 4 is down in 35 ft. of clean ore and is bottomed in ore. No. 5 is down in 50 ft. of ore and is bottomed in ore. No. 6 shaft is one of the latest sunk, and ore has been struck therein at a depth of 50 ft. The shaft penetrated only a few feet of ore, and sinking is still being continued in ore. With these new developments, the vein is shown up for a length of 1,000 ft., and for a width of at least 800 ft., and, allowing for an average depth of 75 ft. for this area alone, the amount of ore apparently in sight would be 6,000,000 tons.

MONTANA.

Deer Lodge County.

The Granite Mountain and Bi-Metallic companies, says the Phillipsburg "Mail," propose to utilize the Flint Creek water power to move their mining and milling machinery after electric transmission. When this power is secured the Granite Mountain Co. is going to do considerable experimenting with a view to utilizing electricity in the reduction of ores. They have laid aside a fund for this purpose. Last year work was carried on extensively until winter set in. The dam has been completed and excavations made for a flume and pipe line. The company doing this work is incorporated under the name of the Flint Power Company, by C. M. Bennett and Messrs. Baker & Harper, who long before beginning the operations had figured on utilizing the Flint Creek water power. The company is confident it can depend upon about 3,000 ins. of water for use from the Georgetown flats to the falls. To utilize this a flume nearly 1,000 ft. in length has been constructed. The flume is 3½ x 4 ft., and there are two tunnels, one 350 ft. long and the other 700 ft. long. At the end of the flume a tank with a capacity of 35,000 gallons is to be built. From this tank a pipe 30 ins. in diameter and 1,300 ft. in length will extend down the mountain side to the power house. The tank will be 650 ft. higher than the power house, so there will be a fall of 2,000 ins. of water that distance. In the power house the main pipe branches into a number of smaller ones, by means of which ten Pelton water wheels are to be fed. These wheels are capable of running ten dynamos. The site of these works is hardly seven miles directly south from Phillipsburg.

Grand Republic Mining Company.—The machinery for the concentrating mill, being erected near the mines southeast of Elliston, is all on the ground and is being rapidly put in position. The machinery foundations are all laid, the frame of the building is up and enclosed. The mill will consist of 10 stamps, supplied with crushers, automatic ore-feeders and the other improved appliances, together with seven Frue vanners. A large quantity of ore is on the dumps of the several mines belonging to the company, which have been developed sufficiently to give an output of 50 tons daily.

Jefferson County.

Homestake.—This mine is already on a paying basis, and large results are anticipated. The mine is amply equipped with the best machinery.

Lewis and Clark County.

Montana Company, Limited.—The fire in the Drum Lummoa mine, which occurred on the 8th inst., has been controlled. The floor of the station had been nearly burned away and one post of the gallow's frame, a timber 28 x 33 ins., burned. The engine was uninjured except by smoke and water. The damage to the shaft cannot yet be determined, but is only partial. The mills, which were shut down in consequence of all available water being thrown on to the mine, have started up. As a precautionary measure a stream of water from a 4-in. hose was kept running into the shaft. It is believed that the fire is extinguished except in one isolated pump station below. The mine is rapidly being cleared of smoke. The bulkheads are removed. The total output for April, according to the manager's report, was \$42,851, and the working expenses for the month \$37,900. In addition to 7,100 tons of ore crushed, 1,100 tons of tailings were treated, yielding \$5,100 at a cost of \$2,950, which figures are included in the above returns.

Missoula County.

Iron Mountain Mining Company.—The annual stockholders meeting of this company was held recently at the office of the company, in Helena, the election of the Board of Trustees resulting in the re-election of the old board, excepting that A. L. Smith was substituted for Chas. Kaufman, of St. Louis, the change being made for the convenience of having the board composed of resident members. General Manager Forbes was present, and reported that the mine and mill were in excellent condition. During the year the mine has produced over \$145,000 in ore and concentrates; \$100,000 have been expended in the erection of a lead concentrator, in the construction of roads and in exploiting the mine. Since the organization of the company \$160,000 have been paid in dividends, and there is now in sight ore suffi-

cient to insure monthly dividends for three years to come, it is stated.

Silver Bow County.

Anaconda Mining Company.—A cave-in occurred in the Anaconda mine on the 14th inst. on the fourth floor of the 800 level, which resulted in a terrible loss of life. There were 14 miners at work on the floor at the time. Of this number only four were taken out alive, all of whom were badly hurt. Six dead bodies have been removed, but the rescuers are confronted with an entire wall of ore, completely filling the level.

Blue Bird Mining Company, Limited.—The Blue Bird mine, the 80-stamp mill, mill site, pump station and several mining claims of the Blue Bird Company was sold at Sheriff's sale May 9th. Hoge, Brownlee & Co., bankers, bid in the entire property for \$31,841.38, which amount satisfies their claim. There were no other bidders. The property will probably soon revert to the Blue Bird Company.

Colorado Mining and Smelting Company.—The Gagnon mine has been closed down for a period of three weeks. The shut-down was necessitated by the giving out of three of the new boilers at the concentrator on Saturday morning. These boilers were of the best grade of steel and had only been in use for a short time. On Saturday the boiler inspector pronounced them to be unsafe until new patches were put on.

Moulton Mining Company.—In the west cross-cut of the 300-ft. level of the Moulton a strike of good ore was made last Wednesday. The vein is about 3 ft. in width, and assays run between 60 and 70 oz. per ton.

Ophir Mining Company.—At this mine a new hoist has been erected and pumps put in the mine. The ore taken from this property yields from 200 to 450 oz. per ton in silver and some gold.

NEVADA.

(From our Special Correspondent.)

The mining assessments falling delinquent during the month amount to \$92,270.

Elko County.

Belle Isle Mining Company.—North drift, 350-ft. level, extended 5 ft. showing some ruby ore. The stope below the 350-ft. level is looking well.

North Belle Isle Mining Company.—No. 1 upraise from this drift extended 14 ft., showing some fair-looking ore. West cross-cut, same level, extended 4 ft., and suspended. South intermediate drift below the north 400-ft. level extended 7 ft., showing a fair width of rich ore. Hoisted 24 cars of second-class ore.

Nevada Queen Mining Company.—Second level: East drift from No. 1 chute extended 19 ft., exposing 3 ft. of ore, average assay \$60 per ton. Going west from same chute made 12 ft., exposing high grade ore. East drift from No. 2 chute advanced 14 ft., 2 ft. of second-class ore with seams of first-class mixed through. Going west from same chute there is 3 ft. of ore, 18 ins. being first-class ore. East drift from No. 3 chute was driven 25 ft. in low grade vein matter. West from same place 22 ft., seam of high grade ore in the face of drift. South drift run 5 ft., small seam very high grade ore in face of drift. South drift from No. 3 east cross-cut in 15 ft., showing 15 ins. first-class and 2 ft. second class ore. North side from same is in 8 ft., ore 4 ft. wide, 18 ins. being first-class. Third level: South intermediate from No. 2 chute extended 16 ft., following seam of good ore; east from same, 24 ft., connecting with south intermediate from No. 3, which has been advanced 24 ft. East drift from No. 3 advanced 20 ft. Ore produced: 37 tons first-class, assay value \$250 per ton, and 182 cars second class, average car sample \$32 per ton.

(From our Special Correspondent.)

Coptis Mining Company, Tuscarora.—The stopes are yielding more first and second class ore and the full quantity of third class. The work of milling has been delayed by bad weather.

Commonwealth Mining Company, Tuscarora.—At the annual meeting of stockholders, held this week, 82,120 shares were represented and the following officers elected for the ensuing year: T. Bell, president; P. C. Hyman, vice-president, and F. A. Berlin, G. W. Grayson and T. Pheby, directors. R. R. Grayson was reappointed secretary and F. F. Coffin superintendent. The output, according to the report, amounted only to 43 tons of first-class ore, assaying \$196.26 per ton, and 200 tons of second class ore. The latter yielded 14 tons of concentrates, assaying \$313.48 per ton. The superintendent reported the ore exposed in the south drift from east cross-cut 2, third level, will be developed as soon as the Nevada Queen workings reach the second level, as then air can be had through their chute. In other parts of the mine only streaks of ore had been encountered, and when any good prospect appeared the ore pinched out upon being followed. There is a large area of ground next to the southern line that has not been prospected, but can be reached soon from the Nevada Queen openings, in that manner saving the expense that would be occasioned by running drifts from the company's shaft or cross-cut. This development work will be carried on as fast as practicable.

Storey County—Comstock Lode.

The Dayton "Times" says: Since the burning of the Eureka mill the ore from the California & Virginia mine is being worked in the Morgan mill at Empire. This is a steam mill, and it has not the capacity that the Eureka had, and consequently cannot handle all the ore coming from the mine. Neither can the ore be worked as cheaply at the Morgan. These facts have caused rumors to the effect that a mill may possibly be built at Sutro and the ore taken out through the tunnel. This method of extraction and transportation would be much cheaper than any other, and in time would save the price of the construction of a mill. Such a move would no doubt lead to other mines than the Consolidated California & Virginia shipping ore through the tunnel, and in time a number of mills might be at work at this place and Sutro.

The following is the weekly statement of ore hoisted from Comstock mines and milled, with the car and battery assays, etc.:

Mine.	Tons extracted.	Car sample assay.	Tons milled.	Average bat. assay.	Bullion for the week.	Bullion shipped.
Con., Cal. & Va.	1,161	....	985	\$21.44	....	\$29,508.16
Hale & Norcross	454	\$23.42	430	15.90	....	12,843.07
Ophir	16	29.00	26	16.56	....	....
Overman	43	20.71	26	16.56	....	....
Potosi	374	....	350	25.34	....	....
Savage	647	....	525	19.61	\$7,286.67	....
Yellow Jacket	..	....	196	....	....	....

* Cars.

R. P. Keating, the late superintendent of the Hale & Norcross mine, and who won notoriety by sharing with Levy, the president, the shame of skipping out of California to avoid the court's jurisdiction, is being brought to task by the citizens on the lode. Mr. Keating is the Democratic boss on the Comstock, and is anxious to represent the Democracy at the Chicago National Convention. As he sold out his party at the last election and gave Jones a walkover, he preventing an opposition ticket, he is being reminded of that fact now, and furthermore he is being told that the man who was privy to and was, indeed, one of the main instruments in perpetrating the \$2,000,000 steal from the Hale & Norcross, is scarcely the man wanted in politics just now. This spasmodic fit of virtue on the part of the "white slaves" of the Comstock may not last long, however, as the "ring" carries the State in its hip pocket. In 1890 the total vote was only 12,348. Lyon County polled 694, Ormsby 820 and Storey 2,623, a total vote of only 4,137, or 33 1-3% of the total vote cast. In these counties are situated the principal mines, mills, B. and Exchange banks, U. S. mint, and all the other accessories by which the mill ring are enabled to steal elections as well as bullion.

Alta Silver Mining Company.—The upraise north of the shaft is in about 3 ft. of ore, assaying from \$2 to \$40 per ton. Height above sill floor, 14 ft.

Belcher Mining Company.—The winze from the north lateral drift on the 300 level is now down 75 ft. The bottom is in porphyry with streaks of low grade quartz through it. From the bottom of the winze have extended a west cross-cut 14 ft.; face in porphyry. The winze from the 200 level has connected with the top of the 300 level raise. The 1,300 level 7th floor cross-cut is now out 37 ft.; top in low grade quartz.

Consolidated California & Virginia Mining Company.—After all expenses are paid for the month of April there will be \$1,800 to the company's credit. During April there was worked at the Eureka mill 4,970 tons of ore, which produced in bullion: Gold, \$53,659.09; silver, \$29,042.39; total, \$82,701.48. Yield in bullion per ton was: Gold, \$10.79; silver, \$5.84; total, \$16.64. Assay value of the ore per ton, as per battery samples: Gold, \$9.89; silver, \$8.94; total, \$18.83.

East Sierra Nevada Mining Company.—At the annual meeting 58,125 shares were represented and the following directors were elected: H. F. Cutter, W. R. Sherwood, C. C. Harvey, F. G. J. Margeson and R. N. Graves. H. F. Cutter was elected president, W. R. Sherwood vice-president, George R. Spinney secretary, and R. P. Keating superintendent.

Hale & Norcross Silver Mining Company.—There has been a general shaking up since the Levy crowd retired in favor of the new management. The entire affairs of the company, so far as transportation and milling were concerned, were in so rotten a condition that it will necessarily take some time to bring order out of chaos. The test run of the Occidental on 110 tons of rock from the mine has, by its results, proven highly displeasing to Evan Williams and others of his kind. Particulars of the test have already appeared in the Engineering and Mining Journal, but when the detailed statement is made public it will be a matter of astonishment that such wholesale robbery could go on so long undetected and without raising a storm among the notoriously complaisant stock holders.

Justice Mining Company.—The west drift, 490 level, is now out 847 ft., face in hard rock. The south winze from No. 2 cross-cut, 622 level, is now down 33 ft. There is a streak of ore in the bottom 18 ins. wide assaying about \$20 per ton.

Kentuck Mining Company.—We are still opening out north and south on the ore streak, 160 level, with no special change to report. The streak varies in width from 10 to 12 ins. and is of fair grade.

Mexican Mining Company.—Keen interest has been aroused by the report of the development in the south drift from the 1,465 level. The face of the drift is in \$18 ore, and crosses the boundary line into Ophir ground.

Ophir Mining Company.—The running into the west ledge alluded to above attracted attention to work in this mine also. The ore uncovered is reported to be a fairly large body, but no news has been received during the last day or two, and particulars are awaited with increasing interest.

Potosi Mining Company.—The winze is down 266 ft. below the 1,500 level; bottom in quartz which gives low assays. Potosi and Bullion west cross-cut on the south line, 1,500 level, is out 164 ft.; face in porphyry. Extracted and sent to mill during the week 374 1700-2000 tons of ore from the 930, 1,100, 1,150 and 1,250 levels. Milled during the week 380 tons; on hand at mill, 95 200-2000 tons; average battery assay, \$25.34. The joint northwest drift from 1,800 level of the Ward shaft has been cleaned and repaired 150 ft. A body of mineralized quartz fully 55 ft. wide has been cut by an east cross-cut 350 ft. south of the north or Potosi line on the 1,300-ft. level. Wednesday a south drift was started from the east cross-cut, about in the middle of the quartz, to explore it in that direction. Work has also been resumed in the face of the northwest drift from the Ward shaft on the 1,800-ft. level, which is well into Bullion ground, and an east cross-cut is also running on the 1,500-ft. level, both of which will intersect the formation on its downward dip. Should the quartz formation described improve in any place or make into a valuable body of ore it will have a vital influence on the future of the Comstock lode.

Savage Mining Company.—Bullion yield for the week, \$7,286.67. The south upraise from the 1,100 level was connected last Thursday with the winze from the sill floor of the 950 ore stopes. On the Suro tunnel level the joint north drift with the Gould & Curry Company was advanced 27 ft., making its total length 404 ft.; face in porphyry.

Scorpion Mining Company.—At the annual meeting of this company, held in San Francisco, Charles Hirschfeld resigned from the management on account of press of other business, but continues to have a large interest in the mines. At the meeting 56,849 shares were represented, and the following directors were elected: W. R. Sherwood, H. F. Cutter, C. C. Harvey, F. G. J. Margetson, and H. Zadig. W. R. Sherwood was elected president, H. F. Cutter vice-president, George R. Spinney secretary, and R. P. Keating superintendent.

NEW MEXICO.

Grant County.

Negotiations have been closed in Chicago for the purchase of beds of iron ore in the Hanover Valley. The company will be formally incorporated next September. The property includes 30 claims. The purchasers of the property are said to be Horace Brock, owner of the Cornwall iron mines near Lebanon, Pa.; A. Lanfer Norrie, of the Norrie mines near Irontown, Mich.; William Harriman, of New York City, of Harriman & Co., bankers; L. W. Barringer, of Philadelphia; W. H. Simpson, of Boston; Fred Crocker, of San Francisco, Cal.; Heber R. Bishop, of New York; John Brockman, of El Paso; Isaac E. Adams, of Chicago, and others.

Manhattan Gold Mining and Milling Company.—Work has been resumed on the Aztec tunnel at Pinos Altos by this company, which is the successor to the Aztec Gold Mining and Milling Company, and it will now be continued until the main vein on the Aztec mine is reached. The tunnel was driven over 400 ft. by the Aztec company, and it is expected that the vein will be reached in 606 ft. The cost of driving the tunnel will be from \$12 to \$16 per foot. No more ore will be taken out of the shafts on the company's property, and the mill will not be started up until the tunnel is completed and a good supply of ore has been taken out.

Pacific Gold Mining Company, Silver City.—It is reported that this company is considering a plan to remove its mill from Silver City to Pinos Altos and lay a pipe line from Whisky Creek to the mill, through which to obtain their water supply. The cost of hauling ore from the mine to the mill at present is \$1.60 per ton, and this could be saved by the removal of the mill to the mine. The mill, which has a capacity of 50 tons per day, has been compelled to close down for lack of water.

NEW YORK.

Governor Flower has signed the bill providing that mines operated through a vertical or oblique shaft, at a depth exceeding 250 ft., must have not less than two openings or outlets, at least 150 ft. apart and connected with each other. A violation is deemed a misdemeanor. He has also signed the bill providing that where two corporations organized under the stock corporation law of 1886 shall consolidate, the new corporation shall be required to

pay a tax only upon the amount of capital in excess of the aggregate amount of the capital stock of the two corporations.

OHIO.

Snow Fork & Hocking Railway Company.—This company has been organized with David Lee, of Zanesville, president, and S. P. Peabody, of Columbus, secretary. The line will run from New Straitsville to Athens and will be a coal feeder for the Baltimore & Ohio Railroad.

PENNSYLVANIA.

Coal.

The following mines at Scranton will work on full time this week: Pyne, Taylor, Holden and Archbald.

The amount of coal shipped from Honesdale in April was 203,045 tons—106,920 tons by canal, and 201,125 tons by rail. During the season the total shipment has been 492,227 tons. The amount on hand at Honesdale is 282,058 tons. There were 792 boats cleared during the month. The Delaware & Hudson Canal Company has mined and shipped 269,809 tons during the month, and 1,265,242 tons so far this season.

It is reported that work is being pushed with great energy on the Wilkes Barre & Eastern Railroad, about which there is so much mystery, but which is supposed to be backed financially by the Pennsylvania Railroad, in order to give it a direct outlet from the Wyoming coal fields to tidewater. The engineers have 18 miles ready for the graders, and there are 250 men employed on the construction at Stroudsburg and Springbrook. As soon as the route for crossing the Stroudsburg Mountain can be determined, the work will go on with great rapidity. The route at the point named, so far as fixed, gives a grade of 65 ft. to the mile. The line will be about 57 miles long.

Blue Ridge Coal Company, Scranton.—This company was chartered at Harrisburg on the 14th inst. The directors are James H. Rice, Charles B. Penman, Stephen L. Rice, Harry C. Reynolds, Frank H. Clemons, Scranton; Aaron C. Holden, Pittston; Daniel R. Stiles, Scranton. The company will operate at the colliery near the Wildcat turnpike formerly owned by the Rushbrook Coal Company. The breaker has a daily capacity of 1,000 tons.

Delaware & Hudson Canal Company.—It is expected that the Dickson breaker, at Green Ridge, which has been undergoing repairs, will be in readiness early next week.

Mill Creek Coal Company, Mahanoy City.—This company, which operates in the vicinity of Mahanoy City, and which is the successor to the Buck Mountain Coal Company, will soon sink another slope and build a large breaker. The slope will be put down 900 ft., to the basin of the Buck Mountain vein, after which all the overlying veins will be tapped by tunnels. The work will be done under the supervision of Superintendent T. D. Jones, of Hazleton.

Oil.

The first flowing well seen on the banks of Oil Creek in many years was struck on the 17th inst., on the famous old Columbia farm. The well belongs to John Reynolds & Son, H. D. Rhodes and James Burns, and is located on the eastern bank of the creek on a 20-acre lease. When 4 ft. in the sand on the 17th it flowed over the top of the derrick a number of times. It was showing for 100 barrels or more a day.

SOUTH CAROLINA.

Greenville County.

The Wolf & Tyger Mining Company held a meeting recently at their gold mines, eight miles north of Greer's, and elected the following officers: L. W. Jordan, president; D. A. P. Jordan, vice-president, and Hewlet K. Sullivan, secretary and treasurer. This company has options on about 3,000 acres of land. The capital stock is \$200,000. By use of the hydraulic system it is developing its property.

SOUTH DAKOTA.

Lawrence County.

Big Missouri Mining Company.—This company is again working full time. The size of the ore body may be imagined from the fact that 260 tons of ore are taken out daily and handled by six shovelers, the arrangement being such that the work is almost automatic through chutes from which the cars are loaded. Each car holds on an average 18 tons. A fine body of ore was lately struck in the Gen. Custer and Little Maud locations, both of which are owned by the Big Missouri. The 100-ft. shaft on the south end of the Big Missouri is now being sunk to the 300-ft. level. A drift will be run from it to the main shaft, 1,000 ft. distant, on the 200-ft. level. This is done to comply with the State law requiring two exits to producing mines. It will at the same time open up good ground and furnish ventilation throughout the workings.

Hawkeye Mining Company.—Grading for the new 40-stamp mill for this company is being pushed with all possible speed by Superintendent Hunter. Seams of ore have recently been cut through in the tunnel, some specimens showing free gold in profusion. The general average of the ore body is said to be good.

Homestake Mining Company.—According to the Black Hills "Times" an extensive body of high grade

ore has recently been struck on the 600-ft. level in the Homestake mine. A similar statement is made in regard to the Caledonia, the strike in this mine being made on the 400-ft. level. The diamond drill, with which the Homestake Company has been prospecting the Monitor and other claims in its vicinity, has encountered a valuable vein of ore. The drill has been run 450 ft. in one direction. From these reports and indications it is presumed that the continuation of the Caledonia vein has been found and that it extends across Deadwood Gulch and up Sawpit. Up the latter gulch the company have recently purchased the Minerva mine, which was abandoned years ago and relocated by others, all of whom failed to make it pay, not having the necessary money to sink shafts or drive tunnels where the ore bodies were supposed to be. The new owners, however, have unlimited means at their disposal.

UTAH.

Juab County.

Denver & Ogden Mining Company.—This company has filed articles of incorporation with the county clerk at Ogden to operate in the Tintic mining district. The capital stock of the company is placed at \$1,000,000. The officers of the organization are C. L. Peebles, president and manager; John Zehring, vice-president; S. S. Schram, secretary, and J. D. Carnahan, treasurer.

Mohawk Queen Consolidated Mining Company.—Some time ago the stock of this company was withdrawn from the market, and there was considerable conjecture as to the cause. It has leaked out, says the Tintic "Miner," that the actio of the company was on account of the discovery of mineral bearing ledge on the adjoining claim north. A number of assays have been made, some of which go as high as 8:86 oz. silver, 56 per cent. lead and \$151.15 in gold. A tunnel is being run to strike the ledge at a depth of 460 ft. The ledge has been traced through the Mohawk Queen and Cororado Belle, and there are many mining men who think it is the Keystone vein.

Tintic Milling Company.—This company is incorporated recently. The capital stock is \$200,000, shares of par value of \$1 each. The object of the company is to do a general milling business at Tintic, and the company succeeds to the contract heretofore held by John A. Shettle with the Mammoth Mining Company, also all machinery, property and rights of every nature owned or possessed by Shettle in the Mammoth mill, and his rights to any and all processes for the reduction and milling of ores. George Arthur Rice is president, S. J. Lynn, vice-president; W. S. McCornick, treasurer, and George W. Rapp, secretary.

Salt Lake County.

Flagstaff Mine, Limited.—The annual meeting of this company was held in London on the 2d inst. Prof. Vincent, manager of the property, who was present at the meeting, reported the mine in a better condition than the previous year, although the results have been extremely disappointing, a considerable quantity of ore having been mined under the impression that it was carbonate of lead carrying a percentage of silver, but which was found to be of very low grade, in fact almost worthless carbonate of lime. He stated that a body of ore had been struck during the year, and that in his opinion the outlook was promising. It will be necessary, however, as there is but £75 in the treasury, to levy an assessment.

WYOMING.

Sweetwater County.

(From our Special Correspondent.)

Oil-bearing shale that will light with a match and burn furiously has been found at Green River in quantity. Prospecting for merchantable coal gas and oil is progressing in a small way, as this section is of the proper formation, and coal crops up in all directions. There is but little doubt that eventually one or more of the desirable veins will be found. Most of the miners are idle for part of the time. As soon as the winter supply is wanted mines will be active. The Union Pacific Railway, although promising to do the fair thing by private owners of mines, still continue to show a disposition to discriminate against other coal producers in favor of themselves. They show their old-time disposition to mine and sell all the coal used on their entire system, as well as the supply needed by people along their lines only through their own agents. As the coal trade is more than 10% of their entire business, it is a scheme which they are not liable to forego. As they have eradicated competition in the past, they will do the same again as soon as practicable. The history of the absorption of the Laramie Soda Lakes and the Rawlin's Paint Mine (metallic oxide of iron) will probably be repeated to the sorrow of any property along their line which to them may seem desirable.

FOREIGN MINING NEWS.

CANADA.

Province of Nova Scotia.

Northup Mining Company.—Suit has been commenced in the Supreme Court at Halifax by this mining company and John H. Dingee against Clarence H. Dimock, Joshua H. Smith, Arthur J. Lau-

rence, Gould Northup, Edward V. Douglas, Henry Taylor, Job P. Illsley and Charles E. Willis. The statement of claim alleges that Arthur J. Laurence, Gould Northup, Clarence H. Dimock, Joshua H. Smith were the holders of a lease issued by the Commissioner of Mines for Nova Scotia on May 14th, 1889, of 49 acres in Center Rawdon gold district. The above parties as owners of the mine operated and put a plant in and erected all necessary machinery. The above named persons are charged with fraudulently procuring the other defendants to become the promoters of a company, and to organize and procure subscriptions to the stock of said company for the purpose of purchasing said mining property leases for the sum of \$100,000, out of which the said E. V. Douglas, Henry Taylor, J. P. Illsley and A. E. Willis were to receive upward of \$30,000 as a commission for promoting said company and inducing the company to purchase the said property. They concealed the fact that they were to receive the said commission, thereby fraudulently inducing a number of persons, including the plaintiff, John H. Dungee, to agree to purchase said property for the sum of \$100,000 and to form themselves into a company to be called the Northup Mining Company. The plaintiff John H. Dungee paid over the sum of \$100,000 to the defendants C. H. Dimock, Joshua H. Smith, A. J. Laurence and Gould Northup; and the said defendants E. V. Douglas, H. Taylor, J. P. Illsley and C. E. Willis received from the other defendants upwards of \$30,000 as alleged commission. Northup, Douglas and Illsley were incorporators and provisional directors of the company, and afterward elected directors. The defendants Dimock, Smith, Laurence and Northup are also accused of falsely and fraudulently stating that all the shafts on said mining property contained paying quartz and caused paying quartz to be taken or removed from one shaft and deposited in another. The plaintiffs were, by reason of such representation, induced to enter into the agreement to purchase the properties and to pay therefor the sum of \$100,000. The frauds were afterward discovered, but not before machinery, etc., had been placed on the property. The plaintiffs want the conveyances set aside, \$100,000 repaid with interest and the further sum of \$12,000 expended.

Coal.

(From our Special Correspondent.)

Shipments by water have now begun from all coal ports. It is expected that the sales of this season will not show much increase over last year, as the unusually mild winter have left all points with considerable stores of coal. In Pictou County work continues dull, except at the Intercolonial mine, where some parts of the mine have been double shifted to fill a large order from the Grand Trunk Railway. The large Cornish pump at the second pit of the Acadia Company is being removed, and will be repaired and replaced from top to bottom. In Cumberland County work continues fair. The Springhill mines are introducing underground haulage, and will require over 20 miles of rope for the different levels in their three slopes. A dispute over the dismissal of three men at these mines has been referred to the Provincial Secretary and the Inspector of Mines for settlement. The royalty question has been for a time settled by the Government making, as proposed, the royalty 10 cts. per ton instead of 7½, and issuing new leases agreeing to this rate of royalty until 1906, a rate not exceeding 12½ cts. until 1926, and a rate not yet agreed on for the remainder of the lease, until 1946. This should make the question of title fairly settled. Power is also given to the Government to issue leases for longer terms to parties willing to pay a royalty higher than 10 cts. This, however, still leaves unsettled the question of the right of the Government to make the change, and it is stated that some of the companies will contest the point.

Gold.

(From our Special Correspondent.)

Mining continues very dull, and few new finds are reported. Considerable interest is taken in a suit brought by the Northup Gold Company against C. H. Dimock, J. A. Smith, C. E. Willis and others, the details of which are published in this issue of the Engineering and Mining Journal. The mine was a large producer for some time, and it seems hard to believe it was effected by fraud.

Iron.

(From our Special Correspondent.)

The increased cost of coke under the new royalty has led the directors of the Londonderry Iron Works to hesitate to blow in their furnace lately repaired. The New Glasgow Company expect to put their new furnace in blast shortly, and are turning out very good ore from their mines on the East River.

MEXICO.

Importation of Lead Silver Ores into the United States.—The Committee of Ways and Means of the United States House of Representatives have sent in their report on the bill for abolishing the duty imposed on silver-lead ores by a clause of the McKinley act of October, 1890. The report states that most of the silver-lead ores imported into the United States comes from Mexico, and that the imposition of this duty has placed the smelters of silver ores in a difficult position. Hitherto one ton

of this ore has been used to supply the fluxing quality to two tons of the dry silver ore of the States. Since the imposition of this tariff the lead-silver ores have been smelted in Mexico, as it has been found cheaper to ship the lead in bullion to the States than to send the ore itself. The silver smelters of the States are, therefore, without their flux, and the production of the lead bullion in Mexico has supplied that country with another industry. The figures given in the report in support of this contention are as follows: "The cost of shipping one ton of Mexican ore from Monterey to New York by rail would be, approximately, \$15; whereas by way of Tampico, on the Mexican Gulf, and vessel, the rate is in effect \$12 per ton on lead bullion. Giving, however, the same rate of freight to ore and bullion, i. e., \$12 per ton, the following facts are developed: The average contents of a ton of lead-silver ore in lead is 25%. One ton of ore, therefore, contains 500 lbs. of lead. The smelting process produces about 90% of this, i. e., 450 lbs. At the rate of \$12 per ton of freight to New York, the cost on 450 lbs. would be \$2.70. It will be remembered that the duty on lead in pigs and bars is 2 cts. a pound; therefore, this lead bullion, i. e., 450 lbs. produced from 1 ton of ore, would pay \$9 duty upon entry into the United States, making, therefore, the cost of delivery in New York, and duty, \$11.70. On the other hand, the cost of transporting 1 ton of ore to New York, as stated, would be \$12; that is to say, the cost of delivery of 1 ton of ore, without any duty upon entry into the United States, is greater than the cost of delivering the contents of that 1 ton of ore in New York, and paying 2 cts. per lb. on the lead which was originally contained in the ore. In other words, the concentration on tonnage by the smelting process saves so much freight (in this case about 75%) that such freight-saving overcomes the duty imposed on lead bullion. From what has been stated it is clear that the duty imposed on lead ores is simply an obstruction and barrier to the American user of Mexican ores in competition with the Mexican smelting works. In other words, the tariff act of 1890 assists Mexican smelting works in their competition against American smelting works, and injures the great majority of the silver miners of this country by rendering scarce a flux ore which must be used to reduce the products of their mines."

Chihuahua.

Batopilas Mining Company.—The San Miguel mines are at present producing more silver than any of the others belonging to the Batopilas Mining Company and principally from a rich body struck in the lower working of the mine, in the southern division, and some 200 ft. below the level of the river. The last shipment from the mine weighed 6,700 lbs. ore and produced at the mill over \$9,000. The San Miguel division is a system of veins opened up by the San Miguel tunnel, which at present is some 1,500 ft. long and which cuts the veins at a vertical depth varying from 350 to 550 ft. below the surface. Sixteen different veins cut in this tunnel have produced silver, and the principal ones, Veta Grande, Carmen and San Antonio, have given large bonanzas, the first mentioned of late years, the latter in times past. The ore yards of the San Miguel tunnel are connected with the main hacienda by a horizontal tramway a mile long, mostly cut out of the solid rock on the slope of the mountain.

San Luis Potosi.

Mexican Metallurgical Company.—The smelter at San Luis Potosi, Mexico, has been blown in. Three hundred men are employed there. This is one of the smelters which have been and are being erected in Mexico in consequence of the duty on Mexican lead ores which prohibits the importation of these ores to this country. Formerly quantities of lead ore were shipped from Mexico to this country for treatment, and in consequence of the plentiful supply of fluxing ore the smelters charged low rates for the treatment of the dry ores which are produced on this side of the line. When the supply of Mexican lead ore was cut off the smelters at once raised their rates, and many mines in New Mexico and Arizona were shut down, and since that time some of the smelters have been blown out and are still idle. The removal of the duty now might result in some benefit to the smelters and producers of dry ores here, but the large works which have been put and are now building in Mexico will treat the greater part of the ores produced there.

SOUTH AFRICA.

Robinson Gold Mining Company, Limited.—The annual report of this company for the year ending Dec. 31st, 1891, has been issued. It shows a profit, including balance brought forward from Dec. 30th, 1890, of £251,121 18s. 7d. The production of gold during the year was 93,991 oz. 10 dwts., 66,850 oz. 10 dwts. of which was from the mill, 19,260 oz. from the reduction of tailings, and 7,881 oz. from concentrates. During the year they have driven and sunk 11,732 ft. of workings. The third and fourth levels have been driven in pyritic ore, and Nos. 2 and 3 shafts, cutting the south and main reefs, have been sunk to the fifth level. The reserves of ore in sight, according to the report, exclusive of the main reef, amount to 40,582 tons, being about 20,050 tons in excess of the reserves at the end of 1890. During the year a compressed air plant supplying power to drills has been erected, and began operations in September last. Eleven drills have been employed

daily, averaging 20 ft. a week per drill. Twenty stamps and 36 Frue Vanners have been added to the 40-stamp mill. 87.52 per cent. of the ore was free milling and 12.48 per cent. was pyritic; 71.04 per cent. of the gold was extracted, the stamps crushing 4.1 tons to the head. Experiments were made on the pyritic ore showing that from 69.77 to 82.16 per cent. of the gold could be recovered by amalgamation and 9.3 and 5.18 per cent. respectively in the concentrates; while 20.93 per cent. and 12.66 per cent. were lost in the tailings. The Vanners are said to work efficiently, and have added 5.41 per cent. to the year's output of gold through concentrated ores worth 4 oz. 15 dwts. per ton. The concentrates are worked by chlorination. The chlorination works yielded during the year 7,982 oz. of fine gold. The long hearth reverberatory furnace, modeled after that of the Alaska Treadwell mine, is used for roasting the ore. The contract with the Gold Recovery Syndicate using the McArthur-Forrest cyanide process for the treatment of 10,000 tons of tailings was completed in June last. The yield by this process amounted to 19,260 oz. The plant has been added to and started partial work in December, producing for that month 1,043 oz. 12 dwts. of bullion. It is now capable of treating about 8,000 tons per month. Twelve circular open leaching vats of improved design, each having a capacity of 2,000 cu. ft. and holding 100 tons of tailings and cyanide solution, have been built. The average number of employees for the year was 257 white men and 860 Kaffirs. This includes all hands on construction works. Dividends amounting to £136,000 were declared against £108,000 for the year 1890.

SOUTH AMERICA.

Venezuela.

El Callao Mining Company, Venezuela.—The report of this company for the year ending Dec. 31st, 1891, has been issued. During the year 558,494 tons of ore yielding 34,239.41 oz. of gold were crushed, an average of .58 oz. to the ton. Compared with the previous year, this yield was .34 oz. less, a depreciation in the total yield of 1891 of 14,687.78 oz. This was due to the failure to discover richer deposits and the thinness of the vein. Notwithstanding the increased ore output and the heavy prospecting cost, the total expenditure for the year is some \$150,000 less than that of the year before, a saving in the cost of nearly \$4 per ton. This saving has been effected through a reduction in wages of 8 to 10%, and curtailing the labor and staff force, as well as economies in the use of supplies, and increased facilities for obtaining firewood and timber. The mine cannot be said to be in a satisfactory condition, the vein as far as the new ground has been opened up having been shown to be extremely narrow. The mill operations during the year have been extremely satisfactory regarding the crushing capacity and the cost per ton. The returns show a further reduction in the cost of from 7.82 francs in 1890 to 6.29 francs in 1891, an increase in capacity of nearly 5,000 tons. This cost per ton has been steadily reduced since the erection of the new modern 60-stamp mill plant by Frascr & Chalmers in 1885 from 18.4 francs in that year. This reduction reflects much credit on the makers of the machinery and on the efficient management. The mining expenses amounted to 41.23 francs per ton, divided as follows: Labor, 20.73 francs; wood, 7.44 francs; explosives, 4.01 francs; supplies, 2.32 francs; water and light, .51 francs; shop work, 2.63 francs; general expenses, 3.54 francs. The milling expenses as stated before were 6.29 francs, divided as follows: Labor, 1.89 francs; wood, 1.56 francs; supplies, 1.94 francs; shop work, 1.05 francs—less .65 francs for water supplied for electrical use in mine, for water supplied to outside parties, and for a certain profit on reducing 469 tons of custom ore—and general expenses of .60 francs.

CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, May 20.

Heavy Chemicals.—The past week has seen a very quiet market in heavy chemicals. The dullness has been very great, and absolutely nothing of interest can be reported. Carbonated soda ash was unusually quiet, and alkali was not much livelier. Caustic soda was quiet, but prices were well maintained. Of the other chemicals only a small and featureless trade is reported. Prices remain unchanged as follows: Caustic soda, 79 per cent., 2.95@3.10c.; 74%, 2.97½@3.12½c.; 76%, 3.12½@3.25c.; 77%, 3.12½@3.25c. Carbonated soda ash, 48%, 1.62½@1.75c.; 58%, 1.50@1.55c. Alkali, 48%, 1.60@1.65c.; 58%, 1.47½@1.57½c. Sal soda, English, 1.10@1.15c. Bleaching powder, 2.15@2.20c. on the spot, according to quantity.

Acids.—This continues the most active branch of the chemical market. Business, according to manufacturers, is good, although the spot demand is not quite as great as it was two or three weeks ago, the only explanation for the favorable state of affairs which has prevailed for some months past lies in the fact that there has been no overproduction in acids, although the factories were running on full capacity. For many years the acid market was in so unsatisfactory a condition, owing to competition, overproduction and low prices, that no new plants were erected—indeed some were dismantled. There

was no inducement to capital to build new acid works, but now, however, while the acid market has remained stationary, the consumptive capacity of the various users of acids has increased and hence the good trade reported to-day. All rumors to the contrary notwithstanding, prices show no change. We quote 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", \$1.12@\$.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 nitro-glycerine, 11½@12½c., according to quality and quantity.

Brimstone.—This market is quiet but rather firm. Quotations for best un-mixed seconds on the spot are \$24. For May-June shipments prices are given as follows: best un-mixed seconds, \$22.25; best un-mixed thirds, \$21.50.

Fertilizers.—The spring demand has slackened off, and only a small business is reported in fertilizing chemicals. Ammoniates have fallen off in price. Nothing of special interest has transpired. We quote this week: 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, \$1.90 @\$.1.95. 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: 48-53%, \$1.13½@\$.1.23½; 90-95%, \$2.13@\$.2.23½.

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.—The usual arrivals are reported this week. The market is very quiet.

Phosphates.—We are in receipt of the following interesting statistics showing shipments of fertilizers from Charleston, S. C., from September, 1890, to April, 1891, and September, 1891, to April, 1892, inclusive. Total, 1890-91, 280,869 tons, an increase over the corresponding season of 1889-90 of 20,700 tons. Total for 1891-92, 215,894 tons, a decrease over 1890-91 of 64,975 tons. Mr. Paul C. Trenholm sends us the following interesting statistics showing shipments of crude phosphate rock from Charleston, S. C., for April, 1890, 1891 and 1892:

	1890.	1891.	1892.
	Tons.	Tons.	Tons.
Domestic.....	19,134	19,684	11,864
Foreign.....	6,305	.....	.....
Grand total.....	25,439	19,684	11,864

Nitrate.—The market for nitrate continues dull and uninteresting. Goods on the spot are held at \$1.62½.

MINING STOCKS.

[For complete quotations of shares listed in New York, Boston, San Francisco, Baltimore, Denver, Kansas City, Deadwood, Dak., Pittsburgh, St. Louis, London and Paris, see pages 560 and 562.]

NEW YORK, Friday Evening, May 20.

The mining market during the week under review has exhibited no features of interest. Those of our readers who follow this column as a trustworthy source of information know that this has been the tenor of our remarks for several months, but it is a fact that the dullness at the mining exchange has continued unabated all of this year.

From San Francisco reports come of a slightly improved market, but it is exceedingly doubtful whether any great activity will be experienced on the Slope this year. Something entirely unexpected must happen, and the unexpected never happens in this market for mining shares.

The price of the various Tuscarora stocks also show a slight improvement in price. In our opinion this should have occurred long ere now, were it not for the existence of a "ring" at Tuscarora, which is really at the bottom of the depression in prices.

In the Colorado stocks a great and rather unusual lack of interest has been displayed here during the week. Those of California stocks which do not show a decline in prices have been neglected. Other shares listed under the Consolidated Stock & Petroleum Exchange have been devoid of activity. It may be surmised what little interest is taken in mining stocks just now that even rumors are very scarce.

The Comstocks have been very quiet. The official lists of the exchange show few sales this week. We note a transaction in Comstock Tunnel bonds, \$6,000 at 18; of the stock, 2,250 shares were sold at 13@16c.

The only Tuscarora stock dealt in during the week was Nevada Queen, of which 100 shares were sold at \$1. We note the sales of 150 shares Eureka Consolidated at \$2.10.

Of the California stocks sales of Belmont amounted to 2,000, at 35@36c. Brunswick Consolidated appears on the official lists as having been traded in to the extent of 6,200 shares at 16@20c.; at the close the price was 16@17c.

Plymouth Consolidated was rather active during the week, 1,000 shares being sold at 89c.@1.00.

Among the Colorado shares dealt in this week we note a sale of 1,300 shares of Little Chief at 25@26c., and 1,200 shares of Leadville Consolidated at 15@16c. Robinson Consolidated shows a transaction of 500 shares at 46c. In our mining news columns will be found interesting information concerning this com-

pany. There was a sale of 1,000 shares of Lacrosse at 5c.

Among the Black Hills stock California shows sales of 400 shares of 85 cents. A report was current during the week that this company would soon levy an assessment, but no official information to this effect has been received. We learn, however, that the surplus of this company has been exhausted. The superintendent of the company stated recently to a well-known mining man in this city that he expected to commence working on ore shortly and that he thought the proceeds therefrom would help the company out of financial difficulty. The surplus was only about \$22,000 and not \$40,000, as was currently reported. Father De Smet was in some demand during the week, 800 shares being sold at 33 to 35 cents.

Of the Utah stock, Horn Silver was very quiet; only 50 shares were sold during the week at \$3.35. Of Ontario, 60 shares were sold at \$40.

El Cristo had a sale of 100 shares at 50c.

Of Phoenix, Arizona, 300 shares were sold at 42c.

Mr. Leo von Rosenberg is offering for sale \$125,000 first mortgage bonds bearing 6% annual interest of the Polar Rocky Point Gold and Silver Mining Company, of Battle Mountain, Eagle County, Colorado. Mr. von Rosenberg offers \$125,000 in stock of the company as a bonus. The company's capital stock is 250,000 shares of \$1 each. The property has been reported upon by Mr. Eben E. Olcott, of this city.

Boston.

May 19.

(From our Special Correspondent.)

The market the past week has shown a good degree of activity in the leading specialties, and prices generally have held firm, with an advance noted in the Montana group, which has furnished the larger part of the transactions. There is a firmer feeling in ingot copper abroad, which has a tendency to stimulate speculation in mining shares, and it is predicted by those competent to judge that higher prices for all the good copper stocks will prevail during the summer months.

Boston & Montana advanced from \$43 to \$44½, and has been in good demand all the week, closing at \$44 to-day. Butte & Boston has ruled very steady at \$11½@\$.12, over 2,000 shares being taken at these figures, the closing being at about the highest for the week.

Calumet & Hecla has declared a \$5 dividend, payable June 9. The stock sold at \$275 early in the week, and closed to-day at \$267 bid, \$270 asked, ex dividend.

Tamarack also declared its usual dividend of \$4 per share, payable June 16th. Stock sold at \$170, but was a shade off to-day, selling at \$168 for small lots.

There has been considerable excitement in copper circles on the reports from the Tamarack, Jr., that No. 2 shaft was showing indications of the Calumet conglomerate vein. The stock sold up to \$46@\$.47 on the street, and it is stated that it is soon to be listed on the Stock Exchange.

Centennial has been fairly strong the past week, selling up at one time to \$12½, but later declined to \$11½. It is reported that some of the New York stockholders have been taking their profits, but it is quietly taken by parties who believe in the ultimate value of the mine.

Osceola was quite steady at \$31½@\$.32. A dispatch from Lake Linden states that No. 12 shaft of the South Hecla, a branch of the Calumet & Hecla, has struck a rich chute of ground, which encourages the hope of the Osceola being able to reach rich conglomerate again.

Franklin is dull but strong, selling up to \$15½ to-day, a gain of 50c. per share.

Kearsarge sold at \$13, a decline of \$½. A few shares only of Atlantic were quoted at \$11. Allouez sold at \$1 for 100 shares.

Wolverine sold at \$2 for 50 shares. An assessment of 50 cents per share is called for, payable June 15, 1892.

A sale of 675 shares of Mesnard Mining Company at 52½c. per share is reported, the first sale for long period.

Sales of Quincy are reported at \$120. A dispatch was received by the Quincy officials stating that every point in the Pewabic contest had been decided in favor of the Quincy.

Santa Fe advanced from 30c. to 32½c. To-day a flood of stock was poured upon the market, knocking the price down to 17½c. We were not able to hear of any reason for the decline other than the fact that the stock was to be sold, and was offered down until it met purchasers.

Silver stocks continue dull. Catalpa sold at 30c., and Dunkin is offered at 30c. without finding purchasers. Napa Quicksilver sold at \$6½, same as last week.

Chicago.

May 18.

(Special Report by Horace M. Johnson, Chicago, Ill.)

Mesaba Range Mines.—Present cash value of shares May 18th: Boston, \$12; Buckeye, \$30; Biwabik, \$32; Cincinnati, \$5; Champion, \$10; Charleston, \$10; Clark, \$10; Cosmopolitan, \$20; Columbus (fee), \$7.50; Great Northern I. & S. Company, \$1.35; Horton, \$15; Keystone, \$9; Kanawha, \$18; Lincoln, \$10; Lake Superior, \$3.50; Licking, \$7.50; Mesaba Mt., \$18; Mallman, \$1.35; Mountain Iron, \$59; Mesaba Chief, \$6; Minneapolis, \$10; New England, \$15; Shaw, \$9; Twin City, \$20; Virginia, \$12; Washington, \$7.

Gogebic Range Mines.—Aurora, \$8; Ashland, \$50; Anvil, \$3.75; Brotherton, \$2.60; Germania, \$7.50;

Gogebic I Syid, 25c.; Iron Belt, \$1.75; Montreal River, \$8.50; Metropolitan, \$75; Minnewawa, 75c.; Odanah, \$15; Pence, \$1; Section "33," \$9; Windsor, \$—.

Marquette Range.—Champion, \$60; Cleveland, \$18; Jackson, \$100; Lake Superior, \$45; Pittsburgh & Lake Angeline, \$160; Republic, \$18.

Vermillion Range.—Chandler, \$45; Minnesota Iron, \$80.

Prices quoted are based on the actual selling and holding values, as near as can be obtained. Where prices are not quoted, no recent sales have been reported, and prices cannot be named.

The actual market price of these stocks cannot be given satisfactorily, with reference to actual sales, for the reason that prices often advance or depreciate very considerably without a single sale being made. For instance, a block of Republic stock may be sold in Milwaukee or some other city at \$18.50, and at the same time be offered for sale in Chicago, Cleveland, or some other city at a much less price.

Keeping daily informed of the stocks offered in the principal mining stock centers, and from these quotations, together with what is done here, I am able to give the lowest prices at which stocks are offered for sale, which represents, as nearly as can be obtained, the actual selling and holding price.

San Francisco.

May 13.

(From our Special Correspondent.)

A sudden reaction took place in the mining stock market at the opening of the week, and prices that were almost down to bedrock had for a short time a veritable boom. Consolidated California & Virginia advanced from \$3.80 to \$5.50; Ophir from \$2.20 to \$4.50; Mexican from \$1.50 to \$3.10. Best & Belcher from \$2.15 to \$3.50, and the balance of the market also being steadier. The excitement was caused by an improvement in the Ophir and Mexican mines, and as since then the prospect has not been so encouraging the above rates have not been maintained with any steadiness.

To-day, however, prices which were inclined to languish at the close yesterday recovered and the North and Comstocks sold at rates strongly sustained. Consolidated California and Virginia sold to \$4.40, Mexican for \$2.15, Ophir for \$3.20, Sierra Nevada for \$1.50, Union Con., \$1.53 and Utah for 40 cents. The demand for these stocks was active and the shading off at the close was very slight.

Of the middle Comstocks Best & Belcher has shared in the advance inaugurated at the north end. A week ago it sold for \$2.25 and after selling to \$3.50, declined and was ruling to-day at \$2.50. Chollar sold for 90 cents, Gould & Curry for \$1.35, Hale & Norcross, \$1.60; Potosi for \$1.30, and Savage for \$1.50.

In the South End Comstocks and Gold Hill group Belcher has been in favor and has sold from \$1.20, the ruling rate last week, to \$1.45, the selling price to-day. Crown Point at \$1.35 has also shown an advance on the week's trading. Alpha at 20c., Bullion at \$1.20, Consolidated New York at 40c., Exchequer at 40c., Occidental at 50c., Overman at 65c., Seg. Belcher at 45c. and Yellow Jacket at 85c. have remained steady in some instances, a nominal advance of 5c. per share having been made.

The various outside stocks continue languid, the demand being very slight. Of the Tuscaroras Nevada Queen has sold 15 cents stronger during the week, and was quoted to-day at \$1.15, with 500 shares sold. Belle Isle sold for 15 cents, and Navajo for 10 cents.

In the Bodie group Bodie Consolidated has advanced over 100 per cent., selling to-day for 65 cents, with, however, very small sales.

The mining assessments falling delinquent during the month of May make a total amount of \$105,270, the larger portion of which will have to be paid by Comstock stockholders.

SAN FRANCISCO, May 20th.—(By Telegraph).—The opening quotations to-day are as follows: Best & Belcher, \$2.85; Bodie, 35c.; Belle Isle, 25c.; Bulwer, 40c.; Chollar, 85c.; Consolidated California & Virginia, \$4.45; Eureka Consolidated, \$2; Gould & Curry, \$1.30; Hale & Norcross, \$1.45; Mexican, \$1.95; Mono, 60c.; North Belle Isle, 30c.; Navajo, 10c.; Ophir, \$3; Savage, \$1.35; Sierra Nevada, \$1.40; Union Consolidated, \$1.40; Yellow Jacket, 75c.

St. Louis.

(From our Special Correspondent.)

The St. Louis Mining Stock Market is almost too dull to need reporting. During the week not more than a dozen sales were made and the total is below 10,000 shares. The brokers seemed to have lost all interest in stocks, and but little activity shown by any property.

Central Silver sold 3,200 shares at ½c. on Friday and 1,000 shares on the following day at 1c., closing at that figure.

On Saturday a lot of Granite Mountain was placed on the market, 80 shares selling at \$13, and on Tuesday 15 shares more brought \$13.50. Market closes at \$13.

No other sales were made. Changes in quotations are: American and Nettie opened at 57½c., closes at 55c.; Elizabeth opened at 50c., closes at 45c.

MEETINGS.

Himalaya Mining Company, at the office of the company, in Salt Lake City, Utah, May 23th at 7 P.M.

Little Rule Mining Company at the office of the company, Mining Exchange Building, Denver, Colo., May 25th, at 3 P. M.

Wood River Mining and Milling Company, of Idaho, at the office of the company, Rooms 77 and 78, Commercial Block, Salt Lake City, Utah, June 13th, at 2:30 P. M.

DIVIDENDS.

Calumet & Hecla Mining Company, dividend of \$5 per share, \$500,000, payable June 9th at the office of the company in Boston, Mass.

Daly Mining Company, dividend No. 63, of 25 cents per share, \$37,500, payable May 31st, at the office of Messrs. Lounsbury & Co., Mills Building, No. 15 Broad street, New York City. Transfer books close May 25th and reopen June 1st.

Homestake Mining Company, dividend No. 166 of ten cents per share, \$12,500, payable May 25th, at the office of Messrs. Lounsbury & Co., Mills Building, No. 15 Broad street, New York City.

Ontario Silver Mining Company, dividend No. 192 of fifty cents per share, \$75,000, payable May 31st, at the office of Messrs. Lounsbury & Co., Mills Building, No. 15 Broad street, New York City. Transfer books close May 25th, and reopen June 1st.

Tamarack Mining Company, dividend No. 17, of \$4 per share, \$200,000, payable June 16th, at the office of the company in Boston, Mass. Transfer books close May 21st and reopen May 31st.

ASSESSMENTS.

COMPANY.	No.	When levied.	D'th'q't in office.	Day of sale.	Amt. per share.
Alpha Cons., Nev.	8	Apr. 14	May 18	June 8	.15
Brunswick Con. G., Cal.	3	Apr. 15	May 18	June 3	.02
Confidence, Nev.	20	Mar. 30	May 3	May 25	.75
Gold Mountain, Cal.	2	Mar. 29	3	May 23	2.00
Justice, Nev.	50	May 2	June 6	June 27	.15
Lone Star, Cal.	4	Apr. 2	May 14	June 6	.004
Modoc Chief, Idaho	.....	Jan. 28	May 21	June 13	.02½
Norway, Utah	.....	Dec. 24	Feb. 1	July 21	.02
Occidental, Nev.	10	Apr. 6	May 9	May 31	.25
Seg. Belcher & Mides, Nev.	10	Apr. 8	May 11	May 31	.25
Silver Hill, Nev.	30	Mar. 31	May 5	May 25	.10

PIPE LINE CERTIFICATES.

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
May 14.....	56¾	56¾	56¾	56¾	7,000
16.....	56¾	56¾	56¾	56¾	6,000
17.....	57¼	57¼	57	57	8,000
18.....	56¾	56¾	55¾	55¾	7,000
19.....	55¾	56	55¾	55¾	17,000
20.....	55¾	55¾	55¾	55¾	42,000
Total sales in barrels.....					87,000

COAL TRADE REVIEW.

NEW YORK, Friday Evening, May 20th.

Statement of shipments of anthracite coal (approximate), for week ending May 7th, 1892, compared with the corresponding period last year:

Regions.	May 7, 1892.	May 9, 1891.	Difference.
Wyoming Region....	Tons. 385,485	Tons. 386,723	Inc. 3,762
Lehigh Region.....	112,875	139,928	Dec. 27,053
Schuylkill Region....	230,213	216,385	Inc. 3,828
Total.....	728,573	743,036	Dec. 14,463
Total for year to date.....	12,772,983	11,824,703	Inc. 948,280

PRODUCTION OF BITUMINOUS COAL for week ending May 14th, and year from January 1st.

EASTERN AND NORTHERN SHIPMENTS.

	1892.		1891.
	Week.	Year.	Year.
Phila. & Erie R. R.....	1,416	33,610	44,804
Cumberland, Md.....	74,927	1,288,609	1,542,507
Barclay, Pa.....	3,972	75,435	65,806
Broad Top, Pa.....	13,315	218,862	215,361
Clearfield, Pa.....	83,066	1,409,748	1,646,327
Allegheny, Pa.....	27,838	444,972	526,075
Beach Creek, Pa.....	42,031	977,250	884,651
Poconongas Flat Top.....	52,039	904,816	909,103
Kanawha, W. Va.....	39,032	904,379	858,573
Total.....	337,636	6,257,681	6,693,509

WESTERN SHIPMENTS.

	1892.		1891.
	Week.	Year.	Year.
Pittsburg, Pa.....	23,535	486,653	416,864
Westmoreland, Pa.....	28,581	574,284	730,597
Monongahela, Pa.....	12,761	196,549	207,100
Total.....	64,877	1,257,486	1,354,561
Grand total.....	402,513	7,515,147	8,048,070

PRODUCTION OF COKE on line of Pennsylvania R. R. for the year ending May 14th, 1892, and year from January 1st, in tons of 2,000 lbs.: Week, 101,627 tons; year, 2,105,124 tons; to corresponding date in 1891, 1,074,919 tons.

Anthracite.

An improvement is noticeable in the anthracite market. The stocks of coal in this city are diminish-

ing, in consequence of which the volume of business has been good—exceptionally so for this time of the year. The full May prices have been obtained without exception, and the producers thus far have had no cause for complaint. The few "independent operators" who have remained independent have done a particularly good business, but it must not be supposed that it has been obtained by means of concessions as to prices.

Many eyes are turned longingly toward the West; the prospects are good there both for high prices and increased consumption. We know of an instance where a large operator—one of the largest—is actually refusing to sell to any but his old customers, owing to the increase in his Western trade. And there is still another who contemplates entering that field for the first time in case certain negotiations now pending between him and the "combine" come to naught. In this city those coal companies included in the "combination" all report a good local trade, although it is not expected that the allotment for May will be exceeded. It must be understood that a "good business" at this time carries a different meaning since the merging of anthracite interests under control of the Philadelphia and Reading company. The speculative element has been eliminated absolutely. There is now no inducement for a retailer to lay in three or four months' supplies ahead to take advantage of low prices. Under the old order of things the coal miners generally reduced their prices in order to keep the collieries at work during the dull months by means of this speculative buying of the city dealers. The "combination," however, places the rich as well as the poor retailers on precisely the same footing. No concessions are made, and no cutting of prices is indulged in.

Therefore, when we say that a "good business" is doing at present, it must be understood that while no large sales are made, the current consumption is, to say the least, up to expectations.

The actions of John C. Haddock, and of Haddock, Shook & Co., against the Delaware, Lackawanna & Western Railroad, are still unsettled. Negotiations for a compromise are in progress.

Bituminous.

The market for bituminous coal is quiet and rather uninteresting. The blockade on the Pennsylvania Railroad has been relieved to some extent, although cars are by no means as abundant as shippers would wish. Along the line of the Baltimore & Ohio a similar state of affairs is reported. This has not affected South Amboy as much as it has Philadelphia, and local trade is running smoothly, although very quietly.

At Baltimore vessels are in very limited supply, but in Philadelphia they are plentiful. Freight rates are 70@80c. for Boston, Salem and Portland, and 70@75c. for Sound ports; this from Philadelphia, Baltimore, Norfolk and Newport News.

Nothing new has developed in connection with the negotiations said to be pending between the Philadelphia & Reading and the Cresson & Clearfield Railroad.

NOTES OF THE WEEK.

A dispatch from Zanesville, O., states that the Snow Fork & Hocking Railway Company has been organized, with David Lee, of Zanesville, president, and S. P. Peabody, of Columbus, O., secretary. The line will run from New-Straitsville to Athona, and will be a coal feeder for the Baltimore & Ohio Railroad.

Mr. John DuBois has sold 7,000 acres of soft coal and timber land on the line of the projected connection between the Buffalo, Rochester & Pittsburg and Beech Creek railroads. The Vanderhills are said to be the purchasers. The property will be developed at once, furnishing additional tonnage to the Beech Creek and Reading roads.

The many friends of Mr. Theodore S. Mize, the popular Eastern representative of the Chicago *Black Diamond*, will be sorry to learn that he is dangerously ill with inflammatory rheumatism.

Boston.

May 19.

(From our Special Correspondent.)

Dealers here are all very anxious to see what the coal combination is going to do June 1st in regard to prices. It is believed by most of the dealers at present that an advance is most likely. However, there is very little buying. Stocks held here are of very fair proportions, and probably that is the reason why there is so little if any buying.

We quote f. o. b. prices net at New York: Stove, \$4.15; egg, \$3.90; free burning, broken, \$3.75; chestnut, \$3.90; Lykens Valley, broken, \$4.50; egg, \$4.90; stove, \$5.40; chestnut, \$4.50. Prices on Lykens Valley are net at Philadelphia.

In soft coal there is very little doing at present. Prices are rather easy. We quote on cars here \$3.15 for Clearfield and George's Creek \$3.60@3.65.

There is nothing new to note in regard to freight rates. As there is very little call for tonnage, prices are low and easy. We quote: From New York to Boston, 60c.; from Philadelphia to Boston, 85c.; from Philadelphia to Portland, 85c.; to Bath, 90c.; to Providence, 75c.; from Baltimore to Boston, 90c.; Newport News to Boston, 70c.; Sound points, 70c.

In a retail way there is very little if anything doing. The high prices seem to have scared off would-be purchasers. We quote: Stove, \$6; nut, \$6; egg, \$5.75; furnace, \$5.50; Franklin, \$7.25; Lehigh egg, \$6; Lehigh furnace, \$6.

The receipts of coal at the port of Boston for the week ending May 14th were 49,427 tons of anthracite

and 17,199 tons of bituminous, against 32,397 tons of anthracite and 28,171 tons of bituminous for the corresponding week of 1891. The total receipts thus far this year have been 604,640 tons of anthracite and 242,196 tons of bituminous, against 551,443 tons of anthracite and 387,864 tons of bituminous for the same time in 1891.

Buffalo.

May 19.

(From our Special Correspondent.)

The calm which prevails in the anthracite coal trade is phenomenal. There is but little trading done; families are not laying in winter stocks yet, and nearby orders are few and far between. The increase areage in which natural gas is now supplied in the city and the areage that the 20 miles of pipes now being laid will cover indicates a large falling off in the city consumption of coal, although the number of new residences being built will somewhat counterbalance the decreased consumption in certain districts.

Bituminous coal fairly active and market weak in consequence of large receipts.

Coke quiet and unchanged. It is expected that the inequalities existing in coal freights to interior points will be equalized before many days are over, as the general agents are considering the matter with that end in view.

During the month of April 151,495 tons of coal passed the Sault Ste. Marie Canal westward.

The shipment of coal by canal from this port to Eastern points during the second week of May were 1,387 net tons. The rates were as follows: Nine loads to Syracuse at 60c. 55c. and 50c., per gross ton free on and off; one load to Rome at 55c., per net ton free on and off; one load to Fulton at 55c. per gross ton, and one load to Jordan at 50c. per gross ton, both free on and off.

The shipments of coal from this port by lake from May 12th to 18th, both days inclusive, aggregated 60,615 net tons, distributed about as follows: 21,530 to Chicago, 14,900 to Milwaukee, 10,900 to Duluth, 2,630 to Toledo, 13,235 to Superior, 670 to Detroit, 200 to Bay City, 1,850 to Saginaw, 1,400 to Gladstone, 1,650 to Racine and 650 to Sheboygan.

The rates of freight on Monday last advanced 10c. to Chicago and Milwaukee. The quotations were: 40@50c. to Chicago, 50c. to Milwaukee and Sheboygan, 40c. to Saginaw and Sheboygan, 45c. to Marquette, 60c. to Racine, 30c. to Gladstone, Bay City, Duluth and Superior, and 25c. to Toledo and Detroit; closing steady, with large fleet leaving light, as there is but little coal offered for shipment.

It was rumored yesterday that the Helvetia Mining Company had been consolidated with the Rochester & Pittsburg Coal and Iron Company; and further, that the Mahoning Valley Railroad had been leased by the Buffalo, Rochester & Pittsburg Railroad. This deal is of importance to Buffalo, it being the outlet of both companies, and the headquarters of the Bell, Lewis & Yates Coal Mining Company, who controls the output of its own mines as well as those of the Reading & Philadelphia Coal & Iron Company. A local newspaper says: "The Helvetia mines were opened about two years ago when the Buffalo, Rochester & Pittsburg and its mining properties were secured by Messrs. Bell, Lewis & Yates by the purchase of a controlling interest in the road. Adrian Iselin, Jr., who had previously been at the head of the Buffalo, Rochester & Pittsburg, had in his possession about 40,000 acres of coal lands lying between the properties of Bell, Lewis & Yates and the Rochester & Pittsburg Coal and Iron Company, and these he at once began to develop. J. A. Haskell, the former general manager of the Rochester & Pittsburg coal properties, was made general manager and the construction of a railroad line, the Mahoning Valley, begun. This is now nearly completed, and will give to the Buffalo, Rochester & Pittsburg good connections."

There are some speculative utterances in coal circles as to whether the Philadelphia & Reading Company is working with the aim of controlling in a great measure the bituminous coal output.

Chicago.

May 19.

(From our Special Correspondent.)

Agents' traveling salesmen report orders of 10 to 50 car lots between here and the Mississippi, but country trade is light, and all orders taken are for immediate shipment. It is a little early yet for the Missouri River anthracite trade. There is a large increase in the receipts of vessel and all-soft coal as compared with a year ago. The increase via the lake is over 50%, and as the docks and yards were well cleaned up, they have a greater storage capacity than average previous years have shown. Retail trade keeps up remarkably well, not only for immediate consumption, but also on orders and contracts for next season's supply; this, of course, applies to private consumers who do not care to run the risk of further advances, and can as well afford to pay for their coal now as several months later. Shippers, that is companies' agents, report some inquiry for coal, but the market as a whole is remarkably quiet as contrasted with the activity which obtained a year ago at this season. The prevailing impression in the retail trade is that to continue present prices until July, and then make an advance if the combine see fit, or deem wise to do so, will result in a more satisfactory trade, than to advance the circular June 1st. The latter course would drive buyers and consumers to hold off to the very last moment before placing any orders, while the former would unquestionably stimulate trade and give a better business in June and move stocks from

dock and yard. The sensation of the week was the attempted investigation of the consolidated companies by the Federal Grand Jury. The United States District Attorney issued subpoenas on the agents of the Philadelphia & Reading, Delaware & Hudson Canal Company, Pennsylvania Coal Company and others. They one and all stated on oath that personally they were ignorant of the existence of any combine, and knew of it only through the newspapers. That not one, but half a dozen railroads, carrying companies and private concerns controlled the anthracite coal trade, and to their certain knowledge some of them had entered into no combination. When asked how or why the recent advance had been brought about, they replied that operators were working under a better system by which a uniformity of prices was assured to all concerned. The whole thing was treated as a good joke, and the United States District Attorney stated his belief that the representatives here knew nothing, that there was no trial evidence whatever, but that it was patent to himself and the Federal Grand Jury that there was a "combine." The Government must look East for the facts, as it was there that the situation was controlled and not here. Regular circular quotations are steadily held at \$5.35 for car coal, \$5.50 from dock or yard, \$6.50 delivered to domestic and small consumers.

Bituminous coal is rather dull and evidence is not wanting that some sharp cuts are being made on all grades of coal—eastern as well as western. Some of the railroad and other large contracts now being consummated are all at extremely low prices. There is of course a heavy curtailment in consumption of steam coal by reason of the mild weather necessitating the use of less steam heat in large factory buildings and down town offices. In some instances the reduction in deliveries of fuel range as high as 30 to 35 per cent. of what it was two months ago.

Coke is in somewhat better demand, but as this fuel is largely dependent on the iron trade, improvement to any extent cannot be expected until that is in a more flourishing condition.

Quotations are: \$4.65 furnace; \$5.05 foundry, crushed; \$5.40 Connellsville; West Virginia, \$3.00 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, \$6.35; large egg, \$5.35; small egg, range and chestnut, \$5.35. Retail prices per ton are: Large egg, \$6.50; small egg, range and chestnut, \$6.50.

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

Pittsburg. May 19.

(From our Special Correspondent.)

Coal.—The market since our last has exhibited no particular change. The mild weather caused a falling off in the local demand. Trade generally was dull. The supply in the Western and Southern markets is largely in excess of the demand—result, prices weak and very uncertain. Most of the mines in the pools are partially running. Another rise in the Ohio enabled the coal men to forward to Cincinnati 1,127,000 bushels; Louisville, 2,131,000; total, 3,258,000 bushels. Coal for some time has been shipped as fast as loaded.

A big coal deal: Washington County coal territory is on the boom and beds of black diamonds promise eventually to yield larger returns and more lasting industrial growth than the fleeting benefits of an oil excitement. The latest purchase by an outside company was that of 900 acres of the finest coal land in Cecil township by the Pennsylvania and Ohio Coal Company. Pittsburg parties are endeavoring to make a deal whereby they will control the land lying at McGlaughlins, Blythe & Co.'s works and the Charleroi fields, and if they are successful operations will be pushed at once.

Connellsville Coke.—The market was dull, business being very much restricted—blowing out ovens being the rule, not the exception. There is considerable anxiety among the cokers as to whether there will be any difficulty in regard to the signing of the iron scale. Prices are the same as those that have governed the market for some time; so far as can be learned no change is looked for. A dispatch from Uniontown says: "The big coke plant of the Oliver Coke and Furnace Company, on the edge of Uniontown, will be started up in full next week. By that time 300 ovens at the No. 1 shaft will be fired at once. The superintendent says they will employ 450 to 500 men. They have been working 220 men heretofore and when the second block of 300 ovens are finished will employ 700 to 800 men."

METAL MARKET.

NEW YORK, Friday Evening, May 20, 1892.
Prices of Silver Per Ounce Troy.

May.	London, Pence.	N. Y. Cents.	Sterling Exchange.	Value of sil. in \$.	May.	London, Pence.	N. Y. Cents.	Sterling Exchange.	Value of sil. in \$.
14	40%	88%	4.87%	.681	18	40%	87%	4.87%	.677
16	40%	88%	4.87%	.681	19	40%	87%	4.87%	.678
17	40%	87%	4.87%	.677	20	40%	87%	4.87%	.679

Silver has remained during past week steady to firm. Amount of offerings have been sufficient to meet the demand. Speculation has been tame and without feature. No developments in regard to silver conference have occurred beyond the announcement that it will probably be held at Brussels.

Silver Bullion Purchases.

WASHINGTON, D. C., May 20, 1892.—(By Telegraph).—The Treasury Department purchased to-day 455,000 oz. fine silver at prices ranging from '885 to '8865 per oz. fine.

Silver Bullion Certificates.

	Price.		Sales.
	H.	L.	
May 14.....	.....	.....	.....
May 16.....	88 1/2	.....	7,000
May 17.....	88 1/2	88	60,000
May 18.....	88	87 3/4	12,000
May 19.....	88 1/2	.....	20,000
May 20.....	88 3/4	.....	65,000
Total sales.....	.....	.....	227,000

Copper.—The market for lake copper has been somewhat irregular this week; some sales have been made at 12 1/4 and 12 1/10, but the bulk of the business was done at 12c., and ingot copper for present delivery sold even at 11 1/8 and 11 1/10. There is considerable uncertainty regarding the result of the negotiations to restrict production, which are now dragging along. Evidently there is some diversity of opinion between the American and foreign producers, and it is difficult to overcome the difficulties naturally attendant upon the diverse interests.

No lake copper can be exported at present prices, and home consumers have not been buying as freely as some weeks ago, and the fact that Lake copper is somewhat above the price of all other brands is interfering with sales. Copper is held at 11 1/4 @ 1/2. We have not heard of any sales of Arizona pig copper, of which considerable quantities have been accumulated here in New York.

The foreign market has been rather strong, and prices show a considerable advance. G. M. B.'s closing at £47 7s. 6d. for spot and £47 15s. for three months prompt, and for manufactured copper we quote: English Tough, £49 10s. @ £50; Best Selected, £50 10s. @ £51; Strong Sheets, £57 10s. @ £58; India Sheets, £55 @ £55 10s.; Yellow Metal Sheets, 5 1/4.

According to our cables the statistics for the first half of this month show a decrease of 100 tons, which, considering the heavy shipments of furnace material which have been made from here, is a favorable sign.

Tin continues exceedingly strong and prices are again rather higher. From the reports which come to hand from England it appears that nearly all the spot tin or that near to hand is held in a few hands and it is not at all impossible that in June we shall see a considerable corner in spot tin. Shipments from the East continue on a moderate scale, and with the good consumption there is every probability of the article being much higher before very long. Considerable business has been done from day to day, and we have now to quote for spot 21 3/4 @ 35, while for futures considerable of an advance is obtainable and there are free buyers for the last four or five months of the year at 21 1/2.

In London the market has steadily risen and closes at £97 for spot and at £96 15s. for three months.

Lead continues quiet, but rather steady, with little alteration from 4 1/4 @ .275. The strikes in Idaho are not yet over and it is reported that the mine owners are securing non-union workman to operate the mines, which, it is expected, will be the cause of further trouble.

In London the market is somewhat higher, being quoted at £10 12s. 6d. for Spanish and at £10. 15s. for English lead.

Chicago Lead Market.—The Post, Boynton Strong Co. telegraph us as follows: "The market during the past week has been quiet, though sales of some 500 tons of soft Missouri and desilverized have been made at 4 1/2 @ 4 1/2 c. Consumers are apathetic, and buying from hand to mouth only. Spelter firm though quiet at 4 7/10c."

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: "Lead firm and moderately active; about 1,200 tons common sold during the past week at 4 07 1/2 c. Market closes strong at 4 07 1/2 c. hid and 4 10c. asked."

Spelter is very irregular indeed; spot is rather scarce, and the shipments from the West are considerably interfered with by the heavy floods along the Missouri and Mississippi rivers. Future deliveries are very much pressed for sale from different sides, and sales thereof have taken place at 4 70, New York, and we are told, even at somewhat below that figure. The production in the West certainly is rather large, and although somewhat interfered with just now by the rains, will no doubt soon be fully up to the capacity.

The London market is steady, spot being quoted at £22 12s. 6d. and June and July delivery at £22 7s. 6d.

Antimony is very firm, with but little obtainable on the spot. Cookson's at 15c., and L. X. at 13c.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, May 20, 1892.

Pig Iron.—In this market the dullness which we have reported for several week past has undergone no change, either for the better or the worse. The demand continues light and prices are as low as ever. While we hear that in certain iron centers an improved demand has been felt, it is doubtful whether the increase amounts to much, and certainly no reports have been received of better prices. The iron trade is in an unsatisfactory a condition as ever. We quote: 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.—This market continues as dull and uninteresting as ever. No business is reported. Quotations remain nominally as follows: 20% spiegeleisen, \$26@27, and 80% ferro-manganese, \$61@62.

Steel Rails.—A thorough canvass of the trade fails to bring to light any sales of importance. A majority of the mills have sold only small lots of steel rails, which, however, aggregate a fair quantity. There has been no change in prices, and we continue to quote rails at \$30 at mill and \$30.75 tide water.

Rail Fastenings.—No business is reported in this market. We quote this week as follows: Fish and angle plates, 1 65 @ 1 70c.; spikes, 1 95 @ 2c.; bolt and square nuts, 2 70 @ 2 80c.; hexagonal nuts, 2 80c.

Merchant Steel.—This market has been very quiet of late, in sympathy with the general iron market. Prices continue unchanged as follows: Mushet's special, 48c.; English tool, 15c. net; American tool steel, 6 1/2 @ 7 1/2 c.; 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 Pipes.—There is nothing of interest to report in this market. The volume of business shows no increase. Prices remain unchanged: We quote ruling discounts as follows: Butt, black, 57 1/2%; 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.—No improvement is noticeable in this market as yet. The various labor difficulties in the building material trades make it possible that the coming season may not be as good as has been expected. As yet the strikes have not had any appreciable effect in the structural iron market, but should they continue they would no doubt prove harmful. Prices show no change. We quote this week: Beams, 2 30 @ 2 50c.; angles, 2 @ 2 10c.; sheared plates, 1 90 @ 2c.; tees, 2 40 @ 2 60c.; channels, 2 40 @ 2 50c. Universal plates, 2 @ 2 10c.; bridge plates, 2 @ 2 10c. on dock.

Old Material.—There is very little doing in this market. A sale of old iron rails at \$17.50 is reported. If this is true it shows plainly in what condition the iron market is to-day.

Buffalo. May 18.

(Special report by Rogers, Brown & Co.)

No noticeable change has occurred in the market during the week. Some large orders have been placed, but the general run is of the carload or one hundred ton variety. Prices remain unchanged with a very severe competition on all business going. We quote for cash f. o. b. cars Buffalo: No. 1X Foundry Strong Coke Iron Lake Superior ore, \$15.75; No. 2X 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, \$17; Lake Superior Charcoal, \$16.50 to \$17; Tennessee Charcoal, \$17.50; Southern Soft No. 1, \$14.65; Alabama Car Wheel, \$19; Hanging Rock Charcoal, \$20.50.

Chicago. May 19.

(From our Special Correspondent.)

A number of large transactions, involving upward of 15,000 tons of crude iron of local make, and which had been pending for several weeks, were placed under contract last week. These were for extended deliveries until the early months of 1893, and were all for coke iron. The week under review and the first few days of this one have been marked by a masterful inactivity, and although the statistical report of furnace output and stocks on hand show some reduction, that fact has added no improved tone to the market. Much interest is concentrated on Lake Superior charcoal as there is now only a matter of half a dollar between the heavy consumers and furnace agents, the latter having dropped a quarter dollar during the week. A notable mining transaction has just been made public. One of the largest mining companies in this country, if not in the world, has been formed in Chicago. The company now own some 31 mining claims in the Hanover Valley, New Mexico. The iron ore is said to be of the best Bessemer steel quality. The value is estimated at from 15 to 25 million dollars. Some of the wealthiest mine owners in the country are interested in the deal.

The boiler-makers are still out on strike and only four shops are running which have signed the scale. The sheet metal workers will strike this week unless their claims are conceded. Bars and sheets are quiet, but firmer, in this market. An active inquiry continues for structurals of all kinds. Soft steels are in good inquiry and the outlook in this line is excellent. Old material continues inert.

Pig Iron.—Lake Superior charcoal iron, though quiet, is attracting more attention than any other grade. Several of the largest consumers in this vicinity have fixed their limit at \$16 for good round quantities and believe that by waiting furnace agents will yield. A number of good orders could be placed at that price but agents say that \$16.50 is the best they will do, and so matters stand at present. General foundry work appears to be improving and consumption goes on at an enormous rate. Appearances indicate that smelting of coke iron in this vicinity is greater than the output of local furnaces now in blast. The principal makers in the South are endeavoring to hold up values, but are making poor success of it. With the exception of the large deals closed for coke iron already noticed, demand is chiefly confined to small amounts, from carloads up to 100 tons, though a sale of 800 tons of No. 1 local make was made at \$15, our outside quotation. No. 2 Southern soft iron is in moderate demand at better figures than current several weeks ago.

Quotations per gross ton f. o. b. Chicago are: Lake Superior charcoal, \$16.50@17; 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, \$14.75; No. 2, \$14.25; No. 3, \$13.75; Southern coke, soft, No. 1, \$14; No. 2, \$13.25; 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.—The bridge works here report quite an accession of business, inquiry is good in all branches, and out of store demand for lots aggregate a good tonnage. Regular quotations, car lots f. o. b. Chicago, are as follows: Angles, \$1.95@2; tees, \$2.20@2.30; universal plates, \$1.95@2; sheared plates, \$1.95@2; beams and channels, \$2.10@2.25.

Plates.—The strike of the boiler makers is *in statu quo*, and at present there are no indications of an early settlement. There is of course no local business, and that from outside points is light, as agents' warehouses are closely watched by the strikers to see where material is shipped. Steel sheets, 10 to 14, \$2.30@2.40; iron sheets, 10 to 14, \$2.20@2.30; tank iron or steel, \$2.10@2.15; shell iron or steel, \$2.75@3; firebox steel, \$4.25@5.50; flange steel, \$2.75@3.00; boiler rivets, \$4.00@4.15; boiler tubes, 2½ in. and smaller, 55%; 7 in. and upward, 65%.

Merchant Steel.—There is a strong tendency among manufacturers to place contracts for the coming season's supplies. Implement makers are several weeks ahead of their usual time for buying and mill agents are kept busy looking after the trade now on the market. While prices are low there has not been as much activity for months. Tool steel is in good demand from agents' warehouses. 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@1.80; open hearth machinery, \$2.40@2.60; open hearth carriage spring, \$2.25@2.30; crucible spring, \$3.75@4.

Galvanized Sheet Iron.—The sheet metal workers threaten to strike this week. Demand is only fair and prices weak, but unchanged at 70 and 10% on mill lots and 67½ and 5% off on Juanita and 67½ and 10% off on charcoal from warehouse. An extra 2½ to 5% is given on large orders.

Black Sheet Iron.—Mill agents are chary of accepting contracts for delivery after July, and some have booked all the orders they care for between now and then. Prices, too, are firming up, and 2½c. for No. 27 common would be hard to shads. Dealers quote 3@3.10c. from stock.

Bar Iron.—The attitude of some mill agents is very firm, but there is still some weakness. There is a good inquiry from nearly all sources, but it is slow to materialize into actual business. Ordinary quotations are 1.57½@1.62½c. with half extras added, and 1.65c. for all muck bar. On fancy specifications these figures could probably be shaded. Jobbing orders are quoted at 1.75@1.85c., rates according to quality.

Nails.—Wire nails are decidedly weak and selling as low as steel cut and \$1.50 from mill, equal to \$1.65 here, is freely quoted, and some mills are shading that price. Jobbing quotation is \$1.70 from stock in small lots. Steel cut are in light demand and price weak at \$1.50 mill, regular 30c. average. Dealers quote \$1.70 from stock in less than car loads.

Steel Rails.—As we have freely foreshadowed in our report on steel rails, the contracts placed by the Northwestern systems have not been sufficient to meet requirements and further orders are being placed. A number of inquiries covering extensions are also noted. Quotations are \$31@32.50 according to quantity and delivery, and some pressure would have to be used to get an order out before September 1st. Other track supplies are in fair demand at \$1.70 for iron or steel splice bars; spikes, \$2.05@2.15 per 100 lbs.; track bolts, hexagonal nuts, \$2.65@2.70; square, \$2.55.

Scrap.—The market is flat and without any indications of an early reaction. Prices are nominal at: No. 1 railroad, \$16.50; No. 1 forge, \$15.50; No. 1 mill, \$10.50; fish plates, \$18; axles, \$21; horseshoes, \$16.50; pipes and flues, \$7; cast borings, \$6.50; wrought turnings, \$9; axle turnings, \$10.50; machinery castings, \$10; stove

plates, \$8.50; mixed steel, \$10.50; coil steel, \$14; leaf steel, \$15; tires, \$15.

Old Material.—There is only a light movement of iron rails at \$18.50. Mixed lengths of old steel rails are in some demand at \$12, but selected lengths are a drug at \$13.50@14. Car wheels are very slow at \$15.

Louisville. May 14.

(Special Report by Hall Brothers & Co.)

A very quiet market has ruled for the past week, a few orders for as much as 500 tons have been placed, but at prices heretofore unheard of. No. 2 foundry has been sold as low as \$9.75 Birmingham, and it is said in one case to have sold for even less than this. Competition is so acute that whenever an order is offered there is no way of guessing at what figure it will be taken. No. 1 foundry and Grey Forge are said to have been sold on equally as low a basis as the No. 2 foundry. In fact there is an abundance of all grades for sales, and buyers have only to name their figures, which meet with prompt acceptance by some one.

Hot Blast Foundry Irons.—Southern coke No. 1, \$14@14.25; Southern coke No. 2, \$13@13.25; Southern coke No. 3, \$12.75@13; Southern charcoal No. 1, \$16@17; Southern charcoal No. 2, \$15.50@16; Missouri charcoal No. 1, \$17@17.50; Missouri charcoal No. 2, \$16.50@17.

Forge Irons.—Neutral coke, \$12.50@12.75; cold short, \$12.25@12.50; mottled, \$11.50@12.

Car Wheel and Malleable Irons.—Southern (standard brands), \$20@21; Southern (other brands), \$18.50@19.50; Lake Superior, \$19.50@20.50.

Philadelphia. May 19.

(From our Special Correspondent.)

Pig Iron.—The closing of a few orders for large lots of both forge and foundry iron for summer delivery by buyers who had about run out of stock, gave rise to the rumor this week that there was quite an active demand. This activity is genuine, and will continue, provided other parties who are almost out of stock will pursue the same course. Prices continue very weak, and strange as the statement may appear, shadings are being made from \$16 for No. 1 and from \$14 for forge. It is also true that two or, perhaps, three brands, are sold at a little higher than two weeks ago for spot cash, immediate delivery, but this does not mean that an advance is likely to take place in iron generally. Southern irons are being as liberally offered as ever, but there are not many sales reported.

Muck Bars.—Offers are being made at \$24.50 delivered, and this is about all that certain buyers will pay.

Steel Billets.—To-day's reports are that there are inquiries for some three or four thousand tons all told. Buyers in the Schuylkill Valley are willing to pay \$24.50 for immediate delivery. A slight advance will probably be effected on billets coming from western points after June 1st, due to freight.

Merchant Iron.—It is hardly correct to say that there has been an improvement in demand, but iron makers talk more hopefully, and store keepers are shipping more iron. Prices continue weak at 1.60@1.70. There are indications for a little more activity for the summer.

Sheet Iron.—Competition is very close on common sheets. Galvanized is also shaded, but there is a good deal of business coming in, sufficient to impart vitality to the market. Very large orders are exceptional.

Merchant Steel.—A good deal of material is being shipped to customers on old orders, and the merchant steel makers say there will be a good demand as soon as a number of contracts are out, which will be about the middle of June.

Nails.—The nail trade continues quite active, but unfortunately production is too heavy for the maintenance of strong prices. It is not at all probable that there will be any improvement on this account; slight concessions are still occurring.

Skelp Iron.—Business is very light and there is scarcely anything to report.

Wrought Iron Pipe.—Some business is going on on large wrought iron pipe orders, but actual business in hand is not heavy.

Plate and Tank Iron.—Small orders are the rule; it is impossible to gather any information concerning late rumors of large transactions. Buyers have things their own way. Tank is about 1.80 for iron or steel; shell, 2.10 for steel; firebox, 2½@4, according to quality.

Structural Material.—Additional cutting has been going on for some orders for channels and prices are very low. Bridge plates 1.85.

Steel Rails.—Steel rails are \$30; new orders trifling; prospects not bright.

Old Rails.—A few small orders have been filled this week at usual prices.

Pittsburg. May 19.

(From our Special Correspondent.)

Iron and Steel.—Trade during the week was not very active. In regard to certain articles the same unsettled condition of affairs continues, and there seems little indications of any early change for the better. The Amalgamated Iron and Steel Scale will come up for adjustment on July 1; what the result will be will be learned later. As usual, there are plenty of rumors of what will be demanded from

both parties; as a general thing, rumors do not usually count for much.

As a matter of fact, business has been in a very unsatisfactory condition for some time. Certain descriptions of iron and steel have been disposed of at the lowest prices ever recorded. It seems very evident at this time that bottom prices have been reached. There are certain makes of pig iron the makers of which have set the figures and refuse to accept less; as usual, city-made iron continues to command the top figures. On the other hand, there are unknown and outside brands that require shading before sales can be effected; their sales are generally of limited amounts and are used as mixtures with better descriptions of iron. There are certain buyers considering that present prices are likely to continue for some time yet, and that, therefore, nothing is to be gained by purchasing ahead unless concessions from present rates can be secured for future delivery. Sellers, however, as a general thing are not very anxious to make contracts for long deliveries at present spot prices, feeling that it is only a question of a few months before trade will improve.

There are many furnaces whose condition compels them to realize on current output, and the forcing of this iron on the market cannot fail in exerting a depressing effect. The competition of the Southern producers continues brisk at certain points in the west and in the valleys. A dispatch from Youngstown says: "It is now certain that a new steel plant will be erected near this city during the summer, and that it will furnish employment to from 800 to 1,000 men. The capital stock has been placed at \$500,000. The major part of it has been subscribed, and there is little doubt of the entire amount being placed here. Among those who have taken large blocks of the stock are the Youngstown Iron and Steel Company, the Andrews Iron Company, and the Mahoning Valley Company. It is expected that the output of the plant will be from 800 to 1,000 tons per day, all of which will find a ready market in the rolling mills of the Mahoning Valley."

A leading dealer has this to say: "The expected movement toward better prices has not yet put in an appearance. Nevertheless, things are shaping in that direction, and the influence now in operation must, in the not very distant future, develop something of that kind. The steady decrease in the supply must of itself bring about an adjustment eventually, but when we add to that a little better demand, the movement when once started ought to be a fairly rapid one. But the trade is not easily aroused, and before such a theory meets general acceptance it will need to be almost an accomplished fact. Improvement brought about by decreasing productions is not one to arouse much enthusiasm, although it is usually a preliminary to a market of a more definite and decided character. A reduction of the output of pig iron at the rate of over three quarters of a million tons per annum, within sixty days, is a pretty heavy shrinkage, and upon that basis it is believed that demand and supply will soon be adjusted to current requirements."

The following sales tell the whole story:

Standard Bessemer Ore.	
15,000 Tons Standard Bessemer Ore, on wharf at Erie.....	\$4.10
Coke Smelted Lake and Native Ores.	
3,000 Tons Bessemer, May, June, July.....	\$14.35 cash.
3,000 Tons Bessemer, June, July.....	14.25 cash.
2,500 Tons Grey Forge, at City Furnace.....	14.50 cash.
2,000 Tons Bessemer.....	14.45 cash.
1,000 Tons Grey Forge Valley Furnace.....	13.80 cash.
1,000 Tons Grey Forge, City Furnace.....	13.00 cash.
1,000 Tons Bessemer, June.....	14.35 cash.
1,000 Tons Grey Forge.....	12.85 cash.
500 Tons Grey Forge, May, June.....	12.80 cash.
500 Tons Bessemer, June.....	14.30 cash.
500 Tons Grey Forge.....	13.00 cash.
500 Tons Bessemer.....	14.40 cash.
150 Tons Grey Forge.....	12.90 cash.
150 Tons No. 2 Foundry.....	14.25 cash.
100 Tons No. 3 Foundry.....	13.50 cash.
100 Tons No. 1 Silvery.....	16.75 cash.
Charcoal.	
100 Tons Cold Blast, Southern.....	\$24.00 cash.
75 Tons Cold Blast.....	25.50 cash.
75 Tons Warm Blast.....	13.00 cash.
50 Tons No. 2 Foundry.....	20.50 cash.
50 Tons No. 1 Foundry.....	21.00 cash.
Steel Slabs and Billets.	
1,000 Tons Steel Billets, June, July.....	22.50 cash.
750 Tons 4-in. Billets.....	23.00 cash.
500 Tons Steel Billets, May, June.....	22.60 cash.
300 Tons Steel Billets, June.....	22.50 cash.
200 Tons Small Billets, delivered.....	26.25 cash.
100 Tons Steel Billets.....	22.75 cash.
Muck Bar.	
500 Tons Neutral, May.....	25.60 cash.
500 Tons Neutral, June.....	25.00 cash.
Skelp Iron.	
600 Tons Sheared Iron.....	1.80 4m.
400 Tons Wide Grooved.....	1.57½ 4m.
350 Tons Narrow Grooved.....	1.55 4m.
Steel Skelp.	
700 Tons Wide Grooved.....	1.50 4m.
400 Tons Narrow Grooved.....	1.40 4m.
Ferro Manganese.	
200 Tons 80% imported seaboard.....	59.25 cash.
Steel Wire Rods.	
600 Tons American Fives.....	31.75 cash.
Bloom, Beam, R. & C. Ends.	
1,250 Tons Bloom and Rail Ends.....	16.50 cash.
Old Iron and Steel Rails.	
500 Tons Old Iron Rails.....	20.25 cash.
500 Tons Old Steel Rails.....	15.50 cash.
500 Tons Old Iron Rails.....	20.50 cash.
Scrap Material.	
500 Tons No. 1 W. R. R. Scrap, net.....	16.00 cash.
200 Tons Wrought Turnings, net.....	12.00 cash.
150 Tons Cast Scrap, gross.....	12.25 cash.
100 Tons Cast Borings, gross.....	8.75 cash.
100 Tons Leaf Steel, gross.....	20.25 cash.
75 Tons Cast Steel, gross.....	18.50 cash.
50 Tons Locomotive Tires, net.....	15.50 cash.

DIVIDEND-PAYING MINES.

NON-DIVIDEND PAYING MINES.

Table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES (No., Par), ASSESSMENTS (Total levied, Date and amount of last), DIVIDENDS (Total paid, Date & amount of last). Rows include Adams, Alice, Alma & Nel Wood, etc.

Table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES (No., Par), ASSESSMENTS (Total levied, Date and am't of last). Rows include Allegheny, Alliance, Alton, etc.

G. Gold, S. Silver, L. Lead, C. Copper. * Non-assessable. + This company, as the Western, up to December 10th, 1881, paid \$1,400,000. † Non-assessable for three years. ‡ The Deadwood previously paid \$275,000 in eleven dividends and the Terra \$75,000. Previous to the consolidation in August, 1884, the California had paid \$31,320,000 in dividends, and the Con. Virgin \$4,000,000. § Previous to the consolidation of the Copper Queen with the Atlanta, August, 1888, the Copper Queen had paid \$1,350,000 in dividends. ¶ This company paid \$190,000 before reorganization in 1880. ** This company acquired the property of the Raymond & W. Company which had paid \$3,075,000 in dividends.

STOCK MARKET QUOTATIONS.

Aspen. May 16. The closing quotations were as follows:

Table of stock market quotations for Aspen, May 16. Lists various stocks like Agnes C., Argentinum Junilata, Aspen Deep Shaft, etc., with bid and asked prices.

Baltimore, Md. May 19.

Table of stock market quotations for Baltimore, Md., May 19. Lists companies like Atlantic Coal, Balt. & N. C., Big Vein Coal, etc.

Pittsburg, Pa. Prices highest and lowest for the week ending May 19:

Table of stock market quotations for Pittsburg, Pa., May 19. Lists companies like Allegheny Gas Co., Bridgewater Gas Co., Chartiers Val. Gas, etc.

St. Louis. May 18. CLOSING PRICES.

Table of stock market quotations for St. Louis, May 18. Lists companies like Adams, Colo., American & Nettie, Colo., Bi-Metallic, Mont., etc.

Deadwood. May 14.

Table of stock market quotations for Deadwood, May 14. Lists various stocks like Bullion, Caledonia, Calumet, Cambrian, etc.

Helena, Mont.

(Special report by SAMUEL K. DAVIS.) Prices highest and lowest for week ending May 14, 1892:

Table of stock market quotations for Helena, Mont., May 14. Lists stocks like Bald Butte (Mont.), Benton Group, Mont., Bi-Metallic, Mont., etc.

Trust Stocks.

Special report by C. I. Hudson & Co., members New York Stock Exchange. The following are the closing quotations May 13:

Table of Trust Stocks closing quotations for May 13. Lists companies like Am. Cotton Oil Co., Am. Sugar Refineries, Distillers' & Cattle Feeders, etc.

Foreign Quotations.

London. May 11.

Table of foreign quotations for London, May 11. Lists various commodities like Alaska Treadwell, Amador, American Belle, etc.

Paris. April 28.

Table of foreign quotations for Paris, April 28. Lists commodities like East Oregon, Forest Hill Divide, Golden River, etc.

CURRENT PRICES.

These quotations are for wholesale lots in New York unless otherwise specified.

Table of current prices for various commodities. Lists items like Acid-Acetic, Commercial, Carbonic, Chromic, Hydrobromic, Hydrocyanic, Hydrofluoric, Alcohol, Absolute, Ammoniated, Alum-Lump, etc.

Powdered, # lb.

Table of prices for powdered and other materials. Lists items like Marble Dust, Metallic Paint, Mineral Wool, Naphtha-Black, Nitro Cake, etc.

THE RARER METALS.

Table of prices for rarer metals. Lists items like Aluminum, Arsenic, Barium, Bismuth, Cadmium, Calcium, Cerium, Chromium, Cobalt, etc.