

THE ENGINEERING AND MINING JOURNAL



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

VOL. XLVII.

MARCH 23.

No. 12.

RICHARD P. ROTHWELL, C.E., M.E., } Editors.
ROSSITER W. RAYMOND, Ph.D., M.E., }

Cable Address: "Rothwell," New York.

Books for review and all communications for the JOURNAL should be addressed. Managing Editor, P.O. Box 1833, New York.

Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND, P. O. Box 1465, New York. Articles written by Mr. Raymond will be signed thus: "and only for articles so signed is he responsible."

London Office: Finsbury Chambers, 76 Finsbury Pavement, London, E. C. Mr. Thomas B. Provis, Civil and Mining Engineer, Manager.

Mexico: Mr. R. E. Chism, M.E., Callejon Espirito Santo No. 4, City of Mexico.

Peru, South America: Mr. John Newton, No 2 Calle Constitucion, Callao.

Australia: Mr. W. Forster, 56 Elizabeth street, Melbourne.

REMITTANCES should always be made by Bank Drafts, Post-Office Orders, or Express Money Orders on New York, payable to THE SCIENTIFIC PUBLISHING COMPANY.

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

SUBSCRIPTION PRICE of the Monthly Export Edition, including postage to any country \$2.50 per volume per year.

All payments must be made in advance. FILE COVERS will be sent by mail for \$1.00, or delivered at office for 75 cents each.

Advertising Rates.—See page xx.

THE SCIENTIFIC PUBLISHING CO., Publishers,

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

The Table of Contents will be found at the end of the reading matter, page 294.

PLATINUM.

During the last year or so there has been a renewed demand for crude platinum, or "platinum sand." There are so many localities in this country where it has been found, that it seems reasonable to believe that a regular platinum-mining industry may at some time be established, perhaps, independently of placer gold-mining.

The placer mines of California, Oregon, and other States and Territories have shown a large number of localities in which platinum occurs. Small lots have come into the market from many of them, and the number would doubtless have been greater had the miners known that the crude metal could be sold in very small quantities. While aware that their "black sand" contained platinum, it seemed hardly worth while to take the trouble to collect the ounce or so of metal which might be obtained at a clean-up.

Now that hydraulic mining in California has received such a set-back from invidious legislation, the quantities of platinum found, or to be found, are naturally less than before. Still, the known localities, where gold mining is still carried on by the hydraulic process, or by sluicing from drift or cement mines, are not few.

It is very possible that some arrangement of the undercurrents, by which a larger quantity of black sand would be collected with the amalgam, might be profitable. Whenever grizzlies are used, the addition of screens, placed below, might be an improvement. The platinum grains are, as a rule, in better shape for concentration than particles of gold, and they do not flour like amalgam.

In cleaning up the main line of sluice in placer mines showing platinum, if pains were taken to collect a comparatively large amount of the heavy material—"black sand," etc.—this, together with the savings from the undercurrents, might be run over some mechanical concentrating apparatus, such as a vanner, with a production of platinum which would pay for the extra trouble.

But there are possibilities of finding platinum in other than gold-mining regions. Of course, wherever the metals occur together, any method of saving gold by gravity will also result in the saving of platinum, if present; and when amalgamation is the principal dependence, as in ordinary sluicing, still gravity is mainly relied on, even if plates are also used, to hold or to catch the amalgam, and, therefore, any platinum which may be present. It may be, however, and very probably, too, that there are localities which have been prospected for gold and abandoned as unprofitable, which would furnish platinum in commercial quantities. The association of the two metals is by no means a necessary condition. That they are in practice found together simply means that a gravity process which saves the one saves also the other. It is, therefore, worth while for prospectors exploring new fields to keep an eye open for platinum.

Within the last few days a noteworthy discovery has been made—

platinum has been found *in place* in the nickeliferous ore of Sudbury, Canada, by Prof. F. W. CLARKE. This discovery was made accidentally, in the course of determinative and analytical work upon the ore, which presents other peculiarities. While the amount found is of little or no commercial importance, it has a very great scientific significance, and is certainly something new. Platinum grains have been found in secondary rocks, such as recent sandstones, conglomerates, etc., but never before, so far as we are aware, in vein stuff, although it has long been looked for, and such an occurrence was to be expected. There is, therefore, always the chance that actual veins of platinum-bearing material, so often falsely reported, may actually be found, and that perhaps some of them may be of a paying grade. The number of localities, and their wide distribution, in this country points to such an outcome.

AFRICAN MINES AND ENGLISH MINING COMPANIES.

The excitement which still prevails in London in regard to South African mining ventures, and the speculation rampant in the shares of the companies formed both there and in the mining districts themselves, make it a matter of interest to examine into the soundness of the basis of the speculation, and the probable effect on mining business in London.

The new companies make their appearance, with considerable capital asked for and subscribed, almost daily, and the field they propose to occupy covers a vast extent of country. Many of these new concerns are simply exploring companies, with great concessions of territory and equally great promises of what is to be found. Of course extensions of good paying mines also abound and are floated at high figures, on the strength of adjoining properties frequently a mile or two distant. There can be no doubt that most of these prospecting companies will prove failures, taking the ordinary average of chances in all other gold fields as a guide. If we turn to the actually producing mines we can see at once how far the present excitement has run ahead of all reasonable calculation. The Witwatersrand gold district is just now the most productive and best developed, and taking the published returns of sixteen of the most successful mines in this district for January, we find less than 14,000 ounces of gold produced, while the selling value represented by the shares of these mines in the market is over £10,750,000. At the most liberal estimate of profit on this monthly production, the return on the above market value cannot exceed 3 per cent per annum, and some of the mines, although only provided with small mills, which there should be no difficulty in keeping steadily supplied with ore, show great irregularity in monthly yield. Of course, construction account and deadwork expenses will wipe out a great deal of this estimated 3 per cent profit, so that those who buy these shares at present prices must be doing so entirely on the faith of future development, or on their abiding belief in a still greater foolishness and credulity in others than they themselves have shown.

The district we have mentioned is undoubtedly a good one, and will produce largely in the future, but first of all there must come a severe weeding out, and the present excitement will terminate with the liquidation of many companies, a heavy tumble in prices and probably a feeling of disgust with mining in general. The breakdown will probably commence in the speculation on the spot, as those on the ground will be the first to realize how unsound it is.

The effect of this concentration of speculation in African mines is seen in the neglect of mining properties in other parts of the world. A good mine may at present go begging in London for a long time, if it does not hail from South Africa. It is simply a repetition of what occurred some seven or eight years ago, when a similar craze for mining in one single quarter of the globe took the British public, and millions of dollars were invested in India, it being then a most common occurrence for \$500,000, and often a larger sum, to be paid for what we should consider here a hopeless prospect. Again, two or three years ago, with the same facility, every property from Queensland could be floated, with or without value, and now, although there are many people who bitterly regret having been carried away in the excitement of these former years, the lesson seems quite forgotten.

So far the gold in South Africa seems to be entirely free, requiring the simplest form of mill, and most of the companies have only ventured upon a small plant, the orders for which have naturally chiefly been placed in England, freight, time and cost being seriously against our manufacturers. A mushroom crop of experts, engineers and managers has sprung up, who, with the confidence born of ignorance, think that they can plan and erect as good mills as any one in the world, and certainly are the last men to look abroad to benefit by the experience of others. Some of the reports on which properties are floated are simply too absurd to be taken seriously (the serious part of these reports is yet to come), and machinists, surveyors, constables, brokers, and all sorts and conditions of men have suddenly developed into mining engineers, and report boldly on the present and future value of ledges containing "visible" gold. It is quite sufficient for one of these self-styled experts to be shown the merest prospect on which an

assay can be hunted up, for him to make a report, calculating the profit arising from "40 stamps only, 300 days in the year," and the property is sold immediately.

THE OUTCOME OF THE COPPER CORNER.

WAS THE GAME WORTH THE CANDLE?

The collapse of the French syndicate, or the *Société des Métaux*, in its efforts to control the copper of the world on a high price basis, which we recorded last week, has not come unexpectedly to any reader of the *ENGINEERING AND MINING JOURNAL*.

In our review of the copper industry January 12th last, it was shown conclusively what the end must be, and this end has come perhaps a little sooner than at that time was expected, but just as it was inevitable it must come.

There is no need of repeating what we then wrote, though it would still prove a wholesome study to those who try to reverse the operations of the fundamental laws of trade.

The error of the Syndicate was, as we have constantly pointed out, in making the price of copper too high. Had the general selling price of lake copper been put at 12 cents, and the Syndicate basis 10 or 11 cents, and other brands in proportion, the Syndicate, though in that event unnecessary, would still be in existence, and the violent and injurious fluctuations we are now having or are likely to have in the price of the metal would have been avoided.

The outcome of this wild attempt at cornering the copper of the world has been the utter bankruptcy of the *Société des Métaux*, the most important Copper Manufacturing Concern on the Continent; and of the Comptoir d'Escompte, the second largest banking institution in France, and the more or less serious embarrassment of several lesser institutions and individuals.

It must be interesting, now that this last attempt at cornering an important metal has run its course and come to grief, to figure up the net result of its one year's operations.

As a starting point we take the statistics which we published January 12th, last for while the operations of the Syndicate extended up to the present time and commenced only about May, 1888, yet the statistics of the year 1888 will represent fairly the whole history of the corner.

Stocks of copper on hand Dec. 31st. 1887.....	40,000,000 pounds.
Production of the United States in 1888.....	236,000,000 pounds.
Total supply.....	276,000,000 pounds.
Consumption in 1888.....	120,000,000 pounds.

Balance.....156,000,000 pounds.

Exports in 1888 taken for the most part by Syndicate.....	78,000,000 pounds.
Stocks Dec. 31, 1888.....	78,000,000 pounds.
Of which the Syndicate held about 60,000,000 pounds.	

It is well known that the Syndicate took all the stock of copper in this country at the end of 1887, and practically all the production of 1888, and held most of the stock here at the end of 1888, except some fifteen or twenty million pounds, which were in process of manufacture in various parts of the country at that date.

The average price of Lake copper at New York in 1885, was 11½ cents per pound; in 1886 it was 11 cents; in 1887, 11½ cents and in 1888 16½ cents, counting the Syndicate prices to manufacturers and not the brokers prices in arriving at this average. Some copper was sold above 17 cents. Though the price of casting brands was lower than this the advance was as great as on Lake copper.

It is true that the prices in 1885-6-7 were quite unremunerative to the producers, but 12 cents, or even 11½, would have left a fair margin to mines that could have supplied the requirements of this country, and have supplied the foreign market with all it would have taken.

We may, therefore, assume the average increase in price, due to the operations of the Syndicate, over a price that could easily have been maintained without any combination or Syndicate, to have been about five cents per pound. This on the production in 1888 and the stock on hand January 1st, 1888 (less the stock in process of manufacture), may be counted as about 250,000,000 pounds, which, at five cents a pound, would give the gross amount, \$12,500,000, by which the value of our copper production and stock was increased by the Syndicate over a normal figure. Of this amount the copper producers received about 3¼ cents a pound; or, say \$8,000,000.

The consumption of copper in this country in 1888 was about 120,000,000 pounds, on which the consumers paid the excess of five cents a pound above what may be considered a fair cost, or they paid \$6,000,000 as their contribution to the Syndicate. The Syndicate contributed about \$2,000,000 to the profits the producers made over what they would have received in selling at the normal figure of 12 cents for Lake, and say 11 cents for casting brands, and it furnished them a market for their entire product.

The net result of the year's operations of the French Syndicate, so far as it concerns our copper industry, has been to give our producers a magnificent abnormal profit, which came chiefly out of the pockets of our own consumers, and to enable them to unload their entire product on the French Syndicate. A great impetus has been given to the opening of

new mines and the development of old, and a vast amount of money has changed hands in speculating or gambling in copper mining stocks. We have also now an enormous stock in Europe, which will keep the market demoralized probably for some years. It depends altogether on which side of these positions the response comes from as to whether we are to conclude that "the game was worth the candle or not." As disinterested "students of markets" we are of the opinion that it was not.

THE SERVICES TO THE STATE AND TO MINING OF THE ARKANSAS GEOLOGICAL SURVEY.

The Geological Survey of Arkansas is one of those institutions that illustrate the ancient proverb that "virtue is its own reward." It was a very laudable and much-needed step on the part of the State Legislature to authorize a geological survey as it did about two years ago, when it secured the services of Mr. JOHN C. BRANNER as its geologist in charge. We were then far from appreciating the full need of such a selection or of the value of the services which he could render the State.

During the past year we have had on many occasions to refer to the "Arkansas Mining Bubbles"—in other words, to the frauds that were being practiced by a set of unscrupulous charlatans, who pretended to have found vast amounts of gold and silver in the rocks of several parts of the State, and when the samplings and assays, made by competent engineers and chemists, failed to find any valuable amount, or generally any amount whatever, of the precious metal in the so-called ore, they resorted to that old but long since wholly discredited explanation that the ordinary methods of chemistry are imperfect and the metal escaped them. When such a statement is made it is quite safe to assume fraud to be at the bottom of the scheme, though the assertion may be repeated through ignorance by honest men.

It is true that well-known experts exposed in professional reports many of these swindling enterprises, but their reports were private property, used simply to keep their clients out of certain worthless investments; and except when the *ENGINEERING AND MINING JOURNAL* took up the matter, and, fortified by the exposures of their character and tricks by the St. Louis Sampling and Testing Works and the Columbia College School of Mines, denounced the swindlers, no public obstruction was placed in the way of their continued success. Even this publicity could not bring a full exposure and break up at once the schemes that were bringing disgrace on the State and preventing the investment of capital in the legitimate development of its really valuable mineral resources.

It required the prestige of an official document, the report of a recognized officer of the State and of one whose character and ability were above reproach to give the *coup de grace* to these nefarious schemes. And Arkansas was fortunate in possessing such officials. Governor HUGHES fearlessly called on the State Geologist, Dr. BRANNER, for his preliminary report on these mining swindles. The publication in the local papers and in the *ENGINEERING AND MINING JOURNAL* of this full exposure immediately brought down on the Governor, the State Geologist and his assistants the most indecent attacks of a large part of the local press, inspired by the swindlers or their dupes.

Efforts were made to bully the Governor by threats of political annihilation, and to frighten the State Geologist and his assistants with the threat of a discontinuance of the survey and by the most vulgar abuse. Fortunately for the State of Arkansas and for the industry of mining in general all these threats proved unavailing, and the report that the offenders and their dupes were so anxious to suppress has appeared, and furnishes the full justification of the State Geologist's preliminary report.

The examination of the so-called gold and silver districts was confided to Professor THEO. B. COMSTOCK, assistant geologist, and this first volume is devoted chiefly to his "report upon the geology of western central Arkansas with especial reference to gold and silver." In it he shows conclusively the absolute worthlessness of the so-called gold and silver ores, on which had been worked up the Arkansas gold excitement of the past year or two.

It is not our intention at this time to make a review of this report, but merely to record the fact that it thoroughly confirms and justifies Dr. BRANNER's preliminary report published in the *ENGINEERING AND MINING JOURNAL*, August 18th, 1888, and that it does the State and legitimate mining an immense service by dispelling at once the foundation of the nefarious operations which were so injurious to both.

The wholly insufficient financial support given to the survey long ago obliged Professor COMSTOCK to resign from the staff. It is to be hoped that the honest citizens and legislators of the State, recognizing the valuable services which the survey has done in the face of the most unseemly and uncalled-for abuse of its officers, will now put it on a more substantial basis and enable its able and faithful officers to carry forward with greater efficiency the work they have so well begun.

Arkansas possesses valuable mineral resources, though but little is known concerning them, and as we said* in announcing the establishment

* *ENGINEERING AND MINING JOURNAL*, April 23d, 1887.

of the Arkansas Geological Survey and the appointment of Dr. BRANNER as State Geologist:

"There is every reason to expect important developments in iron, manganese, zinc, and lead-ores, and clay. With regard to the gold and silver discoveries, about which there is an occasional brief *furor*, we are less sanguine. It will be, however, a blessing to the State to have its mining delusions (if they are delusions) dispelled, as well as its real mineral resources attested. So we hope Professor BRANNER will attack the gold and silver, as well as the other metals and minerals. Arkansas need not fear to let the world know exactly what she possesses."

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.

The New Gold Field of Arizona.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Although I have not as yet visited the newly discovered gold prospects near the Harqua Hala Mountains in Yuma County, Arizona, I have been favored with some reliable information in regard to this eminently promising district, which, in the face of so many contradictory statements may probably be useful to readers of the ENGINEERING AND MINING JOURNAL. The location is not exactly in the Harqua Hala Mountains, but southwest of it and substantially in the Old Centennial District, where a 10-stamp mill has stood for many years. The geological feature of the location is mainly granitic, having its central line in the low grounds west of the new mines and porphyritic slates on either side of it. On the west side of these, a member of small, but very regular veins have been prospected for years, but have not paid, and were virtually abandoned. The newly discovered claims are on the east side of the granite, and consist of a yet undetermined belt of cherty quartz, which carries gold to an almost unprecedented amount, most of which is of a coarse description. The precise trend and the width of that quartz is not yet known, but from the bottom of the present main shaft, which is 40 feet deep, cross-cuts are in, a short distance, on both sides, which reveal the same stuff. I saw this morning a portion of this quartz ore ground and panned, with exceedingly rich results in gold.

Nothing is positively known about the dip or the walls, except that near the contact between the porphyritic rock and limestone, several feet of rich carbonates are found, which seem to work into the latter. So far as examined, these carbonates are "sandy" and assay from 30 to 50 per cent lead, with gold, varying from \$30 to \$100, but carrying little silver.

The whole surface is covered with a cap of limestone, evidently removed from the limestone hill to the east, and from 5 to 6 feet thick.

As the matter stands now, these claims contain first: free milling, cherty, brownish-looking quartz, which is auriferous,—at present very rich. Whether this quartz mass is continuous, and how far it is uniform in its gold-bearing character, can not be established at the present state of development. The other part of that mineralised ledge consists of carbonate, with a more than usual yield of gold, but little silver. This, of course, may change, and it is hardly possible to foretell the future and permanent character of these carbonates.

On the whole, there can be no doubt, that these prospects are eminently promising, and form a part of that gold-belt which passes through Arizona from east to west, and which I referred to recently in my report to the Director of the Mint.

A. TRIPPEL.

The Use of Cupric Chloride in Leaching Silver Ores, and the Russell Process.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: For the information of your readers, who may have been misled by Mr. Hofmann's remarks on the "Use of Cupric Chloride for Badly Roasted Charges," in his article on the "Lixivation of Argentiferous Zinblend and Galena Ore," ENGINEERING AND MINING JOURNAL, page 255, please publish the following extracts from the specifications and claims of U. S. Patent No. 381,849 (and Mexican, Canadian, British and Australian patents), issued to E. H. Russell, April 24th, 1888. Application filed June 24th, 1886.

It will be seen that the claims of this patent precisely cover the process described by Mr. Hofmann. Yours very respectfully,

THE RUSSELL PROCESS COMPANY,
Talcott H. Russell, Secretary.

NEW HAVEN, Conn., March 18th, 1888.

"My invention consists in the process and improvement in the art, as hereinafter specified.

"In carrying out my process, the ore or product is placed in a suitable ore-tub and then the solution (aqueous or otherwise) of copper salt or compound is mixed with the ore or product by any of the well-known methods. The salt of copper which I prefer and generally use for this solution, which I term the 'preliminary' solution, is the sulphate of copper or bluestone; but I contemplate using instead other compounds or salts of copper—as, for instance, the chloride, nitrate, carbonate, or acetate, cupreous carbonate, ammoniated copper, or hydrate of copper. After the mass of ore or product has become saturated with this solution the latter can be either immediately drawn off or left standing in the ore until the desired reactions are completed. Usually it does not interfere with or make any practical difference in the action of the hyposulphite leaching solution used in the subsequent step in the process if the preliminary copper solution is still in the ore or product, instead of being allowed to drain out. Instead of using an amount of this preliminary copper solution sufficient to saturate the ore, a much less amount of the solution may be used, even as little as one-tenth of that necessary to saturate the charge being sometimes sufficient. Usually for a charge of ore or metallurgical product from 1 to 6 inches of water, in which is dissolved from 1 to 5 pounds of blue-stone per each ton in the charge, is enough. As this solution sinks down through the charge, the sulphate of copper attacks and decomposes the hydrates of various elements which may exist in the ore, and which, as is well known, very materially interfere with and prevent the desired dissolving action of a hyposulphite leaching solution used to leach the ore. The sulphate neutralizes the injurious effect of caustic soda or lime, or the hydrates of other metals existing in the ore by the formation of hydrate of copper. After the solution of sulphate of copper has been in the ore a sufficient time to complete this (its neutralizing action), the ordinary hyposulphite of leaching solution containing usually the hyposulphite of sodium or calcium, is used upon the ore in any of the well-known ways of using a leaching solution. As it passes through the charge, not only is its dissolving action not interfered with by the presence of any caustic lime, soda, or other hydrates in the ore,

but any caustic soda, lime, or other hydrates which may exist in the solution itself are neutralized by the copper compounds formed in or left in the ore by the sulphate of copper solution previously used. Moreover, as the ordinary hyposulphite solution passes through the ore the cupreous hyposulphite solution, such as is described as used by me in the processes covered in my patents referred to hereinbefore, is formed by the union of the copper salts or compounds formed in the ore or left therein by the preliminary sulphate solution with the hyposulphite in said hyposulphite solution. By the present process, then, the ore or metallurgical product is really subjected to the action of a hyposulphite solution, to which one or more copper compounds have been added as the solution passes through and acts upon the ore.

"The ordinary simple hyposulphite solution, when used upon the ore in the second step of my present process, after the use of the preliminary copper solution on the ore, becomes then, by the action of the salts or compounds of copper which it meets and takes up on its passage through the ore, the 'extra' or compound solution, the use of which upon ore or metallurgical products is fully described and covered by the claims in my patents referred to. It is this compound or extra solution which acts upon the ore or product when the second step of the present process is being carried out. The present process, then, involves a new method of preparing such extra or compound leaching solution for action upon the ore; that is, a new way of introducing a copper salt or compound into the hyposulphite solution.

"Instead of preparing and using the small amount of the preliminary copper solution described above, enough may be made up to saturate one or more charges and used upon several charges until its strength is exhausted. I contemplate also using in the second step of the process, after the copper solution has been used on the ore, my extra or compound leaching solution described hereinbefore, containing cupreous hyposulphite instead of the ordinary hyposulphite leaching solution; but I prefer the latter for general use.

"Having thus described my invention, what I claim is—

"1. As an improvement in the art of extracting metals from ores or metallurgical products, the method of preparing the ore or product for the use thereon of a leaching solution, which consists in treating the ore with a solution of a compound or salt of copper, substantially as and for the purpose specified.

"2. The process of extracting metals from ores and metallurgical products, which consists in subjecting the ore or product to the action of a solution of a copper salt or compound and then treating the ore or product with a hyposulphite solution, substantially as and for the purpose described.

"3. The process of extracting metals from ores and metallurgical products, which consists in first treating the ore or product with a solution of sulphate of copper, and then subjecting the ore or product to the dissolving action of a hyposulphite leaching solution, substantially as and for the purpose described."

OFFICIAL REPORTS.

The reports of the copper companies for the past year are now being published, and are extremely pleasant reading to the stockholders, for nearly all announce large profits, and most of the companies have greatly improved their plant with the view of being able to stand the strain of the low prices that now appear to be near at hand. The benefit which the French Société des Métaux has conferred upon the copper mining industry (at the expense of its own existence, as is now shown), is the burden of the lay. The very high prices of copper during the past fifteen months have not been without some drawbacks. In some cases they have discouraged economy at the mines, and they have so forced the production of the metal that the stock of copper on the market will probably keep prices down to an unprofitable point for some time to come. Not so long, however, as if the syndicate had been able to maintain the high prices for the longer period of from three to twelve years, as it proposed doing.

The companies managed for a stock boom of course profited most by the high prices and are most hurt by their collapse.

Most of our copper companies placed but a moderate faith in the permanency of the syndicate's boom, and are not taken unawares by its failure.

THE ATLANTIC MINE.

Some of the Lake Superior copper mines have long stood as examples of economical ore mining and concentrating, and chief among the "record makers" has been the Atlantic.

The credulity of mining men is severely tested when they are told that a deep mine working in a moderately hard rock does the mining, selecting, and breaking and all the surface expenses at the shafts at a cost of only 83½ cents per ton; transports the ore from the mine to the mill, about three miles, for less than 3½ cents a ton, and stamps and concentrates this ore at a cost of less than 27 cents a ton. That on an ore which contains only about 13 pounds of copper to the ton, worth, when finally delivered in market, only \$1.97 a ton, the company should make a net profit of more than 54 cents a ton after paying every expense, including improvements of all kinds and a considerable purchase of mining property.

This record is with slight variation repeated year after year by the Atlantic mine of Michigan, and it is not only a standing marvel of economical work, but an example for imitation by other mines, including some of those in its own neighborhood, whose tailings as they run away from the mill contain more copper than the original ore on which the Atlantic mine works.

We make the following full extracts from the report of the directors for the year 1888:

"The production of mineral was 5,383,910 pounds, which yielded 73.83 per cent, or 3,974,972 pounds of refined copper, which realized an average price of about 14.78 cents per pound.

The following is a summary of the year's business:

Production.—3,974,972 pounds copper at 14.78c., \$587,690.42; add balance of interest account, \$5,592.18; total, \$593,282.60.

Costs.—Working expenses at mine, \$340,005.78; freight, \$15,041.54; smelting, \$38,030.67; expenses, \$6,866.22; brokerage, \$2,588.23; insurance, \$995.39; storage, \$319.70; total, \$403,837.53; showing a mining profit in 1888 of \$189,395.07.

Improvements.—Additions to plant, \$20,366.03; purchase of 200 acres of land, \$10,000; explorations on Section 16, \$1,430.37; total, \$31,796.40. Leaving a net gain for the year of \$157,598.67. The surplus from 1887, after payment of dividend, was \$284,966.13. Less dividend paid August 1st, 1888, \$60,000; total, \$224,966.13. Making the net surplus, December 31st, 1888, \$382,564.80. Out of which a dividend of \$2 per share (\$80,000) was paid February 1st, 1889.

The foregoing figures show an increase of production over that of the previous year, as well as a large increase in the average price obtained for same.

Although the advance in the price of copper caused an advance likewise in the wages paid to our workmen, yet the increase in the quantity of the rock mined and treated has resulted in a further decrease in the average cost of treatment per ton to the lowest figure we have yet reached, as shown by the accompanying table of results. The cost of

the refined copper has, however, been slightly increased by a decrease in the average yield of the rock to the extent of about '93 pounds of copper per ton. It is difficult to account for this decline in the yield of the rock mined, but it probably arises from the fact that a large portion of the increased output was drawn from extensions of the upper levels, where the rock is somewhat poorer than in the deeper portions of the mine. As similar fluctuations in yield have occurred in former years, this change does seem to be of any special significance.

We have made some explorations on Section 16, which have exposed several belts of amygdaloid and conglomerate carrying more or less copper, but nothing of value has yet been met with. This examination is not, however, conclusive, as only a small part of the section has been explored. The advent of frost caused suspension of work at this point, but the exploration can be resumed whenever desirable.

We have purchased for the sum of \$10,000 a tract of 200 acres of land adjacent to our mining location. The principal copper-bearing belts of the "Mineral Range" should traverse this tract, but as they have not yet been located nothing is known of their value. As a portion of the surface will shortly be required by us for building purposes, and as the entire tract has a prospective "mineral value," it was deemed best to secure it while we had an opportunity of doing so at a reasonable price.

The maps which accompany the report show the relative position of our mine and stamp mill and of the lands we have acquired from time to time. The lands along "Cowles' Creek" and "Portage Lake" were purchased for the purpose of controlling and protecting the stream of water which flows by gravity into our stamp mill, and those lying adjacent to the ship canal (about 2000 acres) are held as a timber reserve.

The improvements contemplated at the time of last report were only carried out to a partial extent, some changes in plans making it expedient to defer until this year the erection of a new hoisting plant at one of the deepest shafts.

The comparatively high prices obtained for our copper in the early part of the year, and the satisfactory profits resulting from the business of the year, have enabled us to make fair returns to stockholders, besides providing for purchase of the lands named and carrying forward a surplus of about \$17,000, toward paying for an extraordinary expenditure that may be necessary during the current year.

Assets and Liabilities of the Atlantic Mining Company, December 31st, 1888.

ASSETS.—Cash, \$47,139.32; accounts receivable, \$2933.97; loans, \$205,000; copper on hand, sold, \$71,398.24; at the mine, cash, \$2206.30; coal, \$14,412.83; wood, \$14,919.40; supplies, \$34,112.62; merchandise in store, \$39,207.60; total assets, \$431,330.23.

LIABILITIES.—Indebtedness at mine, \$18,694.33; agent's drafts outstanding, \$6818.27; accounts payable, \$23,252.83; \$43,765.48; balance of assets, \$382,564.80 (less dividend payable February 1st, 1889, \$80,000).

Statement of Working Expenses at the Atlantic Mine for the Year Ending December 31st, 1888.

Underground Expenses.—Sinking 93 feet, average \$24.19 net, \$2249.96; drifting 3,912.4 feet, average \$4.73 net, \$18,505.65; stoping 16,844 1/2 fathoms, average \$4.31 net, \$72,599.91; timbering, tramming and labor, \$73,200.00; timber, materials and supplies, \$7829.61; pumping and operating air compressors: labor, \$6168.39; fuel, \$14,284.50; supplies and materials, \$3925.37. Total underground expenses, \$198,763.39.

Surface Expenses.—Superintendence, and labor of all kinds, less sundry credit items, \$32,159.43; supplies and materials, \$2311.06; fuel, \$14,696.74; feed for teams, etc., 1014.75; fire insurance, \$390.00; taxes, \$3143.67; canal tolls on copper, \$289.20; expenses and sundry repair, \$970.39; total \$54,975.24; less amount received for rents, 4177.20. Total surface expenses, \$50,798.04.

Railroad Expenses.—Labor, \$6626.86; fuel, \$2633.60; supplies, \$1506.26; total, \$10,766.72; less received for transportation, \$438.13; total railroad expenses, \$10,328.59.

Stamp Mill Expenses.—Labor, \$29,415.72; fuel, \$39,495.74; supplies, \$9546.08; fire insurance, \$950; teaming mineral, etc., \$748.22; total stamp mill expenses, \$80,155.76.

Construction Account.

At Mine.—Moving No. 2 engine-house, materials used in equipping No. 2 hoist and No. 2 shaft with balance, road, rails, etc., \$6335; one fire-box boiler, \$1333; addition to boiler-house, labor, etc., \$1742; one duplex compressor, \$2000; labor and materials used for same, \$573; one 17 by 24-inch rock breaker, \$1450; labor and materials used for same, \$150; one 24-foot "E. B." plater, \$345; labor and addition to carpenter shop, \$205; fixtures for heating office with steam, \$300; additions to dwelling houses, \$955.

At Mill.—One new boiler, \$1725; addition to boiler-house, labor, etc., \$889.51; one log dwelling, \$184.79; additions to dwellings, \$425.

At Dock.—Materials for new dock, \$1851.73.

Exploring on Sec. 16.—Labor, \$1401.87; supplies, \$28.50; total expenditure, \$361,842.18.

Summary of Results.

Ground broken in openings and stopes.....	16,844 1/2 cubic fathoms.
Rock stamped.....	298,055 tons.
Product of mineral.....	5,383,910 lbs.
Product of refined copper.....	3,974,972 lbs.
Yield of refined copper per cubic fathom of ground broken.....	236 lbs.
Yield of rock treated, 15'339 lbs. copper per ton.....	0.667 per cent
Gross value of product, per ton of rock treated.....	\$19718
Cost per ton of mining, selecting and breaking, and all surface expenses, including taxes.....	8373
Cost per ton of transportation to mill.....	9347
Cost per ton of stamping and separating.....	2689
Cost per ton of working expenses at mine.....	11409
Cost per ton of freight, smelting and marketing product including New York office expenses.....	2142
Cost per ton of running expenses.....	13551
Total expenditure per ton of rock treated.....	14282
Net profit per ton of rock treated (exclusive of interest earned).....	5436

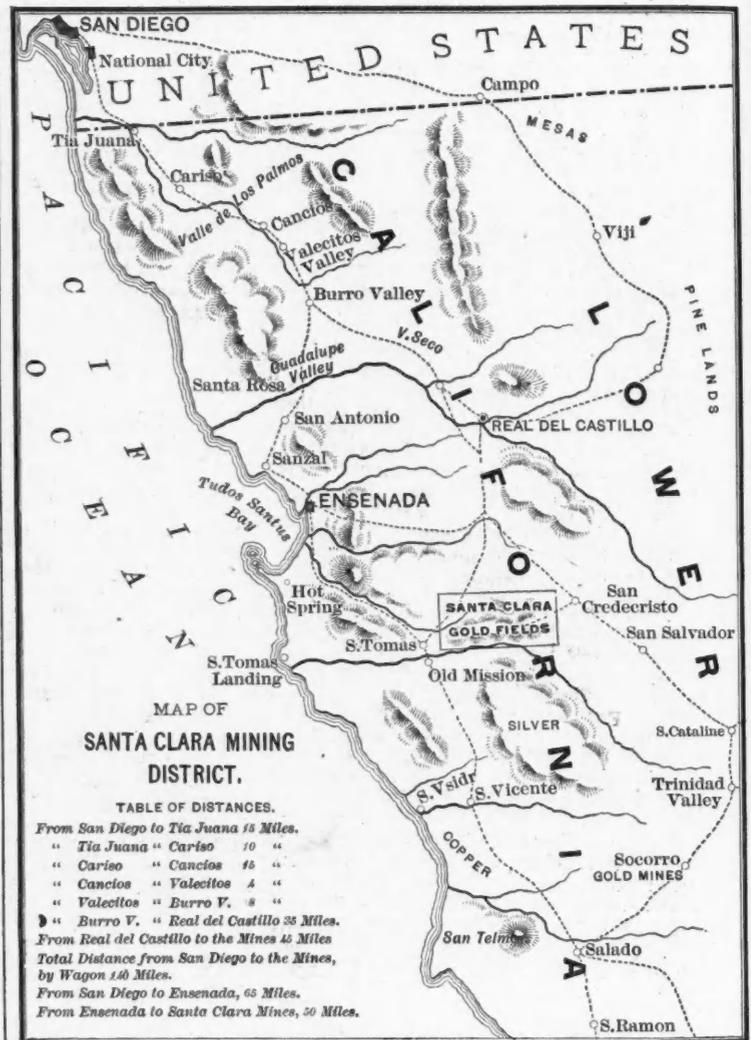
The agent's report shows that the condition of the mine is satisfactory, and that no unusual developments have been made during the year.

PLYMOUTH CONSOLIDATED GOLD MINING COMPANY.

The sixth annual report just issued shows that the gold bullion produced by the company's mines up to January 8th, 1888, since its organization on June 1st, 1883, amounted to \$3,804,499.36; for the year 1888 it amounted to \$51,367.61.

Early in the year 1888 a fire broke out on the fifth level of the mine

(1400 feet). Its origin was accidental. In attempting to remove some timbers in a winze, the dry wood took fire, and when discovered, the flames had made such headway, generating gas and smoke, that the men were compelled to flee to the surface to save their lives. It was thought at first that the fire could be easily extinguished, but after repeated ineffectual attempts to that end, the management decided to close the mine and by excluding all fresh air to smother the flames. In March the shafts were opened, but the fire being still alive, they were again sealed. A similar result followed another attempt to open the mine some weeks later. It was then thought prudent to do nothing till October, when the fire having died out, preparations were made to resume work. The levels were found to be much damaged, and the stopes were in very bad condition. There had been caving of rock, displacement of timbers, and injury from both water and fire. Water had risen 430 feet from the lowest level, and had to be removed before any work could be done. Since then a vast amount of labor has been performed, and the mine will soon be in working order. Operations have been pushed rapidly as consistent with safety. The condition of a mine after a disaster like this is such that the utmost care is required to prevent accident. Notwithstanding the unusual precautions taken, two valuable lives have already been lost—faithful employes. At the present writing twenty-five stamps are in operation, and it is hoped that within a few weeks enough rock will be



accessible to run both mills. By reason of the fire, for the first time in the history of the company the yearly statement shows a deficiency instead of a surplus. The indebtedness, January 1st, 1889, amounted to \$15,446.93.

"The indebtedness is, however, but trifling relatively, being equal in amount to the sum of about twelve days' average net profit when working to full capacity."

The financial statement shows receipts:

Cash on hand January 1st, 1888.....	\$98,118.91
Gold bullion produced—January.....	51,367.61
Indebtedness.....	15,446.93
	\$164,933.45
DISBURSEMENTS:	
Operating expenses and construction, \$84,933.45; dividends.....	80,000.00
Total disbursements.....	\$164,933.45

SANTA CLARA GOLD FIELD, LOWER CALIFORNIA.

In our last issue we referred to the excitement caused by the reported rich gold finds in the above-named district, and we now publish a map of the country which we have received from a reliable correspondent. While the accounts are still very conflicting, and many of them undoubtedly exaggerated, both from an optimist and pessimist point of view, it is well to put on record the opinion of Prof. C. E. Anthony, who has spent many months in Lower California, in the service of the International Land Company. He believes that the gold belt almost continuous for 150 miles in length, and states that the quartz ledges in the neighborhood of Santa Clara are sufficiently rich and important to

give rise to a permanent mining industry there. The present known placers are small in extent, and will, possibly, be exhausted in a few months, but he says there are other gulches equally rich that have not been touched so far. There is another placer district, called Vallederas, about 100 miles south of Santa Clara, where hydraulicking has just been commenced with success, and which Professor Anthony believes to be just as rich as Santa Clara. The geological formation of the district is syenite, associated with talcose slate.

Ex-Governor Murray, of Utah, whose experience should lend weight to his views, has put upon record his opinion that discoveries having great merit have been made at Santa Clara. He says mining has been carried on by the natives for a generation in the placers where water was obtainable, but that except in rare instances, when the quartz was rich enough to pay for crushing in stone mortars, panning the gold out by hand, they have never touched the veins. Five thousand people are said to have passed through San Diego on their way to the "diggings," and a recent estimate of the population in camp was 3000, with hundreds scattered over the country prospecting, and many still on the road, great delay occurring at the frontier on account of the Mexican custom-house authorities being naturally quite unprepared for such a rush, and the staff being quite insufficient to pass rapidly so great a number. Of course, many have already become disheartened and have left in disgust, as they term it, but, as the correspondent of the San

problems come within the field of this journal, and are treated in a fair and unbiased manner for the benefit of its readers, and we may be able to give some points occasionally to the *Gazette* on matters it should be specially familiar with.

In order that the *Gazette* may understand and appreciate the true condition of the general road-bed, we have taken the trouble to reproduce a track photograph of the road-bed of one of our leading trunk lines, not one of those which build broad road-beds on paper, but a trunk line recognized to be perhaps the best in this country.

The ties in this road are eight feet long, and it will be seen that their ends protrude beyond the sides of the road-bed; thus the latter must be very much under eight feet in width the road-bed foundation may be wider but the ballasted portion commonly called "road-bed," in which the ties rest, is as a rule under eight feet. We are sure that if the *Gazette* will examine the roads instead of the drawings, it will find that this same condition prevails on all the roads in the United States.

Of course there may be places at or near stations or general offices where the road-bed has received extra width and care; but at least 90 per cent of the road-beds are like the photograph produced. The traveling public can, of course, see and realize these things for themselves, but the *Railroad Gazette* seems to base its judgment so much on "drawings before it" that we desire specially to present a road-bed as it actually exists, and upon which we base our opinion.



VIEW ON THE BEST RAILROAD IN THE UNITED STATES

Diego *Union* says, "they are mostly of the sort that would leave Heaven in a week if they did not get ice-cream three times a day." Flour is selling at \$13 a sack, and everything else in proportion.

One of the greatest difficulties to contend with in this region seems to be the insufficient supply of water which apparently in this particular section will confine the placer work to panning and rockers. It seems to us from what evidence we have received that in the systematic development of the quartz ledges, wherever the water question can be satisfactorily answered, lies the future prosperity of the district.

The district does not appear to offer the foundation for a permanent gravel mining success, while the development of the veins will, as every one knows, require both time and money.

"A WORD ON METAL TIES."

In the *Railroad Gazette* of February 8th an article under the above title was published, which shows a want of thought on this important subject by our esteemed and usually careful contemporary.

We are pleased to have the *Gazette* criticise any article this journal may publish, and if error can be shown we will cheerfully credit it with a better and clearer understanding of the subject, but in this case it would seem to have spoken inconsiderately, to say the least.

The adoption of metal ties is a subject of great importance to the public. The *Gazette* treats the subject of metal ties in a tone which might suggest a special interest in one of the metal ties it became our duty to condemn, or perhaps it thinks we are encroaching too much upon its special territory in treating upon railroad matters. All engineering

problems come within the field of this journal, and are treated in a fair and unbiased manner for the benefit of its readers, and we may be able to give some points occasionally to the *Gazette* on matters it should be specially familiar with.

In answer to our statement that the road-bed was most solid in the center and that thin or light ties would bend, the *Gazette* says that "the ties are tamped hardest at the ends and lightest in the center, etc." In this it will be seen that our contemporary recognizes the existence of the very difficulty of which we speak, and that the remedy is only a possible one in the hands of the crudest kind of railroad laborers. It also states that the metal ties of the Webb pattern tried on the Pennsylvania Railroad did not bend, which is very true; but the *Gazette* should know that those ties were made very heavy to resist that very strain which is evidence to verify our statement.

We are pleased to have our statements quoted, because they promote thought in the minds of men whose opinions we particularly desire, but it is unfair for the *Gazette* to quote only a portion of a statement so as to misconstrue its import or meaning. What we said with reference to the bending of the ties (*E. AND M. J.*, December 29th, 1888), was:

"These conditions show us that the foundation upon which the tie rests is more solid in the center, and that the greatest resistance to the sinking of the tie is at that point. If we now take into account the location of the rails, we perceive that the strain is against the tie at each end, in one direction, and against its center in the opposite direction, and if this strain was great enough the tie would either bend, to conform to the solid portion of the road-bed, or break, or it would rock with the oscillation of the train. We believe that to make a metal tie in this country of the Webb pattern sufficiently strong to resist the strain would cost more than the railroads could afford, while if it was made slight enough to bring it within a purchasable price the result would be as illustrated." "The sides would flatten out at the center and the ends would bend down."

ward," and we believe that no amount of tamping can remedy this difficulty.

The *Gazette* attempts to belittle the importance and growing interest in the subject of metal ties by asserting that—

"The use of metal ties, even as an experiment, has hardly begun in this country, and it does not seem probable that they will be greatly used here for many years to come. While the relative cost of wooden and metal ties remains near what it now is, the convenience of the wooden tie in track work and the admirable elastic bed which it makes, will cause it to be generally used. We may expect also that the life of wooden ties will be further increased, and the cost of maintenance reduced by the use of metal tie plates of improved forms, and probably by better and cheaper methods of preservative treatment of the timber." "We look to see both these expedients well tried and exhausted before the metal tie comes into great use."

To show how erroneous is the *Gazette's* appreciation of the present status of the metal tie question, we may cite the following statement by Mr. C. P. Huntington, Vice-President of the Southern Pacific Railway:

"I will have the best transcontinental line and will make all needed improvements this year. I will use iron ties for my entire system."

It seems to us that the "admirable elastic road-bed" which our contemporary speaks of would exist with a properly constructed metal tie as well as with a wood tie. What has the tie to do with the elasticity of the road-bed? And especially if the ties are alike in form on their under side; or probably the *Gazette* means that the elasticity is in the wood tie; if this be so, the "metal tie plate" with which it proposes to "reduce the cost of maintenance" would rather tend to destroy this "admirable elasticity."

It is our opinion that the elasticity exists in the road-bed, and that the wood tie acts as a cushion more than an elastic substance, for the elasticity of road-bed exists most where the road-bed is the softest, and that the elasticity is most uniform where the rails are held firm to the ties with good fastenings. From the *Gazette's* statement it would seem also that it considers spike fastenings good enough, while every good railroad manager and engineer considers them unreliable and dangerous.

As to the probability of the general use of metal ties in this country, we believe in common with so well informed a person as Mr. Fernow, Chief of the Bureau of Forestry, that the use of metal ties is one of the best solutions of the Forestry question. For further enlightenment on the subject however, we would refer the *Gazette* to an article published

The operators in the different districts appoint the nine members of the Governing Board, the chief officer or commissioner of which is Mr. Galloway C. Morris, of Philadelphia. The Clearfield and Cumberland districts each appoints two members on this board, the other regions one each. This board of control determines, from time to time, the quantity of coal to be produced, or, in other words, what the market will take. Prices, which are fixed for the opening of the current year at \$2.60 f.o.b. Norfolk, Newport News, Georgetown, Baltimore, and Philadelphia, and \$3.50 a ton alongside in New York, may be changed by the board on a majority vote of five of the regions.

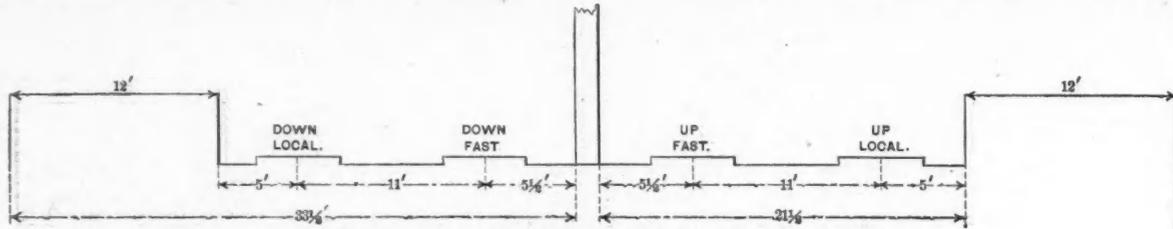
The agreement covers the field north of the Chesapeake and the Delaware, and provides that in this field no member of the association shall have the right to deliver coal, by all-rail, into Connecticut or Rhode Island, or in certain territory in Eastern Massachusetts, or to allow rebates to customers or to guarantee freight rates. All sales are to be made at tidewater at the prices fixed by the board.

Each month each producer is required to pay to the chief commissioner 20 cents a ton on his shipments of the previous month, and this money remains as a guarantee fund until three months' payments have accumulated, or nearly \$100,000. Then, upon the payment of the fourth month's amount, the sum contributed in the first month is returned, and so on.

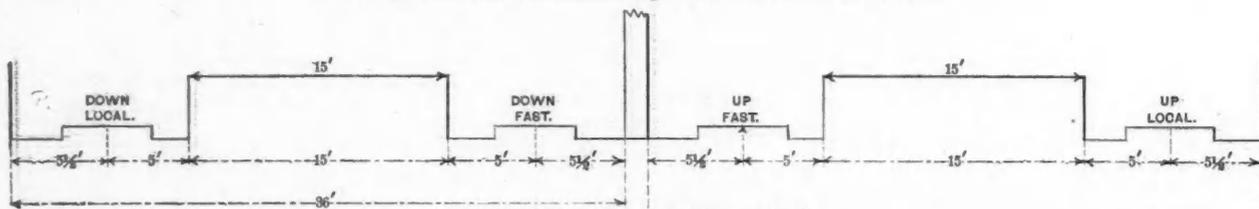
For any violation by overshipment a penalty of 20 cents a ton on the number of tons involved is exacted and is drawn from the guarantee fund of the offender by the commissioner. The penalties go into a compensation fund, out of which sums are given to those who have not shipped their allotment, any possible surplus being afterward distributed among the other concerns. For other violations of agreement the commissioner assesses such damages as seem warranted and deducts this amount from his deposit.

As stated in these pages last week, some of the companies, just before the agreement went into effect, sold quantities of coal on terms which would be gross violations of the agreement. It is hoped that such acts will be prevented in future, since the agreement is now continuous for three years.

It is, of course, understood that the penalties of this agreement cannot be enforced in a court of law, but the good faith and mutual interests of the several parties to the agreement, reinforced by the pecuniary penalty for violation of its terms, are relied on to make this arrangement effective.



At stations where all trains stop the cross-section is like this:



PLAN FOR CITY TRANSIT LINES.

by us December 8th last, which has been largely copied by leading journals throughout the United States; also to Bulletin No. 1 of the Forestry Division of the Department of Agriculture, in the introduction of which Mr. Fernow says:

"Considering the wasteful manner of getting out railroad timber, it can be fairly estimated that to build our present railroad system more than one hundred million acres, or one fifth of our present forest area, were stripped during the last fifty years, and the next fifty will very likely call for more than double that amount, judging from the accelerated development which is probable and the requirements for renewal."

"While railroads have done much for the growth and development of our country, they are also responsible for much of the hindrance to reform in the use of our forest resources."

We wonder if the *Gazette* has been sleeping while other papers, which do not make a specialty of railroad journalism, have been studying this matter from a broad standpoint?

THE SOFT COAL TRADE'S IRON-CLAD AGREEMENT.

As already announced in these pages the Seaboard Association agreement went into operation last week. This pool or agreement covers the seven districts which send coal to the Atlantic seaboard. Their proportion in the output for the year, which is estimated to amount to 5,500,000 tons, is, under this agreement, as follows:

	1889.	1888.
	per cent.	per cent.
1. Cumberland, Md.	30 1/2	30 1/2
2. Clearfield, Pa.	30 1/2	30 1/2
3. Pocahontas, Va., N. & W. R.R.	14 1/4	14
4. New River, W. Va., C. & O. R.R.	11	11
5. Beech Creek, Pa.	7 1/2	7 1/2
6. West Virginia Central R.R.	5 1/2	5 1/2
7. Reynoldsville, Pa.	1 1/2	1 1/2
Total	100	100

The operators in each region distribute their allotment among themselves. The only change from last year has been a very slight increase (one quarter per cent) in the Pocahontas allotment.

The agreement, as already explained, runs for three years, until March 1st, 1892.

The Beech Creek Company has not signed the agreement, though expressing a willingness to do so when certain difficulties have been overcome. The general features of the agreement are as follows.

It certainly does present features of strength which were always heretofore wanting, and its weak points have not yet been developed.

SUGGESTIONS FOR NEW YORK CITY TRANSIT.

The object of a comprehensive transit scheme is to supplement those existing railway lines which may be regarded as permanent, in such manner that the carrying system, as a whole, shall make transit easy, rapid and cheap, between every two points within the city limits.

It may first be premised that when the distance to be traveled does not exceed a mile and a half, most persons, if given a choice, prefer to use a surface road rather than a railway accessible only by means of stairways or elevators, at stations a number of blocks apart. No rapid transit system can command so large a part of this short travel, as to render the longitudinal surface roads unnecessary.

Two four-track rapid transit railways can be made to meet all demands of carrying capacity for some years to come. These railways should extend from the Battery to a point near the upper city line, and form a continuous belt, thirty-one miles in length. No branch or loop should be connected into any of these four tracks. As a further condition of attaining the greatest possible capacity and speed, no track should be curved with a less radius than five hundred feet.

The maximum train should consist of eight forty-seated coaches, with side doors, no platforms, and a system of connections such that the interior of the train will present somewhat the appearance of one long car. Every train should run over the whole route between termini; and the train houses be located at a point beyond the upper terminus.

In running from terminus to terminus, a fast train makes nine stops, and a local train, forty-one. The intertrack platforms (stopping points for the fast trains) are located at the four lowermost stations, at Forty-second street, Eighty-sixth street, One Hundred and Twenty-sixth street, and at three points (including the upper terminus) above One Hundred and Twenty-sixth street.

There are thirty-six platforms 15 x 350 feet, and a hundred and twenty-eight platforms 12 x 350 feet. The average distance apart of the 82 stations is 1,996 feet.

A cross-section of the road at a station where the fast trains do not stop is shown in the first diagram.

Motive power should be provided adequate to move the maximum loaded trains up the steepest gradient at a speed of fifty miles an hour. The running time between termini, including stops, may then be thirty minutes for each fast train, and sixty minutes for each local train.

Not fewer than twenty trains an hour should pass every station on each track from early in the morning until late in the evening; but it may, probably, be permissible to begin at eleven, or half-past eleven P. M. to withdraw the fast trains, and to reduce the number of trains passing each station on the local tracks to not fewer than six an hour.

The two proposed railways, although having a sufficient carrying capacity, cannot, in themselves, provide for travel diagonally across the city, or be of any use to those numerous persons in areas of the city remote from the railways, who want to ride long distances, but cannot or will not walk far, or pay double fares. But both the foregoing requirements can be met by constructing and operating a cross-town surface road in each street where a station of the main railways is located. The tracks should be laid with rails which will not obstruct ordinary street traffic. Electricity could, perhaps, be used as the motive power. The average speed of the cross-town cars, including stops, should be restricted to six miles an hour.

The fare on the main railways should be five cents.

On the cross-town roads, the fare may be three or four cents.

The payment of six cents on a cross-town car should entitle the passenger to the cross-town ride and a main railway ticket.

Any holder of an intact main railway ticket should be entitled to a cross-town ride, upon paying the car conductor a cent, and presenting the ticket to be punched. Punching a ticket would invalidate it for any further use on a cross-town car, but leave it good for a ride on the main railway.

A number of cross-town roads are already in operation; and, in the ordinary course of events, additional roads will be built from year to year. The question, therefore, is, not whether the cross-town roads shall have existence, but whether the public shall reap the advantage of having them operated as feeders to rapid transit railways, at the least fare which will pay expenses. The cost of acquiring control of the existing cross-town roads, of reconstructing and re-equipping them, and of building others, would, of course, be great. But it should be borne in mind that two rapid transit railways with the cross-town roads will cost less than three rapid transit railways without the cross-town roads, and that the two railways will, not only pay better if having the feeding system than not having it, but be vastly more convenient for the public if than any number of rapid transit railways without such a system. The city officers should have power to authorize an increase of cross-town fares, if any year's business shows a considerable loss; and to require that the fares be decreased if any year's business shows a considerable profit. Travel would, no doubt, be assisted in finding its natural channels, were the owners of the longitudinal surface railways party with the rapid transit company to the construction and operation of the cross-town system. Six cents would then pay for a cross-town ride, and a ticket receivable on either of the rapid transit roads, or on any longitudinal surface railway.

When travel on the two suggested four-track roads shall have grown to their full capacity, so that a want begins to be felt for additional tracks, the number of passengers carried, annually, will be from three to four hundred millions; and the receipts from fares, fifteen to twenty million dollars, of which half may be required to pay the expenses of maintenance and operation.

The rapid transit road, if carried through the blocks, should be a tunnel rather than a viaduct; because, if it be intended to construct buildings and a railroad on a purchased right of way, it must be evident that more of the buildings can be made available for the use of tenants by placing the railroad underground than by running it, a story or more high, through the buildings. Moreover, a viaduct would not be a permanent way, since all the crossings of the transverse streets, amounting to some thirty per cent of the road's whole length, must consist of perishable iron bridges. If it may be assumed that trains can be moved at fifty miles an hour, by some other motive power than fire-box locomotives, and that the buildings constructed over a tunnel will yield a profit in rentals, a tunnel through the blocks will, probably, be the most remunerative form of permanent way.

The construction account might be somewhat as follows:

Allowing 20 blocks to the mile, and four lots to the block, with 12 lots added for each of 18 intertrack stations, and eight lots for each of 64 side stations, the number of lots required amounts to 3,208. Averaging the value of improved and unimproved property, from the Battery to the Yonkers line at \$20,000 a lot (25 feet by 100 feet), the cost of 3,208 lots would be \$64,160,000.

One quarter of this amount for right of way of railroad..... \$16,000,000
 Thirty-one miles of tunnel at \$2,000,000..... 62,000,000
 Stations, equipment, cross-town lines, etc..... 25,000,000

Cost of transit system.....\$103,000,000

Whoever is familiar with the subject can now estimate the cost and profit from rentals of 3,208 fire-proof buildings (25 feet x 100 feet), constructed on top of the tunnel, and occupying sites costing \$48,160,000. Except in places where the grade of the tunnel is laid at some distance from the surface (as may, frequently, be the case at points remote from the stations), the buildings will have no floor lower than the street level; and a public footway, fifteen or more feet wide, must be provided, if not through all the blocks, at least through each block where a station entrance is located. The stations would be entered from this footway, and the exits debouch upon the cross-town streets.

It is a vicious principle for a municipality to sell the franchise of a transit line, or to require from a transit company any other payment than just taxes on the property whose title the company acquires; because it is a matter of public interest to add no unnecessary item of cost to either the capital account or working expenses, to the end that the fare may be low and the service as efficient as possible. In so important a matter as a transit system for the whole city of New York, the specification of service to be rendered by the transit company should be drawn with great care, and should show the number, extent, location and character of the roads proposed, the sites and minimum dimensions of the station platforms, the least allowable number of trains and cars to

be run over the whole of their respective routes during each hour of the day, the habitual average speeds required, and the rates of fare.

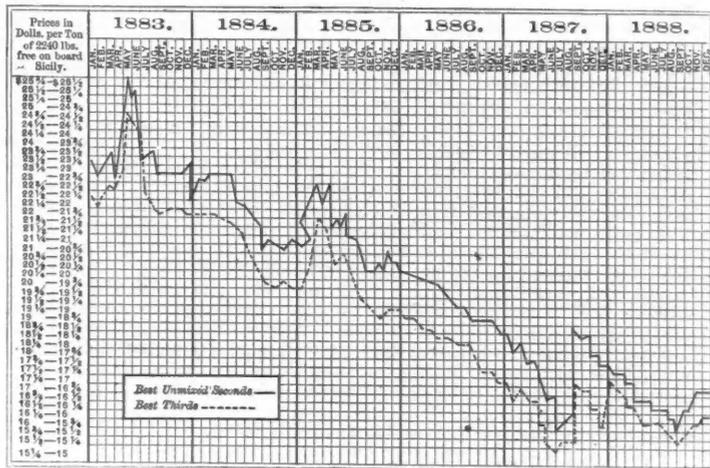
Any representative body of prominent men can render the city a great service by contributing the money needed to pay for having a comprehensive transit specification drawn by a board of distinguished engineers; and, further, by laying down the proposition, as a measure of protection to public interest, that no transit company should be allowed to build a road on a plan made by themselves. By working out the technical details of the general plan it would become apparent what legal enactments are necessary to render possible a thorough reorganization of the city's transit system. To first make the plan and then seek for the needed legislation is, obviously, a more intelligent mode of procedure than to obtain the legislation and then seek for the plan.

In case that private capital hesitates to carry out an adequate transit plan, would it not be wiser for the city to borrow the money and undertake the work, than to allow a cheaper and inferior system to be built by an independent transit company? The indirect profit to the municipality from increase in taxable values would, certainly, be greater if the transit system really meets the requirement of making travel easy, rapid and cheap, between every two points within the corporate limits, than if the system provides only for longitudinal travel, by lines which do not extend the whole length of the city, and which require that many of the persons desiring to ride shall either find some other means of travel, or walk long distances, or pay double fares. Nor is it improbable that a considerable direct profit would remain from the passenger receipts, after paying the renewal and running accounts, and meeting the interest charges. An ultimate effect of such a profit might be a rate of fare less than five cents.

Is not the will of the people, if properly directed, sufficiently powerful to effect whatever changes in existing laws are necessary to enable the building of such roads as the people need?

STATISTICS OF SICILIAN BRIMSTONE.

We are indebted to Mr. A. S. Malcomson for the following interesting statistics, showing the exports and prices per ton of 2240 pounds of Brimstone, free on board, Sicily, during the past six years. Prices have ranged as follows:



The total export from Sicily was divided as follows:

	1888.	1887.	1886.	1885.	1884.	1883.
United States.						
New York.....	60,706	45,979	49,952	50,814	46,460	41,238
Charleston.....	22,496	14,324	10,556	12,416	7,706	5,425
Philadelphia.....	11,793	11,764	15,662	12,153	19,234	23,123
Baltimore.....	17,330	10,306	15,680	16,435	13,966	16,175
Boston.....	6,300	3,300	3,800	4,200	4,723	5,864
All other ports.....	9,640	3,746	3,910	3,360	2,820	4,804
Total.....	128,265	89,419	98,590	99,378	94,229	96,629
France.....	52,083	56,222	54,230	58,264	65,098	63,602
Italy.....	47,664	48,997	48,658	49,415	56,292	66,810
United Kingdom.....	35,634	30,007	30,236	33,402	40,760	41,788
Greece.....	5,809	18,370	19,697	13,664	7,053	10,494
Portugal.....	15,851	16,587	30,943	17,760	11,018	15,298
Russia.....	22,043	13,441	10,570	13,420	12,831	10,413
Germany.....	12,402	9,700	8,088	6,108	6,622	7,232
Austria.....	8,942	6,702	5,800	5,965	6,057	4,915
Turkey.....	1,457	6,238	4,398	3,077	1,285	3,043
Spain.....	3,433	5,873	5,800	2,243	3,920	5,242
Belgium.....	6,951	5,318	6,580	9,516	6,793	7,660
Holland.....	2,793	1,747	2,909	1,237	696	1,256
Sweden.....	3,004	1,169	1,916	328	744	1,010
South America.....	95	710	.....	.....	.....	.....
Australia.....	885	600	.....	.....	.....	.....
Denmark.....	464	202	.....	810	.....	.....
Total, tons.....	347,775	311,302	329,446	314,582	314,058	335,392
Stocks in Sicily, December 1st.....	167,569	199,200	202,392	193,703	184,500	133,707

Of the amount shipped to the United States during 1888, 72,173 tons were best unmixed seconds, and 56,092 tons best thirds, against 46,710 tons of the former and 43,709 tons of the latter shipped during 1887.

The Pietzka Revolving Pudding Furnace.—According to Dr. Wedding, there are seven of Pietzka's double-hearth revolving and puddling furnaces at Witkowitz, in Moravia, and seven others are to be added to those now erected at Zawadski. At the latter works the production of one of these furnaces is found to amount to three times that of a furnace of the ordinary type, besides which only six men are employed instead of twelve. The coal used is less by 40 per cent in the case of the elder

type of the revolving furnace, and it is hoped that a further reduction of 20 per cent will be effected in the case of the more improved form of furnace now in course of erection. The repairs are stated to be unimportant. The arch lasts for many months. The fire bridge is repaired every four weeks. The regenerators are cleaned out every fortnight, two hours being found sufficient to effect this. The heating up of a cold furnace can be completed in five hours. The percentage composition of the producer gas used in the furnaces at this works is about as follows:

	Heavy	Light	CO.	H.	O.	N.
CO. hydro-carbons.	14	0.4	27.8	8.9	1.4	57.8
hydrocarbons.		2.3				

The percentage of carbonic oxide rarely falls below 26, and is frequently above 30. It is stated that the loss of metal in this mechanical puddling furnace is somewhat less than in the ordinary one. The following table gives comparative working results obtained from furnaces at the Witkowitz works:

Month.	Ordinary furnace.			Revolving furnace.					
				With coal.			With gas.		
	Pro-duction.	Loss.	Coal used.	Pro-duction.	Loss.	Coal used.	Pro-duction.	Loss.	Coal used.
First....	Tons. 87.6	P. c. 9.3	P. c. 105.6	Tons. 279.3	P. c. 6.6	P. c. 67.3	Tons. 24.02	P. c.	P. c. 44.8
Second..	89.6	9.8	106.9	314.4	6.1	65.8	337.0	....	42.4

An Air Propeller.—A Danish inventor has designed a method of moving vessels by air propellers. A steam launch was fitted with a windmill with steel blades. It was carried on a frame above the deck, and formed an aerial propeller wheel. Steam machinery was provided for rotating this. With this as a propeller it was proposed to drive the boat. Practically, it was found that a twenty foot launch of five and one half feet, with a propeller eight and one-half feet in diameter, could be driven at a speed of five knots per hour in calm weather, and against a fresh breeze at four knots. The engine producing this effect indicated one and one half horse power. For a single indicated horse power the thrust of the propeller was 36.7 pounds, or about the same as that of a water propeller. It might be supposed that in a contrary wind this thrust would disappear, but, on the contrary, through seventy-five per cent of the horizon, the thrust was found to be augmented by the wind. With a larger launch, having a displacement of five tons, a speed over six knots an hour was obtained against the wind.

Tiffany's Display of Jewels and Silverware for the Paris Exposition.—A display of jewelry and silverware made for the Paris exposition has been on exhibition at Tiffany's, New York. The total value of the exhibit, it is said, will reach upwards of \$1,000,000. The exhibit is distinctively American in its character. The work was all done at Tiffany's establishment in Union Square. The decorations are mostly taken from Indian designs, especially those of the Chilkats, Inuits, Hujas, Sioux and Navajoes. The pearls are from Ohio, Tennessee and Texas, and were found in fresh-water mussels. Mounted with these are garnets from Arizona and New Mexico, sapphires from Montana, and other stones in inexhaustible variety. The jewelry exhibited includes nearly 200 pieces. The silverware, as well as the jewelry, is decorated with designs suggested by works of the North American Indians. The conventional designs have been thrown aside entirely for these quaint but artistic decorations. One striking piece is a large silver urn, with silver buffalo heads for feet and horns for handles.

The Eiffel Tower.—The Eiffel Tower has already attained a height of 295 meters, and in a month it will be completed by the turret and the electric lantern, which will give it its greatest height of 300 meters. The Paris correspondent of the London *Builder* says: "It is curious to notice to-day how inferior is the effect produced by this enormous piece of iron work to the idea that people had of it in advance. Seen from the environs of Paris, it overpowers the city, and appears immense by the side of the large monuments, which are reduced to very small dimensions, but the nearer one approaches it, the less is one aware of its colossal proportions, and the eye hardly sees what relation can exist between the thin termination of the tower and the gigantic arches at its base. There is an optical illusion about it which will always weaken its general effect, and disappoint the hopes of the promoters of this useless attempt to astonish the eye by its giddy height."

The English Salt Output to be Taxed for Surface Damages.—It is stated that the Salt Union has arranged with Mr. Brunner, M. P., to hold an important conference in Cheshire with reference to the enormous damages sustained by property owners and ratepayers owing to subsidences. The conference will be confined to the Salt Union, the directors of Brunner, Mond & Co., extensive alkali manufacturers and brine pumpers, and deputations from Northwich and Winsford local boards. One million tons of salt are raised annually in Cheshire, and Mr. Brunner's main proposition is that a tax should be placed on each ton obtained. The subsidences are so serious that lakes of water have been formed several hundred acres in extent, while at Winsford the extraordinary spectacle is to be witnessed of the ridge tiles of a house just disappearing below ground.

The Issue of Minor Coins.—The Director of the Mint has issued a circular in regard to the issue of minor coins, which provides that five-cent nickel pieces and one-cent bronze pieces will be forwarded in the order of application from the United States Mint at Philadelphia to points reached by express companies, free of transportation charges, in sums of \$20 or multiples thereof, upon receipt and collection by the Superintendent of the Mint of a draft on New York or Philadelphia payable to his order. To points not reached by express companies, and where delivery under contract with the Government is thus impracticable, the above coin can, on the same terms, be sent by registered mail at applicant's risk, registry fee on same to be paid by the Government. Orders for transportation at risk of applicant should express acceptance of the risk.

Important Electrical Patent Decision.—The United States Circuit Court for the Southern District of New York on Monday rendered a de-

cision in the case of the Electrical Accumulator Company vs. the Julien Electric Company for infringement of storage battery patents. The Electrical Accumulator Company sued the defendant on four patents. One patent the complainant abandoned during the trial, two others are decided to be invalid, and two claims only of the fourth patent were in controversy. One of these claims it was held the defendant does not infringe, the other claim, the court holds, is too broad in its present form and can be sustained only when limited to a device which the defendant does not use. The decision is a substantial victory for the Julien Electric Company, and is one of the most important recently rendered.

Mineral Land not Locatable when Patented as Agricultural.—Following is a recent decision of the United States Supreme Court in a case where defendants located mining claims on land held by the Oregon Pacific Railroad Company under a United States Agricultural patent: "Our opinion is that where a patent issues for public land under a law which provides for its distribution as agricultural land—either to a railroad company or to pre-emption of homestead claimants—and there is no reservation in the land except a general one of mineral lands, and no reservation at all in the patent, then the patent must be considered as a conclusive determination by the government that the land is agricultural; and afterwards in a court of law it is not competent to reopen the question of the character of the land."

Iron and Soda in Southern Russia.—Professor Mendelejeff has just published an account of the survey of the Donetz coal basin in Southern Russia, which he has made on behalf of the Government. This field is estimated to produce this year about three million tons of bituminous and 750,000 tons of anthracite. He strongly recommends the abolition of the coal duties so as to admit the competition of English coal. He says that nothing but cheap coal is needed to give birth to a great iron industry, and, perhaps, a scarcely less important soda industry. Iron and soda may, he asserts, be produced in this locality so cheaply that even England itself would become an important market for the produce of the Russian manufacturers.

Australian Cross-Continent Railway.—The promoters of the cross-continent railway line, which is to connect Victoria and South Australia with Western Australia, have received the co-operation and sanction of the Government of the last named State. The terms on which the contractors have agreed to construct the railway are that for every mile of railway they build they shall receive 20,000 acres of land from the Government. As the length of the line, when completed, will be nearly 800 miles, it will be seen that the contractors will then be in possession of an estate equal in size to one fourth of the territory of Victoria. It is expected that the construction of the line will occupy ten years.

The Michigan Ship Canal Scheme.—W. H. Morrell, of New York, is endeavoring to induce the Michigan Legislature to grant a charter for the proposed ship canal across the Upper Peninsula connecting Lakes Michigan and Superior. The route selected is 36 miles long, and begins at Bay au Train, about 15 miles east of Marquette. Its southern terminus will be Little Bay de Noc, near Gladstone. Two locks will be necessary. It will save to ship commerce a distance of 271 miles between Chicago and Duluth. Mr. Morrell says that he has an abundance of New York and Chicago capital interested.

Poppies as Protectors of Embankments.—A new use has been discovered for the poppy. It forms a network of roots that cannot be exterminated without great difficulty, and it is therefore admirable for keeping embankments in place. Within the last two or three years eminent French engineers have undertaken the sowing of railway embankments with poppies, with a view to prevent their being destroyed by heavy rains.

The Atomic Weight of Ruthenium has been re-determined by M. Joly, who finds that it should be, not 104 as heretofore supposed, but a number very near 101.5. This will affect its position in the "periodic system," and differentiate it still further from Rhodium, the atomic weight of which is also very near 104, the weight formerly given to Ruthenium.

A Swiss Cave.—It is estimated that the stalactite cave lately discovered near Reclère, Canton Berne, is about 1600 metres long, 600 metres broad, and from 4 to 20 metres high. The greater part of it has not yet been investigated. A pool has been discovered, measuring 25 metres square, which is supposed to be the only one in the cave.

BOOKS RECEIVED.

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

Economic Value of Electric Light and Power. By A. R. Foote, Cincinnati, O. Published by Robert Clarke & Co., Cincinnati. Pages, 191. Price, \$1.

Steam, its Generation and Use. By the Babcock & Wilcox Company. New York. Published by the authors. January, 1889. Twentieth Edition, Revised and Enlarged. Pages, 120. Illustrated.

MAPS RECEIVED.

Generalized Section of the Coal Measures of Southern Ohio from the Sharon to the Pittsburgh Coal. By Dr. Edw. Oton, State Geologist. Published by W. H. Jennings, Civil and Mining Engineer, Columbus, Ohio.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

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

PATENTS GRANTED MARCH 19TH, 1889.

- 399,658. Ore-Separator. Alma Emmons, Galena, Kans.
 399,706. Process of Extracting Zinc from Ores Containing Precious Metals. Henry B. Slater, Detroit, Mich.
 399,791. Concentrator. Frederick Sletcher, San Francisco, Cal.
 399,809. Grinding and Amalgamating Mortar. G. W. White, San Francisco, Cal.
 399,835. Coal-Elevator. Jonathan Chase, Boston, Mass.
 399,970. Apparatus for Raising and Moving Earth. H. A. Carson, Boston, Mass.
 399,992. Process of Manufacturing Zinc. Henry A. Hunnicke, St. Louis, Mo.
 399,995. Furnace for Working Zinc Ores. Ludwig Kleemann, Myslowitz, Prussia.
 400,010. Process of Converting Crude Iron into Malleable Iron or Steel. Gustave I. Robert, Stenay, France, Assignor to John Wesley Bookwalter, Springfield, Ohio.

THE METALLURGY OF STEEL.*

By Henry M. Howe.

(Continued from page 262.)

Similar changes occur in other malleable metals, and, like those in iron and steel, increase during rest after distortion. Thus Bauschinger noted that if a piece of zinc were subjected to a stress *S* beyond its proportionality limit, and again tested within a few minutes, the proportionality limit had now risen to *S*: but on allowing the same piece of zinc to rest for about a day after the application of the stress *S*, the proportionality limit was now found to have risen from *S*, which was 1,393 pounds, to 1,508 pounds per square inch.^a

Local Cold-Working, however, though its immediate effect may be to strengthen the part worked, may greatly weaken the piece as a whole. For instance, suppose that we hammer the side *A* of the piece shown in Figure 87, and thus strengthen it and raise its elastic limit without changing the properties of the side *B*, striking *A* first crosswise then lengthwise so as to avoid distorting the piece. If we now stretch the piece as a whole in tensile test, all will go on normally till the stress per square inch reaches the initial elastic limit of the material.^b But after we pass this point *B* stretches more under given increment of stress than *A*. *A*, standing up to its work, bears an undue share of the stress. The stress on *A*, whose power of elongation is less than that of *B*, reaches the ultimate tensile strength, and *A* parts while the stress on *B*, which has all the time been stretching instead of resisting, is still relatively small.

Once *A* is broken, *B* has now to bear the whole stress: indeed, as *A* breaks it may start a crack which will quickly rip across the piece.

This ultimate weakening effect of a local strengthening is clearly due to heterogeneousness of elastic limit and of power of elongation.

But such local cold-working need not necessarily weaken the piece. If, for instance, it were the side *B* instead of *A* that had been cold-worked, the cold-worked and the strengthened portion being thus the greater not the smaller of the two, its strength alone would be greater than that of the initial strength of the whole piece before cold-working: so that even if *B* had to bear the whole stress and received no assistance from *A*, the piece as a whole would be stronger than before receiving the local cold-working. Hence local cold-working may strengthen or weaken the piece according to the special conditions of the case, such as the proportion of the whole which is worked cold, the shape and position of the part worked cold, the intensity of the cold-working, etc.

Moreover, cold-working in general and local cold-working in particular should set up severe stress: this may tend to weaken the metal. While it is in general outweighed by the direct strengthening effect of cold-working, it may under many conditions outweigh the direct strengthening effect.

Local cold-working may, further, directly cause local incipient rupture.

Thus it is not surprising that local or excessive or ill-advised cold-working weakens the metal.

Apparent instances of the disastrous effect of heterogeneousness of strength due to local strengthening are the breakage of steel rails through their punched bolt-holes, the usual weakness of punched steel plates, and possibly Sweet's rail-breaking method, in which a single blow from a sledge usually suffices to break a nicked rail.^c A steel rail which untreated would endure the blow of a 2,000 pound ram falling fifteen feet, will sometimes if punched break with a fall of one foot.^d

Steel rails are reported as breaking in the track soon after being struck by a derailed engine; and, when they are broken in normal use, rupture is said to occur usually where the rail has been pressed by the gag which is used in cold-straightening, and which should not be allowed to touch the flange of the rail, thinner, less supported and more liable to severe deformation than the head.^e The breakage of steel plates, angles, etc., which gave

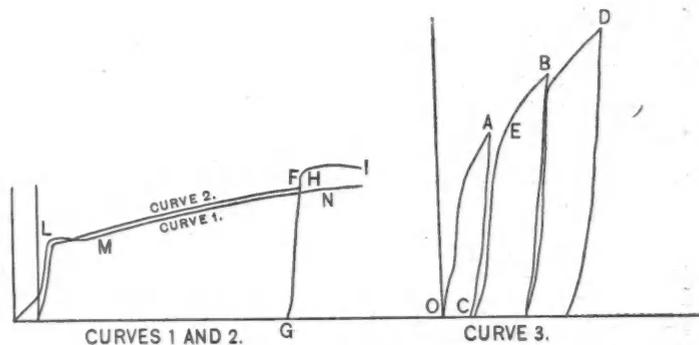
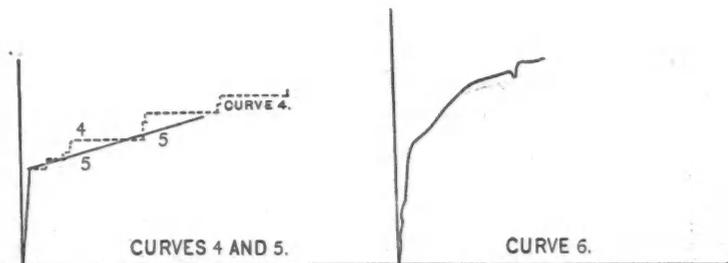


Figure 88.



Curves 1 and 2. Torsion-strain diagrams from two pieces of soft steel of about 0.15 to 0.20 % of carbon, cut from adjacent parts of the same bar. In 1 the stress was continuous, in 2 interrupted. G. W. Bissell, Private Communication, Jan. 15th, 1889.

Curve 3, Torsion-strain diagram of very hard steel (Jessop's) used for tack plates. At A stress was removed for two days; at B the piece was left under stress for one day. Stress was then interrupted momentarily, immediately reapplied, and carried to D. Here the stretching point fails to rise above the last previous maximum stress. Idem. This investigation was kindly made by Mr. Bissell for this work.

Curves 4 and 5. Transverse-strain diagrams of common wrought-iron, weighted with a dead load. In 4 the load was increased intermittently, in 5 it was increased steadily so as to give as little time for elevation of the elastic limit as possible. Thurston, Matls. of Engineering, II., p. 598.

Curve 6. Interrupted-strain diagram of tool steel. Idem, p. 611.

serious alarm during the early employment of steel for structural purposes, was in many cases attributed to too abrupt cold-bending. From the foregoing we see the importance of bending to curves of long radius, of striking with copper-faced or even wooden mallets rather than iron sledges, or applying bending-pressure through wooden blocks, etc., to make the bends less abrupt.

For Table 101 see next page.

(TO BE CONTINUED.)

NOTE.—The publishers of the ENGINEERING AND MINING JOURNAL will thank the readers of this article if they will promptly call attention to any inaccuracies they may observe in it.

* Copyright by the Scientific Publishing Company, 1887.

^a Op. Cit., p. 8.

^b For simplicity I here ignore the usual slight depression of the modulus of elasticity due to cold-distortion. Lowering the modulus of *A* would increase, raising it would diminish these effects.

^c Trans. Am. Inst. Mining Engineers, III., p. 92.

^d J. Fritz, Trans. Am. Inst. Mining Engineers, III., p. 91, 1875.

^e Holley, Trans. Am. Inst. Mining Engineers, VIII., p. 404, 1880.

TABLE 101.—INFLUENCE OF STRETCHING BEYOND THE ELASTIC LIMIT ON THE MODULUS OF ELASTICITY, ELASTIC LIMIT, ETC.; AND MODIFICATIONS OF THIS INFLUENCE BY REST AND FURTHER TREATMENT. BAUGHMEIER.

Main data table with columns for treatment, modulus of elasticity, stretching point, and various test parameters. It is organized into sections I through XI, each representing different experimental conditions and treatments.

A given test-piece is subjected to tensile stress (pull) many times in succession, the stress usually being greater than the existing stretching-point but less than the existing ultimate tensile strength. The modulus of elasticity, proportionality-limit and stretching-point (common elastic limit) are determined after each pull and given in successive lines. Between successive pulls the piece usually undergoes some treatment, or is allowed to rest, as indicated in the second column. All the results in a given set of columns (e. g., I., II., etc.) are the successive results for a single test-piece. The only exceptions are in line 38, in which the piece is subjected to a pull of 61,286 lbs. per sq. in. after receiving the pull in line 37 and before receiving that in line 38; and a similar case in line 18. When a line is blank in a given group of columns, the treatment given in column headed "Treatment prior," etc., has been omitted.

PERSONAL.

Mr. Cyrus H. de Forest, the oldest coal merchant of Buffalo, N. Y., died on the 7th inst., aged eighty-four years.

A series of articles by prominent experts will begin in the June number of *Scribner's Magazine* upon "The Practical Application of Electricity."

Dr. E. D. Peters, Jr., the well-known copper metallurgist, is at present visiting the property of the Eastern Development Company, Cape Breton, Nova Scotia.

Mr. Gabriel Montegut has resigned as Superintendent of the New Orleans Mint. He announces as the reason for his resignation his belief in the doctrine that "to the victors belong the spoils." Mr. Montegut was appointed by Mr. Cleveland four years ago.

Col. William Henry, Jr., died at Fort Worth, Tex., on the 16th inst., in the 58th year of his age. For a number of years he was actively engaged with the Lackawanna Iron and Coal Company, at Scranton, Pa., in developing the industries of that city. He subsequently went to Oxford, N. J., from which place he enlisted in the First New Jersey Volunteers at the outbreak of the war. At the close of the war he moved to the West, and was among the early settlers of Fort Worth.

Senator Stewart's special committee to investigate the subject of reclaiming arid lands will enter upon that duty on the 1st of August next, going first to Montana, and extending the trip to most of the other Territories. This committee includes Messrs. Allison, Plumb, Hiscock, Gorman, Reagan and Jones, of Arkansas. Messrs. Hiscock, Gorman and Reagan are also members of the Inter-State Commerce Committee, which will begin in May an investigation of the railroad and canal commercial relations of the United States and Canada.

One of the advantages Cornell University, at Ithaca, N. Y., offers to her technical students are inspection tours to the great manufacturing establishments in the cities. This year 250 students will go on the different trips. Dr. Thurston and Professors Nichols and Canaga accompany a section West, visiting Rochester, Lockport, Buffalo, Pittsburgh and Cleveland. Professors Roberts and Williams have charge of the eastern trip, which takes in Schenectady, Troy, Albany, New York, Brooklyn, Newark and Jersey City. The electrical students will be specially entertained by Edison.

Mr. John Henry Evans, of the firm of Wing and Evans of New York City, died suddenly of heart disease in Brooklyn on Sunday evening, the 17th inst. Mr. Evans' death, which was wholly unexpected, occasions sincere regret throughout the chemical trade. He had a peculiar faculty of making friends and of keeping them, all with whom he came in contact being impressed by his kindness of manner coupled with an energetic and enterprising business spirit. Mr. Evans was born in Philadelphia in 1831. He came to New York in 1847, and secured a position as a drug clerk; ten years later he embarked in the chemical brokerage business and in 1860, the present firm of Wing and Evans was established. Since then his career had been a gradual but uninterrupted rise to wealth and influence, and at his death the house of which he was a founder is ranked as one of the leading chemical firms of the country. Mr. Evans was known as an authority on matters pertaining to the trade, he was vice-president of the Enoch Morgan Sons' Company, of New York, treasurer of the Warsaw Salt Company, of Syracuse, N. Y., and a member of the Produce Exchange and of the Down Town Association.

INDUSTRIAL NOTES.

Judge Bucher has granted an injunction temporarily restraining execution of the judgments given against the Lewisburg Nail Works, Lewisburg, Pa., which failed recently.

The employes of the blast furnace of the Pottsville Iron and Steel Company at Pottsville, Pa., have been notified of a 5 per cent reduction in wages, to take effect April 1st.

The Ironton furnace, fifteen miles from Buffalo, N. Y., on the Niagara river, will begin operations about April 15th. The capacity will be 100 tons per day, using about 125 tons of coal and 60 tons of limestone.

The Treasury Department has decided that exported galvanized fencing manufactured in New Jersey from imported steel and spelter is entitled to a drawback equal to the duty paid on the imported material, less the legal retention of 10 per cent.

The Collector of Customs at New York has been notified by the Treasury Department that domestic manufactures, including jewelry and personal adornments, sent to the Paris Exhibition of 1889, will, on their return to the United States, be entitled to free entry, provided their condition is unchanged.

The Cartersville Furnace Company, the Etowah Company and the Daisy Coal Company have been consolidated and incorporated by Jos. E. Brown and others as the Etowah Land and Mining Company, Cartersville, Ga., with a capital stock of \$1,750,000, and privilege of increasing to \$5,000,000. The object is the erection of electric light, gas and water works; building railroads, machine shops, furnaces, etc.

The strike at the Wheeling Steel Works at Benwood, W. Va., which has lasted since January 1st, has been

settled by the signing of a wages scale substantially the same as that of last year and the reinstatement of all old employes. The Knights of Labor controlled the mill last year, but the Amalgamated Association presented a scale for the new year and, on its rejection by the firm, ordered the strike. The present agreement was made with the employes irrespective of organization, and holds good till December 31st.

The New England Julien Electric Company has been formed, with a capital of \$1,000,000,—and has executed contracts with the Julien Electric Company and the Julien Electric Traction Company whereby the latter company will receive cash and stock from the sub-company. This sub-company will control the right to use the traction, etc., system in the New England States. The sub-company will begin business with 6000 shares of the par value of \$600,000 in its treasury.

Another meeting of creditors of the Reading Iron Works, of Reading, Pa., to the failure of which we referred in our issue of the 9th and 16th inst., was held in Philadelphia, Pa., on the 21st inst., at which the Committee on Appraisal and Examination of Assets made a further report. The figures previously given were not materially altered. The Committee on Reorganization made a report, the substance of which, it is stated, was that replies had been received from nearly one half of the creditors, and all were substantially in favor of Mr. Baer's plan of reorganization given in our last issue, and this plan has been decided upon.

The Sturtevant Mill Company of Boston, Mass., reports the following sales, which in great part came through the Company's advertisement in the *ENGINEERING AND MINING JOURNAL*: Two Sturtevant Mills to the Standard Cement Company, Akron, N. Y., for grinding cement; one to Allison & Addison, Richmond, Va., for phosphate rock; one to J. E. Tygart & Company, Philadelphia, for phosphate rock; one to Savannah Guano Company, Savannah, Ga., for phosphate rock; one to W. M. Ross & Company, Seaford, Del., for phosphate rock; one to Stewart Stucco & Cement Company, Colorado Springs, Col., for cement; one to Tinsley & Travers, Richmond, Va.; for phosphate rock; one to Orford Copper Company, Constable Hook, N. J., for copper mattes and ores.

Mr. A. T. Douthett of the Porter Foundry and Machine Company of Allegheny, Pa., has issued a call for a convention of boiler manufacturers of Pennsylvania, Ohio, New York, Maryland, West Virginia, and New Jersey, to meet at the Hotel Anderson, Pittsburgh, on April 16. The idea is to organize an advisory board of boiler manufacturers. In the six States named there are about 450 establishments engaged in boiler making. An effort is to be made to create a greater interest in the manufacture of boilers, make the use of the very best material compulsory, thus decreasing the number of explosions, and to establish a minimum price which will insure a reasonable profit on all boilers built. It is not proposed to form a trust. Each manufacturer entering the association will manage his own trade and sell direct, but an agreement is expected to be reached that none will sell below the minimum price per pound decided upon. The question of wages will not be considered.

CONTRACTING NOTES.

Our list of machinery and supplies wanted will be found on page xii. Manufacturers of machinery, engineers and contractors should also consult our directory of "Contracts Open" on the same page. This week, proposals are invited for the following new contracts: No. 1332, Construction of Water Works System; No. 1336, Street Lighting; No. 1334, Furnishing and Delivering Rip Rap Stone; No. 1335, Constructing Dike and Dredging; No. 1336, Dredging Shio Channel; No. 1337, Building Water Works System; No. 1338, Constructing Pipe Sewers; No. 1339, Street and Sewer Work.

GENERAL MINING NEWS.

The Denver Chamber of Commerce is manifesting a deep interest in the development of the iron interests in the West. At a special meeting of the directors, held on the 15th inst., a committee was appointed, consisting of Messrs. R. W. Woodbury, J. W. Nesmith, and H. C. Lowrie to investigate the iron fields near Hartville, Wyoming.

The iron belt near Hartville, Wyoming, of which the following extracts are from a report furnished to the Denver Chamber of Commerce by Mr. J. S. Bartlett, is situated on the line of the Cheyenne Northern Railroad, 225 miles north of Denver. As shown by croppings, the iron body extends from the banks of the North Platte river at Fairbank to Whalen cañon, a distance of about 10 miles. The width, as near as can be ascertained, is from one to two and a half miles. In depth the vein shows 150 feet at the deepest point penetrated, but neither at that point nor at any other has the bottom of the ore body been reached or cut through. In quality this is one of the best upon this continent. This statement refers to its character as to purity; it excels the ores of the lake region and Alabama, Georgia and Missouri ores taken from the surface, and from different points 40, 80, 120 and 150-foot depths show uniform results under analysis, giving metallic iron from 67 to 72 per cent., the average being between 68 and 69. In sulphur, phosphorus and in silica, these ores are remarkably low. There is no titanic acid. They contain about 0.15 per cent. manganese.

The center of the iron belt is 13½ miles from Wendover by railroad survey, and about nine miles by wagon road. The Union Pacific Railroad has made two surveys directly to the mines, which are reached by an easy grade. This is said to be the nearest iron ore of any value to the city of Denver. It is estimated that the ore can be mined for 50 cents per ton and hauled to Denver for \$2 per ton. The first estimate I have from practical miners, the second from officials of the Union Pacific Railroad. Limestone is very abundant in the hills containing the iron.

The railroad coal operators in the Pittsburgh and Hocking Valley districts have decided to reduce the wages of miners 5 cents per ton, to date from May 1st. A reduction of ten cents per ton in the price of coal induced the operators to reduce the wages of the men.

DAVIS-ELKINS COAL COMPANY.—This company has been organized with the following officers: President, Col. T. B. Davis; Secretary and General Manager, W. T. Blackiston. The coal property is located in the States of Maryland and West Virginia, and is said to be of great value. The principal offices will be located Piedmont, W. Va.

ALABAMA.
SHELBY COUNTY.

SOUTH BIRMINGHAM COAL AND IRON COMPANY.—This company, chartered in Virginia, has been organized with a capital of \$1,000,000. Mr. D. B. Stause, President; T. J. Shackell, Secretary and Treasurer, and George H. Dudley, General Manager of the company. The company owns about 3020 acres of land in the Cahaba District, on the Louisville & Nashville Railroad, sixteen miles south of Birmingham at Sydenham, a new name for the place. The property has been recently sold for \$320,000 cash. One sixty-ton furnace and 200 coke-ovens are to be built, and two additional coal mines are to be opened on the north side of the Cahaba River, one being already in operation on that side, and one old slope on the south side of it, and a number of buildings are to be erected, all to be done as speedily as possible. The coke made recently from five tons of this coal in the coke-ovens of the Eureka Company, close by, has been analyzed by A. F. Brainerd, chemist, shows 9 per cent ash. There are two other seams on this land of steam coal that have not been tested for coke making.

TUSKALOOSA COUNTY.

STANDARD COAL COMPANY.—This company has been organized with a capital stock of \$350,000. The company owns in the northern portion of Tuscaloosa County about 29,000 acres of coal lands. The Pratt seam extends through its lands. The officers of the company are Henry L. Eriestein, President; A. F. Bamberger, Vice-President and Treasurer. Messrs. T. H. Aldrich, of Blockton; Geo. L. Morris, of Birmingham; and Wm. Eriestein, of New York, with the officers named above, constitute the board of directors. The Birmingham Mineral Railroad Company will build a branch road three miles in length from the main line of the Mineral road to the property of the Standard Coal Company. The company will first open mines a few miles south of the Blue Creek mines, where work has already been commenced.

CALIFORNIA.

AMADOR COUNTY.

[From our Special Correspondent.]

AMADOR, March 8.

The Astoria, Hollywood and Middle Bar mines remain in status quo. We never hear the names mentioned and many people in the country know nothing about them. As I have said in former reports, how people can be induced to buy stock in such companies is more than I can tell.

AMADOR GOLD MINE.—At this mine work drags slowly on. The sixty-stamp mill is all *done* but *finishing*, and when that will be, will be hard to tell. Am satisfied when the mill is completed it will be the best in the country. Beside finishing the mill, a large amount of surface work remains to be done, such as building large and substantial gallow frames over their two shafts, and a tramway a half-mile long, over which the ore will have to pass to the mill. It must certainly be several months before any ore will be milled.

BUNKER HILL GOLD MINING COMPANY.—This mine at Amador City is running with its full quota of men, and the outlook in the mine is very encouraging. Its 40-stamp mill is crushing about 2500 tons of ore per month, not including work on Sunday. It is the only mine in the county that does not run on Sunday.

COSMOPOLITAN MINING COMPANY.—This company on Dry Creek has bought the claim adjoining them on the north for \$25,000 and are now making arrangements to erect a 30 stamp mill this coming summer. Surveys show they have a water power with a 600 foot fall. Geo. Weymouth, one of the principal owners, is here as general manager, and is rapidly developing into a first class mining man. We are pleased to receive such energetic Eastern men among us, and I only hope more may come. A person does not need to be born and brought up in a mine to be a successful manager of a mining property. We will welcome eastern men and capital at any time among us and will do all we can to prevent them investing in worthless properties, if they will only spend a few postage stamps and write to responsible parties in the county for information before buying.

GOVER.—The new water-works at this mine have not proven as great a success as was anticipated. They are attempting to run their hoisting works and mill with water from the one pipe, but it does not work very well. Such a thing can be done, as the pipe is very large.

HECTOR GOLD MINING COMPANY.—Everything is quiet around and about the mine in Sutter Creek. We notice an assessment of 15 cents per share has been levied upon the stock, and also, that the Eastern stockholders are going to personally examine into matters before paying the assessment. We heartily approve the latter course. The way the business of that company has been managed is no credit to the county, judging by the results.

KEYSTONE.—At this mine, also in Amador C'ty, the outlook is anything but encouraging. The ore has become so poor they have been running behind for several months. They have discharged quite a number of their men, and will now try and make it pay by assorting the ore more carefully, and run only 20 stamps to their mill.

NEW LONDON.—This mine, a short distance southwest of the Plymouth Consolidated, is pushing its prospecting ahead and the company has decided to put up a mill this coming season.

PLYMOUTH CONSOLIDATED GOLD MINING COMPANY.—Since my last report work in the mines has become an established fact. Quite a force is now working in the Pacific mine (that is, the south portion of the Plymouth Consolidated) and 20 stamps in their 80 stamp mill, are running. The general opinion is more men will be put on until 40 and perhaps the 80 stamps will be kept running. Before the fire it was reported the pay ore was about worked out in the Empire mine (the north portion of the Plymouth Consolidated) and I am rather inclined to think the report was mainly true.

SUTTER CREEK GOLD MINE.—The ten-stamp mill on this property is running at present. This mine adjoins the Hector on the northeast. The mine has never been worked to any depth, nor has it ever been worked systematically. What could be made of it if money was expended in prospecting is hard to tell.

CALAVERAS COUNTY.

[From our Special Correspondent.]

ANGELS' CAMP, March 9.

All the mines and mills in this vicinity are running to their full capacity.

CALAVERAS CONSOLIDATED GOLD MINING COMPANY, LIMITED.—The compressor for the power drills and the water pipes are all in place and working well and the drills will be set to work next Monday in the main tunnel, with the expectation to drive ahead at the rate of between 400 and 500 feet per month.

MELONES CONSOLIDATED MINING COMPANY.—This company has declared a dividend of \$1.25 per share on the 28th of January, 1889. The property is located on the middle branch of the Mother lode of California, on Carson Hill, and about 600 feet east of the Calaveras Consolidated. This property is the extension south of the celebrated Morgan mine, which has produced the gold by the millions. The property of the Melones Consolidated is well known by all mining men in California for the immensely rich rock it has produced at different times. It is owned by San Francisco capitalists.

MONO COUNTY.

STANDARD CONSOLIDATED MINING COMPANY.—The following telegram has been received from President Pettibone: "Twenty-two miners prospected old station past week. Mine looks very favorable. Indications are we are approaching ore-body in several places." The February statement, also just received in New York, shows that the company had a cash balance of \$22,068.44 on hand on March 1st. The mill only ran one week in February and produced bullion valued at \$5888. The company received from lessees, who are working only a portion of the mine, \$8880.94.

COLORADO.

The Supreme Court of Colorado on the 16th inst. decided that the law of 1887, providing for the taxation of mines was constitutional. The case was brought to the attention of the Supreme Court upon an appeal from the decision of Judge L. M. Goddard of the District Court of Lake, who also gave the opinion that the law was constitutional and could not be legally evaded. This case has attracted considerable attention, as the success of the Iron-Silver Company would have saved the mines of Colorado a considerable sum. As it is, says the *Denver Republican*, the miners will be obliged to pay taxes upon the value of their mines as well as their surface improvements, the latter heretofore only having been taxable, and the burden of State and county government will hereafter fall more heavily upon the producing and valuable mines than in the past. A comparative basis for the valuation of mines is fixed by the law, which says that producing lode mines shall not be valued by assessment at over 20 per cent of the gross value of the production of such mines during the year immediately preceding the assessment. On this proposition a lode producing \$100,000 in 12 months would be assessed at \$20,000, in addition to the value of the surface improvements, and if the rate of taxation is 2 per cent the amount would be \$400.

The above law will directly affect several of the most important mines listed on our New York Exchange, and owned largely by Eastern parties.

CLEAR CREEK COUNTY.

LAMARTINE MINE.—This claim was patented years ago, and for ten years at least has been in the possession of the Himrods, of New York City. Nothing of importance was done on the property, however, until the fall of 1886. The mine was then leased, and one year ago this month began to turn out ore steadily. It is said that a recent shipment of 64 tons of ore gave net returns of over \$11,000. The ore carried per

ton about 1.15@3.30 ounces gold, in addition to the silver. Considerable development work has been done. Two shafts have been sunk, the main one now being about 275 feet and the other 165 feet. A cross-cut connecting the two has been run at the 165 foot level. A steam hoisting plant, including a 25 horse-power engine and a 45 horse-power boiler, has been erected. About 86 men are employed. The present lease expires one year from date, when the owners of the mine intend to work it on their own account. The mine is coming rapidly to the front as a producer. The output for February was something over 100 tons, milling more than \$10,000.

SILVER AGE MINING COMPANY.—This company, whose property is situated near Idaho Springs, is building a concentrating mill on Clear Creek, at the mouth of Gilson gulch, for the ores from their mine. The capacity of the mill is to be 50 tons per day. Crushing machinery consists of Blake crusher and Cornish rolls. Concentrating machinery, Hartz jigs and Rouse tables. The mill is to be run by water-power, and it is the intention of the company to establish an electric plant in connection for the purpose of furnishing the mine 1 1/2 miles distant with power for hoisting, drilling, etc. This mine now employs about 40 men.

CUSTER COUNTY.

According to the Silver Cliff *Rustler*, the following mines at Rosita are working and most of them are paying: Pioneer, Nellie, Leavenworth, Pocahontas, Humbolt, South Humbolt, Robert E. Lee, West Virginia, Sleeping Pet, Clodhopper, Summit, Bear, Nebraska, Tip-Top, Clara, and Contact.

GUNNISON COUNTY.

BETA.—This mine has been sold to parties who will push development work. Mr. O. H. Harker, who is now the superintendent of the Eureka, will have the management of the mine. There will be considerable straightening up at the mine to put the shaft in shape for systematic and extensive work. The main incline will be put down, new levels started, etc.

LAKE COUNTY.

The citizens of Leadville are considering the matter of sinking a deep exploration shaft, and a meeting to further a prospecting enterprise has been held. The following committee has been appointed to select a suitable location for the shaft: Messrs. Noble, Frank White, A. A. Blow, Max Boehmer, Charles L. Hill, and Manager Argall, of the La Plata.

ADAMS MINING COMPANY.—The concentrating mill is now running regularly, dressing from 70 to 80 tons of low-grade carbonate ore per day. The ore is broken from the bodies of low-grade ore in the upper contact. Four and one half tons are put into one, and consequently from 15 to 20 tons of concentrates are produced daily. Lessees working in the upper contact are also producing a small amount of low-grade carbonate ore, which is shipped direct to the smelters.

DUNKIN MINING COMPANY.—The treasurer of this company received a telegram, dated the 16th, stating that a draft of \$5,000 had been received. After payment of the dividend of \$10,000 just declared, the company will have from \$27,000 to \$28,000 on hand, beside what money may be at the mine. New hoisters and cages have been put in at the mine and paid for.

SMALL HOPES CONSOLIDATED MINING COMPANY.—The Secretary, Mr. C. A. Cameron, informs us that the cash balance of this company on the 1st inst. was \$24,218.50, in addition to the reserve fund, now amounting to \$54,000. The gross value of the February ore produced was \$11,485.23. Expenses for the same period aggregated \$6,000.

PITKIN COUNTY.

ASPEN TRANSPORTATION COMPANY.—This company has been organized at Aspen with a capital stock of \$10,000. The directors are D. M. Van Hovenbergh, H. T. Tissington, W. W. Cooley, H. B. Gillespie and H. J. Moynihan. The charter is for a freight and passenger railroad from Aspen city in a southwesterly direction to the head of Queen's gulch, at or near the Buckhorn mine, varying in direction so as to reach all mines along the route.

LITTLE LOTTIE MINE.—A one half interest in this mine has been sold by J. M. Downing to J. B. Wheeler and D. K. C. Brown, the consideration being \$40,000, says the *Aspen Chronicle*. The grantor still maintains a quarter interest in the property. At present the mine is under lease to John R. Curley.

PUEBLO COUNTY.

PUEBLO SMELTING AND REFINING COMPANY.—This company filed a certificate of mortgage at Pueblo, on the 14th inst., with the County Clerk in favor of the Mercantile Loan and Trust Company, of Boston, Mass. The document states that the mortgage was made for the purpose of furnishing money to build the copper plant. These are its first-mortgage bonds, five to ten years 7 per cent bonds, limited to the amount of \$500,000, dated January 1st, 1889.

DAKOTA.

LAWRENCE COUNTY.

CALEDONIA MINING COMPANY.—Work on the property progresses steadily. Superintendent T. H. Skinner reports to the New York office that the production for the week ending March 11 was 1665 tons. Of the work done in the mine, he says: "A ditch has been cut in the main tunnel on the 500-foot level, to take the water from the winz which we have started to sink on the east vein from the 575-foot level."

POCAHONTAS MINING COMPANY.—The annual meeting of this company was held at Carbonate recently. The following officers were elected: John B. LaBeau, President; John O. Clark, Vice-President; Julius Rebsamen, Secretary. The Treasurer's report showed

that \$539.96 was expended since March, 1888. Balance on hand, \$156.73, and about 5000 shares of stock in the treasury.

INDIANA.

TIPTON COUNTY.

LAFAYETTE NATURAL GAS COMPANY.—This company has struck another gusher at Kempton. A drill had penetrated Trenton rock 25 feet, when the pressure became very great and the drill was withdrawn. When near the top in some manner the gas was ignited, and instantly a stream of fire leaped forth. In the little room around the derrick were fourteen persons and every one was more or less burnt, four very badly.

MICHIGAN.

IRON MINES.

ATLAS IRON MINING COMPANY.—This company has been reorganized. Two years ago controlling interest in this mine was sold to Cleveland parties, for \$120,000. Mr. Edward Ryan retaining a one-tenth interest of the entire stock. After its sale, operations on the mine ceased, and it has stood idle since. The property is located on the Gogebic range, near the Belt Iron mine. There are two shafts sunk on the vein. An assessment of \$5 a share on 4000 shares, making a total of \$20,000, was made, and it is the purpose of the new company to start operations immediately.

COLBY.—Mrs. Crawford has won her suit in the United States Court at Marquette, for a one-sixth interest in this mine. Monroe, a former husband of Mrs. Crawford, furnished the money that Captain N. Moore needed to secure a third interest in the mine, then undeveloped, on condition that Moore should deed him half his interest. When Moore got the property he had the deed made out to his wife to evade keeping his agreement with Monroe, the latter having died in the meantime and his widow marrying again. Suit was brought to enforce the contract.

KILWORTH MINING COMPANY.—At a meeting of the stockholders of this company, held in Ishpeming recently, the following officers were elected: Patrick Sullivan, president; James L. McClear, vice-president; Cornelius Kennedy, treasurer, and T. J. Dundon, secretary. The company owns land adjoining the Braastad (formerly Wintrop) mines, and the work of developing the ore deposit there will be prosecuted with vigor.

MISSOURI.

JASPER COUNTY.

CARTHAGE LEAD AND ZINC COMPANY.—The property and plant of this company, Carthage, owned and operated by D. E. Garrison & Co., of St. Louis, have been sold to a syndicate of Connecticut and Massachusetts companies for \$50,000. These gentlemen have organized a stock company with \$100,000 capital to carry on further developments under the name of the Carthage Zinc Company.

MONTANA.

SILVER BOW COUNTY.

ANACONDA COMPANY.—Owing to the recent burning of the lower works of this company, to which we referred in our last issue. Mr. Marcus Daly, the Superintendent, has ordered the Chambers Syndicate mines to shut down. It is thought that the fire was incendiary, and guards on the works have been doubled. The upper plant of the St. Lawrence Works is still in full blast.

LINGTON MINING COMPANY.—Preparations are being made to put diamond drills at work in exploring on the 1200 level, where some good copper ore has been discovered lately. Plenty of silver ore is being produced from the 500 level up to keep the mill running to its full capacity.

SILVER CHAIN MINING & MILLING COMPANY.—This company has just been incorporated. The mine is situated eight miles west of Anaconda and was discovered July, 1886. The ore carries silver, copper and gold. It is stated that the company expects to have a smelting plant in operation within six months.

NEVADA.

The bulk of the \$100,000 appropriated for irrigating and water storage purposes by the Legislature during the recent session will be utilized in the construction of suitable dams near the headwaters of the Carson River, to store the water now wasted when that stream overflows its banks in the spring. It is claimed that an ample supply of water to operate all the stamp mills to their full ore crushing capacity throughout the year and to irrigate all the land along its course can be saved by the construction of storage reservoirs.

ESMERALDA COUNTY.

PAMICO MINING COMPANY.—We are officially advised that dividend No. 2 since incorporation, of \$3,000 has been declared by this company. Dividends paid to date amount to \$69,253.53. The company has a balance on hand of \$7,658.18. The suit against this company to which we referred in our last issue was brought by Garrison & Keay vs. S. A. Knapp et al. and the Pamlico Mining Company to recover the sum of \$50,000, the value of fifty tons of gold rock, alleged to have been taken by defendants out of the property of plaintiffs "The Lake View;" also another suit by Garrison against the same parties to determine the ownership of some of the Pamlico ground, claimed by plaintiff and known as "The Lake View West." The same damages are asked as in the other suit.

EUREKA COUNTY.

EUREKA CONSOLIDATED MINING COMPANY.—The fifty-cent assessment levied this week was necessitated, we understand, by the refusal of the bank in San Francisco to allow the company any further over drafts. The company's assets are now principally in coke and ore on hand, and money was needed to pay the freight on some coke which was contracted for some ten months ago and which is now being delivered

It has been the custom of the bank to advance the company money whenever it was needed temporarily, but on account of the Government timber suits now pending against the company, the bank officials do not deem it prudent to do so now. We understand, however, that the Senate Committee on Mines and Mining, which has been investigating the timber suits, is expected to report to the Senate to-morrow, and it is thought that action will very shortly be taken to allow the company to resume work. Following is an official statement of the company's condition, March 11th:

LIABILITIES.	
Over draft, in San Francisco.....	\$8,315.22
Company's note, due in March.....	1,632.00
Total.....	\$9,947.32
ASSETS.	
Bullion on hand.....	\$4,231.80
Ores.....	218.80
Zinc.....	281.92
Coke.....	9,781.87
Flue dust on hand.....	4,000.00
Cash on hand.....	412.66
Total.....	\$18,927.05

STOREY COUNTY—COMSTOCK LODGE.

CALEDONIA MINING COMPANY.—The suit of Forman vs. this company, for the same amount and precisely similar to that against the Overman, was called on the 13th inst. but after a jury was empanelled was settled, the company paying the full amount claimed, \$3,075. The suit of Mary Motton against the same company, in which the jury failed to agree upon a verdict, was also settled, the plaintiff receiving \$350, the full amount claimed.

CHOLLAR MINING COMPANY.—The transmission of motive power by electricity from the Suro tunnel level of the Chollar incline to operate the Nevada mill, in conjunction with the surface Pelton wheel, has proved a success, and Chief Electrician Smith, who has had charge of the work, is about to leave for San Francisco, when the electric motor power will be turned over to the Chollar Company, as Mr. Smith claims that the contract with the Bush Company has been filled, that company accomplishing all that was specified in the contract with the Chollar Company.

CONSOLIDATED CALIFORNIA AND VIRGINIA MINING COMPANY.—After paying February expenses, this Consolidated California and Virginia company carries over to the current month's account a coin surplus of \$90,000. It is expected that the payment of regular dividends will be resumed next month. The management has decided to operate the California mill by steam power to keep up the bullion product, whenever a scarcity of water compels the hanging up of stamps at the Eureka. The bullion shipments on February account footed up \$228,359.57 March 1st, with the final shipment, representing the clean up for the fiscal month yet to arrive.

HALE AND NORCROSS MINING COMPANY.—The bullion production for February was \$78,097.77 and not \$68,500 as stated in our last issue. On the 13th inst. shipments of ore to the Nevada mill began. The company expect to crush an average of above 100 tons a day. About ten of the stamps will continue dropping on Chollar and Potosi ore. A draft of miners has been made from the Chollar and Potori stops, and a large force has been added to that of the Hale & Norcross.

OVERMAN MINING COMPANY.—The suit of Charles Forman vs. this company to recover \$3,075 for salary as superintendent was concluded in the District Court on the 13th inst. the jury returning a verdict in favor of the plaintiff for the full amount claimed.

UTAH MINING COMPANY.—After advancing a south-west drift 100 feet along the vein, cut by the north-west drift on the 600 level, an east cross-cut sent in 40 feet cut a breadth of nine feet of ore, showing an average assay value of above \$15 per ton. A winze is being sunk on this ore which is unofficially reported to show marked improvement as depth is attained. In sinking the Utah shaft a vein of ore was passed through on the 700 level, which was never explored. The ore on the 600 level is probably the upward extension of this 700 vein. The ground from the 472 level down to the 1100 level of the mine is absolutely virgin, and as there is a continuous mineral belt of that depth, traceable in the shaft, the probabilities of important ore discoveries are good.

OHIO.

FAIRFIELD COUNTY.

The Ruffner gas well, situated at Thurston, a small station on the Ohio Central Railroad, about twenty-five miles east of Columbus, has turned out to be a gusher. The parties interested satisfied that gas in abundance would be reached by drilling a few feet into the Trenton limestone, the well was plugged up until all the territory for a distance of three miles could be bought up, which has now been accomplished, and the work of drilling commenced. It is stated that a pipe line will be built and gas brought to Columbus.

FRANKLIN COUNTY.

It is reported that natural gas has been struck at Hadley, 26 miles east of Columbus.

OREGON.

It is reported that Chicago parties have secured a tract of land at Portland with deep water frontage, easy access to railroads, for the erection of smelting works. A smelter of two stacks, with a capacity for handling 150 tons of ore per day, will be erected. The gentlemen who have the matter of the erection of the smelting works in hand, are members of a company organized in Chicago some time since under the title of the "Tacoma Smelting Company" to erect smelting works at Tacoma. They secured the machinery and came out to Tacoma and took the preliminary steps

for erecting their works. After a while they found that Tacoma was not a good place for their business, as there they would have connections with only one line of railroad, and finally they decided to come to Portland.

PENNSYLVANIA.

A bill has been introduced in the State Legislature, entitled "An act to promote the safety of persons employed in and about the coal mines." It provides for the appointment of a commission of five persons, who shall decide upon a system of mechanical apparatus for the detection of explosive gases in mines. The bill, it is said, is being pushed in the interest of a corporation, the owner of the only apparatus which can be used under the terms of the bill. The cost of putting in the apparatus would average \$10,000 at a low estimate for each of the 800 mines in the State, and the cost of extra men to keep it in order would be at least \$2000 per mine. Remonstrances are being circulated among all the coal and coke operators, protesting against the passage of the bill.

COAL.

Messrs. H. Liveright & Co., who have leased the coal underlying the (old Heilman & Hesser) tract, now owned by Louis Fulton, located about three miles from Osceola, have been successful through the operations of a diamond drill in finding a seam of coal from 6 to 7 feet in thickness, which is thought to be the Moshannon seam. One or two other good seams, along with a fine bed of fire-clay were found in making the test. The tract contains considerably over two hundred acres. The work of development will be commenced shortly, and coal shipped at an early date.

The Shawmut coal property has been sold to Buffalo parties it is stated for about \$150,000. The property is about four miles east of Brockwayville, on the Erie Railroad, and convenient to the Buffalo, Rochester & Pittsburgh and the Pennsylvania lines. In our issue of the 9th inst., we referred to a strike of coal in this neighborhood.

NEW YORK & WESTMORELAND GAS, COAL AND COKE COMPANY.—The mine known at Manor as Manor Shaft, and owned by this company, will be sold at sheriff's sale. It is rumored that the Westmoreland Coal Company will endeavor to obtain the mine, as it owns a vast tract of coal land on each side of the Manor shaft royalty.

PENNSYLVANIA COAL COMPANY.—Green Ridge colliery, at Mount Carmel, operated by this company, which suspended work last November, resumed operations on the 11th inst. on three-quarter time.

OIL.

Exports of refined, crude, and naphtha from the following ports, from January 1st to March 15th:

	1888.	1888.
	Gals.	Gals.
From Boston.....	680,310	400,038
Philadelphia.....	25,702,810	19,113,666
Baltimore.....	2,223	365,514
Perth Amboy.....	2,607,512	2,324,319
New York.....	80,069,325	65,773,487
Total exports.....	109,162,181	89,177,514

GLOBE REFINING COMPANY.—It is reported that this company, of Pittsburgh, will build an oil refinery and shipping depot in connection with a new steamship line at Philadelphia. For some time past negotiations have been in progress for the purchase of a available wharfage and land along the Delaware River front, and a tract of land on the river front 680 feet in length, which extends from the water-mark back to the Point House road, has been purchased. The newly acquired property includes the space between Mifflin street and Snyder avenue. Work will shortly begin on a wharf 630 feet long and 80 feet wide. Three other piers of the same dimensions will be built as soon as possible. It is said that the company has arranged for a special line of steamships to ply between Philadelphia, Liverpool and Antwerp, and if the scheme is successful other ports will be reached in time. The company has already secured connections with the Baltimore & Ohio, Reading and Pennsylvania railroads.

UTAH.

SUMMIT COUNTY.

DALY MINING COMPANY.—We have been favored with an advance copy of the financial statement of this company:

SUMMARY FOR YEAR 1888.

Receipts.		
Jan. 1. Balance on hand.....	\$369,161.76	
Production of year.....	1,047,859.59	\$1,417,021.35
Disbursements.		
Running expenses.....	404,174.79	
Taxes.....	3,475.00	
Prospecting.....	73,130.55	
Leading works.....	23,462.84	
Purchase account.....	500.00	
Dividends.....	487,500	\$992,293.18
Balance on hand, Dec. 31..		\$424,728.17

BEAVER COUNTY.

COMET MINING AND SMELTING COMPANY.—Mr. B. A. Spear, as attorney for a number of the miners has filed liens and commenced actions to recover their pay, also suits for damages, and has levied upon the Massachusetts mine. Mr. Charles Lammerdorf has also entered suit and filed liens for a large amount on the company. Sheriff Baldwin, of Beaver, has taken all the property outside of the Massachusetts mine in charge. A correspondent of the Salt Lake Tribune says that this will probably amount to a shut down for some time to come unless the French operators succeed in raising an amount equal to \$35,000 by the sale of stocks in Paris. It is now understood that Frazer & Chalmers, of Chicago, have a lien for the first pur-

chase money upon all the machinery, one payment having been made.

WEST VIRGINIA.

WELTON COAL AND SALT COMPANY.—This company assigned on the 18th inst., for the benefit of creditors. Liabilities about \$18,000; assets not large.

FOREIGN MINING NEWS.

CANADA.

PROVINCE OF NOVA SCOTIA.

EASTERN DEVELOPMENT COMPANY, LIMITED.—Dr. E. D. Peters, Jr., left Boston on the 18th inst., in company with General Manager Gragg, of the Eastern Development Company, to visit the property of the company in Cape Breton. During the trip, Dr. Peters will arrange the final details of his plans for the smelting works of the company, on the large scale which the development of the mine seems now to fully warrant. The last reports from the mine show the work in ore-body to be progressing well; main shaft 226 feet, and the stope on vein B now 44 feet, and holding the same breadth from the bottom. The south cross-cut is now passing through strongly mineralized rock.

CUBA.

EMPIRE MANGANESE AND IRON COMPANY.—This company has been organized under the laws of New Jersey with a capital stock of \$500,000, shares \$10 each.

In speaking of the prospects of the company, President Chamberlin said to a representative of the ENGINEERING AND MINING JOURNAL this week: "We have several manganese properties in Cuba, situated both on the railroad running from Santiago to San Luis, also two miles distant from Cristo station. The following is a report on the three mines which have been opened, and from which several cargoes have already been shipped. Ysibelita manganese mine, situated about two miles from Cristo, a station on the railroad from Santiago to San Luis, and distant from Santiago nine miles. The property comprises a large hill overlooking the valley leading to Cristo village. Developments were made near the crown of the hill by running in a level thirty feet wide through earth mixed with manganese, until the main body of the ore was reached and 1500 tons of mineral taken out, when a cross-cut was made 100 feet long, exposing a vein or body of ore 100 feet in length and 40 feet in height by 26 feet wide, which apparently extends under the cap rock throughout the hill. A second level has been started about 30 feet below perpendicular, and continued up to the body of mineral, demonstrating the continuance of ore to the depth of 70 feet. A never-failing stream of water passes along the western side of the hill. Boston manganese mine is situated due east of the Ysibelita, on the opposite side of the valley, bordering on a large mountain stream of water, and with the mine "Pilar" takes in the whole hill, which is heavily wooded. The mineral is exposed in loose pieces throughout the property. Developments were made near the crown of the hill by running in a level fourteen feet and a half wide through earth mixed with manganese ore, until a vein seventy-two feet long and thirty-eight feet high, by thirty-six feet wide, was exposed to view, displaying an immense body of ore almost pure, very little rock being encountered. "The distance from Cristo is about the same as from the Ysibelita. The expense of constructing a railroad from the properties to connect with the railway at Cristo would not be heavy, as the valley is comparatively level. This would facilitate business and materially lessen the cost of transportation, and also be accessible to other properties belonging to the company, on which no work has yet been done, further than to sink test pits to prove the existence of manganese ore in paying quantities. "Analyses of some of the ore show: Iron, '79 per cent; phosphorus, '050 per cent; sulphur, '050 per cent; metallic manganese, 57-85 per cent; silica, 1-78 per cent; moisture, '63 per cent. "This company has recently acquired these properties and engaged a competent engineer to superintend the working of the mines and to build a tramway from the Ysibelita, Boston, and Pilar mines to Cristo station; also to open up the mines situated on the railroad. The ore sells readily, and there is a market for all the company can deliver. It is expected that the tramway will be completed by the middle of May or June and that the company will then be able to ship large quantities of ore both from the mines already opened and from those on the railroad."

ENGLAND.

Reports from London state that a coal syndicate, representing £100,000,000, proposes to purchase all the collieries of Cumberland, Yorkshire, Lancashire, Northumberland and Durham. The proprietors of the mines will meet soon at Manchester to consider the syndicate's stupendous proposal.

MEXICO.

The Mexican National Construction Company has made preparations for building a narrow gauge line, which will run from the port of Manzanillo, on the Pacific Ocean, to some point on the main line of the National Railway. The line will touch the city of Colima, the capital of the State of the same name, go thence to Guadalajara, next to Zacatecas, and from there to the National Railway, thus connecting that road with Zacatecas and Guadalajara, two chief points of the Central railway system. The road from Manzanillo to Colima is under active construction, and subsidies from the state government have been secured for the rest of the line. The Inter-oceanic railway will soon enter Pachuca, which will be the serious block to the Vera Cruz road which has now connection with that important mining point. Contractor Hamp-

son, who is building the portion of the Central branch from Salinas to San Luis Potosi, has advertised for 3000 laborers. The Central will be running trains to San Luis Potosi in July.

Specially reported for the ENGINEERING AND MINING JOURNAL by Richard E. Chism, M. E.]
CHIHUAHUA.

The different mountain ranges around the city of Chihuahua are now being actively explored by a large number of experienced American miners who have been driven south by the prevailing mining stagnation in New Mexico and some rich finds are reported as having been recently made. Due east of the city of Chihuahua an active search is being made for placers of gold which are supposed to exist along the lower part of the Conchos River in the almost unknown mountain ranges that cover that part of the State.

A large deposit of vanadate of lead and native bismuth has been discovered by an American, so it is said, somewhere along the line of the Mexican Central R. R. If the description of the extent of the deposit is correct a fall will soon take place in the present price of vanadium of which the latest quotations are \$320 per ounce.

The Torreon District, thirty miles south of Chihuahua City, near the Mexican Central R.R., is a new camp recently opened up by American enterprise and intelligence. There are already four mines opened in this place, and they are shipping large quantities of carbonate of lead rich in silver, and which carries some little gold. There is also a smelter in the camp which is reducing the ore, which is too poor to ship.

The Magdalena is another comparatively new district, which has been opened up under the same auspices. At the station on the Mexican Central road, eighteen miles to the westward of the camp, a regular American town is being built, with stores, inns, stables, etc. The San Ignacio mine, in this camp, is being opened by El Paso parties, and is said to show in recently opened drifts a vein of solid galena and carbonates, three feet thick, carrying 50 per cent of lead and 50 ounces of silver to the ton. The workings have gone down to the depth of 160 feet. The San Jose mine, in the same camp, is owned by Sr. Dolores Torres, and is producing so largely that the owner has purchased the old Zubiran furnace at Chihuahua city, and is now removing it to Magdalena for the purpose of treating his ore.

In the Corralitos district the mines are said to be producing more than they have ever been known to do before with new discoveries of mineral of a character and richness that is unprecedented in that camp. The new find is of free milling ore and the vein from which it comes is said to be nearly eight feet wide with a general assay of over two hundred ounces per ton.

At the Sabinal camp the prospects are reported brighter than for many months past. The Plancha de Plata mine which made the reputation of the camp but which was wrecked by bad management has passed into more experienced hands and under a single owner will probably do better than ever before. The silver in this camp is in the shape mostly of free milling ores and there is one gold bearing vein, the Alta situated on the very summit of the range and entirely apart from the silver deposits. The recent explorations of the property of D. Urbino Servia have also developed some good ore and added so much to the producing capacity of the camp.

A strike of some magnitude, but of which no particulars have reached me, is reported in the Santa Margarita mine, in the Jesus Maria district, and has created some excitement among the owners of stock in the company. Arrangements are now being made in Chicago to secure capital for the erection of the necessary machinery to treat the ore.

Governor Tabor, of Colorado has secured possession of the San Eduviges mine by a decree of the court of last resort in the State, and will proceed to work it under the management of an experienced Colorado man.

The Perro Bravo mine, near Parral, is now shipping some ore. A new working shaft is being put down as rapidly as possible, after the completion of which the mine is expected to have an output of at least 10 tons daily. The purchasing agent of the Mexican Ore Company has been transferred from Parral to Zacatecas where the field is larger.

The district of Moctezuma, west of Magdalena, is reported to be in a prosperous condition, there are several properties there owned by parties in St. Louis, Mo., with which the owners are reported to be well satisfied.

A company of Mexicans, of which Sr. Juan B. Solis is the head, has bought the Hidalgo smelting works situated between Chihuahua City and the neighboring town of Nombre de Dios. Some improvements will be made in the plant so as to allow of working it on a large scale and improved modern machinery will be put in. It is hoped to commence operations within a short time.

The Mina Grande mine at Hermosillo is in the hands of some American owners who within a short time have turned it from an old hole in the ground into a producing mine that is now claimed to be shipping more ore than any other mine in the State. At the Minas Prietas mine an artesian well is to be sunk as an experiment and the owners have contracted with the sinkers to go to a depth of 3000 feet if no water is encountered sooner.

At the Queen Planchas de Plata mine, the New Orleans company is well pleased with their new purchase and is making the necessary improvements with great energy. A new wagon road to Nogales has already been completed and a large amount of machinery and supplies hauled over it to the property.

The Sabinal mine is located about fifty miles south-

west of Llano station on the Sonora Railroad, and is in the hands of American owners. Different samples from this property have been assayed to run from \$15,000 to \$20,000 per ton. The mine is now being developed by a main shaft and by various tunnels, which are to tap the vein in depth and to connect with the shaft.

Specimens of the coal discovered lately near Paso del Norte have been analyzed and have been found to contain such a small percentage of carbon that the coal is not at present available for fuel, but it is hoped that upon reaching a greater depth where the influence of the atmosphere has not had a chance to deteriorate the coal it will be found to be of better quality. Some capitalists from California are interested, who will furnish money for the exploration of the property, so as to solve the problem.

LOWER CALIFORNIA.

INTERNATIONAL MINING COMPANY.—This company, of Lower California, has a force of men at work on the sulphur mine near the Colorado River, in the northern portion of the Territory. The supply of the metalloid is said to be practically inexhaustible. The same company is also preparing to work some extensive gold placers near Valladares, and has some 30 men at work building a ditch and flume. The mill at the San Nicolas mine has been started up with excellent prospects. The vein of ore at present in sight in the mine is fully 6 feet wide. There are 16 men at work now taking out ore day and night, and this number will be increased at once.

SAN MIGUEL MINING COMPANY.—This company owns a mine at a point about forty miles north of Lagoon Head, on the coast of the territory. Sixty-four tons of machinery and supplies have recently been taken into this property, and a ten-stamp mill is expected to be in operation within two months.

MICHOACAN.

The mines in the Talpujabua district are said to be doing better at present than a month or two ago and the total production of the camp is estimated by one of my correspondents as about 207 tons monthly of silver and gold ore. The reduction works in Talpujabua are the San Juan and the San Rafael del Norte in which the amalgamation is done in pans, the Guadalupe, which is a barrel mill, and the San Joaquin, Santa Teresa, San Miguel, Los Arcos, Las Animas, El Pilar, San Jose, El Rosario and San Nicholas, which are all after the old patio system.

In the Huatumo district there are work the Guadalupe, Carmen and Loreto mines in the Espiritu Santo camp, owned by Srs. J. Olace & Co. In the Characuaro camp, in the same district, is the Proveedora mine, belonging to D. Carlos Eisenmann, and in the San Ignacio camp are the Restauradora, San Ignacio and Armatina mines, belonging to Sr. Agustin Jarjy.

In the Tacambaro district, which has been settled for over two centuries, there has never been a mine denounced until the 25th of last month, when two were taken up on an unworked vein in the borough of Caracaro.

In the Zinapécuaro district is the Machorra and its adjunct mines, which are in charge of Mr. William Carnot, and are said to be owned by Mr. Lionel Carden, a prominent English gentleman of this city. These mines are near the town of Ozumatlan. A smelter was recently erected on this property which is said to have been a failure on account of the rebellious nature of the ores. These latter are now being sent to the United States for treatment.

NUEVO LEON.

The outlook for the mines in this State does not seem to be more flattering than it has been for some months past. The miners complain that they cannot afford to work with lead at its present price, and most of the mines are shut down. The Guadalupe and Iguana mining companies who own a concentrator in Laredo, Texas, are the only companies working to their full capacities.

QUERETARO.

The legislature of this state has passed an act by which the metallurgical works established in the state are exempted from state taxes for the period of five years from their establishment. The chemicals and supplies used in the processes are also exempted under the same law and for the same period. The Governor of the state is clothed with power to designate the substances that are to be thus exempted and to take the necessary steps for the detection and punishment of any frauds that may be attempted.

VERA CRUZ.

A company has been formed in Orizaba the capital of this state to work the auriferous copper mines of Juan Bran, Arenal and San Roque in the district of Tenepanoya, Zemelahuacan gulch and canton of Jalancingo.

SPAIN.

ROYAL ASTURIAN MINING COMPANY.—The production of this company in 1887 amounted to 6500 tons of pig lead, 16,300 tons of zinc ingots and 11,000 pounds fine silver.

ORE MARKETS.

LEADVILLE. March 11.

[From our Special Correspondent.]
The ore production of Leadville has steadily increased during the past few months, and it now amounts to over 1500 tons per day; a larger output than at any time in its previous history. The tonnage of each grade is approximately as follows:

Lead carbonates.....	675
Lead and zinc sulphides and lead and zinc sulphide concentrates.....	130
Pyritiferous sulphides.....	100
Dry silicious.....	150
Argentiferous iron flux.....	475

The mountain smelters as well as the valley smelters are now running to almost their full capacity, which has seldom heretofore been the case; still there is no weakening in the prices of desirable ores.

Lead carbonates are promptly taken at:

Lead per cent.	Per unit.	Working charge.
10 to 20	25c.	\$3.00 to \$6.00
20 to 25	35c.	\$6.00 to \$4.00
25 to 30	40c.	\$5.00 to \$4.00
over 30	40c.	\$4.00 to \$3.50

For the silver 95 per cent of New York quotation.

When the ore contains large basic excess these prices for lead are "flat," but if there is an acid excess, the price per unit is based on New York quotation of, usually, \$4.50 per hundred, with a deduction of 1c. per unit for every 5c. in New York quotation below basis.

Lead sulphides containing zinc and iron hang around the figures that have prevailed for the last six months or more. The grade of the heaviest producers of such sulphides averages about: 50 ounces silver, 20 per cent lead, 7 per cent SiO₂; balance iron pyrite.

The highest schedule for this class is: 30 to 35c. per unit for the lead on New York quotation of \$4.50 per hundred, add and deduct 1c. for each 5c. change in quotation.

Deduct 50c. per unit for every per cent of zinc in excess of 14 or 16 per cent. Working charge, \$14.25 to \$13.75 per ton.

Iron pyrites, with or without zinc and silica, have hard work to maintain the prices quoted in your issue of March 2d, 1889, and were it not that several of our smelters are building additional roasting furnaces, these refractory ores would soon be selling at from one to two dollars per ton less than present figures.

There is no material falling off in the prices of iron fluxing ores, but the supply is now certainly in excess of the demand, and consumers are no longer obliged to seek the producers.

DIVIDENDS.

The following dividends have been declared: Boston and Colorado Smelting Company, of Colorado, quarterly dividend of 2½ per cent.

Consolidated Electric Light Company, quarterly dividend, one per cent, payable April 1st, at No. 32 Nassau street, New York City. Transfer books close March 25th.

Daly Mining Company, of Utah, dividend No. 25, twenty-five cents per share, or \$37,500, payable March 30th, at No. 15 Broad street, New York City. Transfer books close on the 25th inst.

Dunkin Mining Company, of Colorado, dividend No. 28, five cents per share, or \$10,000, payable April 15th. Transfer books close from April 1st to 16th.

Homestake Mining Company, of Dakota, dividend No. 128, twenty cents per share, or \$25,000, payable March 25th, at No. 15 Broad street, New York city. Transfer books close on the 20th inst.

Navajo Mining Company, of Nevada, dividend No. 17, ten cents per share, or \$10,000, payable in San Francisco.

Ontario Silver Mining Company, of Utah, dividend No. 154, fifty cents per share, or \$75,000, payable March 30th, at No. 15 Broad street, New York city. Transfer books close on the 25th inst.

Pamlico Mining Company, of Nevada, dividend No. 2 (since incorporation), of \$3000, declared on the 11th inst.

Silver Cord Combination Mining Company, of Colorado, dividend No. 4, ten cents per share, or \$50,000, payable April 1st, by W. W. Weigler, Treasurer, 919 Drexel Building, Philadelphia, Pa., or by A. A. Blow, General Manager, Leadville, Colorado. Transfer books close at 3 o'clock P. M., March 25.

ASSESSMENTS.

COMPANY.	No.	When levied.	Day of Sale.	Day of office.	Am't per share.
Allouez, Mich.....	.....	Mar. 8	Apr. 8	.....	.50
Anchor, Utah.....	10	Feb. 1	Mar. 3	Mar. 25	.10
Anna, Dak.....	3	Feb. 11	Mar. 18	Apr. 10	.003½
Baltimore, Nev.....	4	Feb. 4	Mar. 8	Mar. 26	.25
Belcher, Nev.....	37	Feb. 19	Mar. 25	Apr. 12	.50
Big Hole Placer, Utah.....	.....	Feb. 25	Apr. 8	May 6	.005
Bullion, Dak.....	6	Jan. 4	Mar. 8	Mar. 25	.005
Con. Pacific, Cal.....	10	Feb. 5	Mar. 11	Apr. 2	.15
Crocker, Ariz.....	6	Feb. 25	Apr. 2	Apr. 24	.10
Deadwood Red, Dak.....	1	Feb. 23	Mar. 26	Apr. 13	1.00
December, Utah.....	.....	Feb. 11	Mar. 25	Apr. 15	.02
Eureka Cons, Nev.....	11	Mar. —	Apr. 27	May 20	.50
Golden Prize, Nev.....	2	Feb. 16	Mar. 20	Apr. 10	.30
Gray Eagle, Nev.....	11	Jan. 23	Feb. 26	Apr. 5	.03
Hector, Cal.....	1	Jan. 29	Mar. 14	Apr. 15	.15
Julia, Nev.....	23	Jan. 30	Mar. 7	Mar. 28	.10
Lapanta, Nev.....	1	Feb. 28	Apr. 5	Apr. 26	0.3
Martin White, Nev.....	22	Jan. 19	Mar. 6	Mar. 26	.25
Mexican, Nev.....	37	Mar. 5	Apr. 10	Apr. 30	.25
Mono, Cal.....	27	Feb. 28	Apr. 2	May 8	.50
North Peer, Cal.....	5	Feb. 25	Apr. 1	Apr. 24	.05
Peer, Ariz.....	7	Jan. 28	Mar. 5	Mar. 28	.10
Piedmont, Nev.....	1	Jan. 28	Mar. 6	Mar. 27	.05
Sierra Nevada, Nev.....	94	Mar. 5	Apr. 9	Apr. 29	.25
Utah, Nev.....	6	Mar. 5	Apr. 10	Apr. 29	.25
Western, Cal.....	2	Feb. 21	Mar. 26	Apr. 16	\$2.00

* Delinquent day and day of sale postponed to dates given above.

† An additional .005c. a share is payable May 6th, delinquent May 8th and saleable June 10th.

MEETINGS.

Chicago Gas Trust, No. 53 Dearborn street, Chicago, Ill., April 25th, at twelve o'clock, noon. Theo. B. Wells, Secretary.

Shoshone Gold Mining Company, of Idaho, Room

222, No. 60 Broadway, N. Y. City, March 23d, at ten o'clock A.M. S. L. Close, President.

Sprague Electric Railway and Motor Company, 16 Broadway, N. Y. City, April 8th, at twelve o'clock noon.

Taylor Plumas Mill & Mining Company, 32 Broad street, Room 78, N. Y. City, April 2d, 1889, at ten o'clock A.M. F. B. Forster, President.

Westmoreland Coal Co., No. 224 South Third Street Philadelphia, Pa., April 3d, at twelve o'clock noon. H. C. Adams, Secretary.

MINING STOCKS.

New York.

Friday Evening, March 22.

Transactions this week have been a little larger than last, but there has been no increase in speculative interest, and, consequently, the tone of the market remains unimproved. The San Francisco stocks, which have always been regarded as "leaders" in this market, show very little animation, and most of our local enterprises are in the same condition. However the stock market may have been, the week has been one full of encouragement to investors. Dividends amounting to no less than \$210,000 have been declared by mining companies this week.

The Ontario is nearing the ten-million-dollar mark. Its 154th dividend declared this week brings the total paid to date up to \$9,950,000, and before another month has past we trust that these wonderful figures will be safely reached. The stock is in good demand, but very little is to be had. Sales were made yesterday at \$35 per share. At its present price, the Ontario pays over 17 per cent per annum. And yet mining investments never pay! The Daly, its neighbor, announces a dividend of \$37,500. This company has paid to date \$975,000. Horn-Silver continues to be firm at from \$1.10 to \$1.25.

There is no change in the price of Rappahannock, which remains at 8c.

Quite a little business was done in Phoenix of Arkansas at from 8c, to 10c.

The receipts of the Sutro Tunnel Company for February were \$21,500. In our mining news columns, we give an official statement of the net receipts for the fiscal year ending February 20th. The adjourned annual meeting of the stockholders will be held in San Francisco on Thursday next, the 20th inst. The stock was firm at from 7 to 9c. The trust certificates were actively dealt in, the price showing an upward tendency, going from 54 to 60c. The transactions amounted to 18,100 shares.

Consolidated California & Virginia was firm at from \$8.50 to \$8.88. Yellow Jacket advanced from \$4 to \$4.25. Savage declined from \$3.05 to \$2.65. Hale & Norcross remained at from \$3.75 to \$3.85. Gould & Curry went from \$3.25 to \$2.75. Belcher from \$3.50 to \$3.25. Exchequer was active and went from \$1.10 to \$1.35. Bullion from \$1.25 to \$1.45.

Barcelona is still neglected, and is selling at 60c. The Tuscaroras show no life. Navajo was quiet, with two sales at \$1.10 and \$1.15. North Belle Isle one at \$2.65.

Eureka Consolidated fell precipitately on the announcement of a fifty-cent per share assessment. Sales were made in the early part of the week at \$2; to-day the dollar mark was reached, and telegrams from San Francisco announce that 60c. was bid there.

The Silver Cord Combination Mining Company, of Leadville, Col., agreeably surprises the stockholders by the announcement of a \$50,000 dividend. This is the first dividend paid by this company since November, 1883, six years ago, and makes a total of \$275,000 paid to date. The stock is listed both in New York and Philadelphia, but the transactions in both cities are small. Small Hopes sold at \$1.05, Iron Silver at \$3.50, Chrysolite at 23 and 24c. Little Pittsburg is down to 5c. Leadville is quiet at 14 and 15c. Lee Basin at 65c., Denver City at 10c. Plutus continues to sell at from 93 to 95c., Monitor at 5c.

There seems to have been a desire to sell Homestake, which declined from \$12@10.88, with transactions of 220 shares. The usual monthly dividend of \$25,000 has just been declared, making a total to date of \$4,368,750. Father de Smet, which is now entirely neglected, sold at 39c. Iron Hill shows a sale at 15c. Sullivan Consolidated again attracted attention; the price was firm all week at \$1.50.

The "Bodies" continue to be neglected. Bodie Consolidated was dealt in at \$1.30, and Mono at 68c.

Plymouth Consolidated continues to move upward, and this week went from \$11.25@13.25.

Brunswick was neglected at 8@9c.

Quicksilver Preferred advanced from \$35 to \$36.25 and Common declined from \$6.13 to \$5.75.

There is little change in the "Amadors." Amador remained at from \$1.65 to \$1.70. Astoria at 20c. Hollywood at 2c., and Middle Bar declined from 30c. to 28c. Excelsior was firm and advanced from 65@70c.

There is no change to report in Mutual, which remained at \$1.40.

United Copper advanced from \$1.20 to \$1.30.

Two hundred shares of Silver King sold at 75c. per share.

Kingston & Pembroke shows a sale at \$1.

The El Cristo stock does not apparently profit from the good report received from the company's mines; there were daily transactions, and the price declined from \$1.20 to \$1.00.

Shoshone, of Idaho, shows a business of 12,900 shares, at from 7@9c.

An upward movement was shown in Colchia, which went from \$2.25@2.80.

Boston. March 21.

[From our Special Correspondent.]

The past week has witnessed a very excited and demoralized market for copper stocks. The failure of the French copper syndicate which was announced on Monday, led to a great pressure on the part of holders to get out of their stocks at any price, and if it had not been for the large short interest a much greater decline would no doubt have taken place; this, and some buying on the part of the inside interest of the dividend-paying stocks averted a panic and the market recovered somewhat from the extreme decline, and has for the past two days developed a much better tone, and prices are a little firmer. As usual the bulk of the business transacted was in Boston & Montana, shares which declined from \$39½ to \$32½, with a subsequent rally to \$35@35½.

Calumet & Hecla dropped from \$230½@214½, and recovered to \$220.

Quincy declined from \$55@46.

Tamarack opened at \$133, and fell off to \$125, and sold up to \$127½.

Franklin declined from \$12@11.

Atlantic touched \$10, and Osceola sold as low as \$12½.

Kearsarge sold at \$7, and Boston & Butte at \$19.

In the second class stocks Allouez declined to \$1. National to \$2. Huron to \$2½. Pewabic to \$3½, but recovered to \$4.

Santa Fe came out freely at \$1¼ to \$1 and Bonanza declined to 85c.

The shrinkage in copper stocks since January 1st has been fearful, and it will be a long time before the public will feel inclined to invest in this class of securities again, although we believe prices are now the lowest we shall see this year.

Silver stocks are quiet and market confined to only a few specialties. Dunkin sold at 97½c. and is in good demand. This company seems to have landed on a dividend-paying basis, and with 20 cents per share per annum makes the stock a pretty good investment at present prices. Napa quicksilver sold at \$3½ and is in good demand.

3 P. M.—The market was a shade lower this afternoon. Boston & Montana sold off to \$34½. Tamarack was offered at \$125; \$120 best bid.

LATER PRICES.

(By Telegraph.)—March 22, 1 o'clock P. M.—Calumet & Hecla sold up to \$230. Other copper stocks were quiet and steady. Boston & Montana at 36; Quincy, 55; Tamarack, 125; Osceola, 12½ bid; Franklin, 10 bid; Santa Fe, 1.

St. Louis. March 20.

[From our Special Correspondent.]

The market is fairly active. Pat Murphy is in the lead, and is strong at 40¼ cents bid. It has had its ups and downs like any other mining stock, and its range for the past 18 months has been a wide one; in December, 1887, it sold up as high as \$1.75; a year later it was quoted at 15 cents, and now on the strength of favorable reports from the mine, together with the prospect of making regular shipments during the summer months, it has advanced to 46¼. It is a legitimate proposition, and one that possesses great merit, and, barring the manipulations of the bears, ought to sell a great deal higher.

Black Oak, of which mention has already been made in your columns, pursues the even tenor of its way and is steadily accumulating a nice little surplus in its treasury. It is firm at 55 bid. West Granite has gone through its usual gyrations during the past two months. In January the street was literally deluged with bull tips; every one agreed that the famous Granite Mountain and B-metallic veins had been discovered in the property. A local brokerage firm of some prominence and wealth, were rampant bulls and predicted \$5 for the stock within a year; their heavy purchases, together with the information so freely given out, had effect, and the "dear" public came meekly up and planked down their little dollars on the counters of many a broker, and bought the stock at \$1 to \$1.20. Visions of untold wealth filled the brain of many a small investor, and countless were the estimates placed upon the mine's output during the coming year; but alas, when everything looked most promising and hopeful, three Montanians, directors of the company, appeared upon the scene and made the woeful statement that the treasury was empty, that the company's notes for \$45,000 were about to mature and that \$55,000 more would be needed to properly develop the property. This announcement was like a clap of thunder in a clear sky and the stock dropped as rapidly as May wheat did in the days gone by when Harper et al. tried to raise the price of bread. Thirty cents, however, was the bottom and its advance from that point was as sudden almost as its decline; in one afternoon it advanced under heavy purchases from 45 to 85 cents; thus by the manipulat on of a few men the value of this mine was enhanced \$200,000 in one afternoon. The stock is now resting, and is quietly perched at a point on the scale near 97½ cents to \$1.00 and whether its course will be upward or downward from this point depends almost entirely upon the result of the efforts of the directors to raise the money needed.

Frisco likewise had its rise and fall; from 30 cents it advanced to 80 on the strength of a very rich strike. Subsequently rumors of financial difficulties broke the market and it is now selling at about 48¾ cents. From all I can learn and gather, the mine has great possibilities and may yet prove a bonanza. Eventually in all probability it will be confronted with the same problem that the West Granite has been called upon to solve, but no trouble need be anticipated in the immediate future, as its indebtedness is very small and can

be extended to almost an indefinite period. On any break it is a safe purchase. "THE SCALPER."

CLOSING PRICES.

	Bid.	Asked.
Adams, Colorado.....	\$.26¼	\$.27½
Aztec, N. Mex.....	.40	.45
Bi-Metallic, Montana.....	40.00	41.25
Black Oak, California.....	.53¾	.58¾
Carriboo, Idaho.....	.12½	.13
Concepcion, Mexico.....	.11½	.12½
Dinero, Colorado.....	.07½	.08
Golden Era, Montana.....	.14½	.15
Golden King.....	.40	.42½
Golden West.....	.80	.85
Gold Run.....	.14½	.15
Granite Mountain, Montana.....	49.75	51.75
Hope, Montana.....	4.25	5.25
I. X. L., Colorado.....	.07½	.08
Jumbo, Colorado.....	.17½	.20
Mary Foster, Colorado.....	.06	.06½
Major Budd, Montana.....	.09½	.10
Mexican Imp., Mexico.....	.25	.26½
Mountain Key.....	1.62½	1.70
Pat Murphy, Colorado.....	.47½	.48¾
Peath, Colorado.....	.22½	.25
Phillips, Colorado.....	.67½	.70
San Francisco, Montana.....	.48¾	.50
Small Hopes, Colorado.....	1.00	1.05
Silver Age, Colorado.....	2.97½	3.00
West Granite, Montana.....	.97½	.98¾
Wire Patch.....	.32½	.33¾
Yuma, Arizona.....	.42½	.45

Pipe Line Certificates.

Watson & Gibson, of 55 Broadway, say that the oil market is utterly destitute of any items of news or interest. There is no speculation in it; and while the reduction of stocks goes on every month, no one outside of the petroleum trade proper takes any interest whatever in the few fluctuations of the commodity. We see no immediate hope for a change, as the Producers' Association have certain relations to the Standard which will not terminate until July 1st, and which apparently forbid any outside operations in the market. We suppose that later in the summer oil will either have a decided advance upon the merits of the Pennsylvania situation, or else by the time the relative value of Ohio oil will compel its recognition, and in that event speculative dealings would be very much stimulated.

NEW YORK EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Mar. 16.....	90¼	90¼	89¾	89¾	199,000
18.....	89¾	89¾	89	89	290,000
19.....	88¾	90½	88¾	90¼	384,000
20.....	90¾	91½	90¾	91½	527,000
21.....	91½	92	90¾	91	544,000
22.....	91¼	91½	90¾	91	190,000

Total sales in barrels.....2,134,000

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Mar. 16.....	89¾	90	89½	89½	126,000
18.....	89¾	90	89¼	89¼	256,000
19.....	89¼	90½	89¼	90¼	546,000
20.....	90¼	91¼	90	91¼	809,000
21.....	91½	92½	90¾	91	873,000
22.....	91	91½	90¾	91	408,000

Total sales in barrels.....3,118,000

Electric Stocks.

The Thomson-Houston Electric Company will hold a special meeting at New Britain, Conn., April 2d. A circular issued showed that it is for the purpose of determining: First—Whether the company shall increase its common capital stock by the amount of \$2,000,000, so that the total shall be \$3,000,000—in 120,000 shares, par value \$25, upon the following plan: A—\$1,000,000, or 40,000 shares, representing present earned and undivided net profits of the company, to be declared as a stock dividend and issued to present stockholders of record April 8th, one new share for one old share held, transfer books closing from April 9th to 14th, both inclusive, certificates of new stock to be delivered April 15th, such stock not being assignable before the issue of certificates, and rights thereto not being assignable. B—The other \$1,000,000 (40,000 shares) of increased capital to be sold and issued for cash, stockholders of record April 8th to have the right up to April 12th to subscribe therefor in cash at par, \$25 per share, one share of new for each share of present stock held, payment to be made at such times and on such terms as may be determined by the directors hereafter. The rights to subscribe to this new stock are to be assignable up to April 12th, after which stock not subscribed for will be sold by the directors for cash, not below par. Second. To determine whether the company shall issue \$1,000,000 preferred stock, in 40,000 shares, par value \$25, making the total capital \$4,000,000, \$3,000,000 common and \$1,000,000 preferred, said preferred stock to receive seven per cent per annum in dividends, payable semi-annually, to be sold for cash at not less than par, and to be issued from time to time in such manner as the directors may determine. Third. To appoint a committee to draft a new or amended code of by-laws to be submitted for approval at the next annual meeting. Fourth. To see if the stockholders will vote to change the office of the company and the place of holding the annual and any special meetings from New Britain to some other place in Connecticut (the company is a Connecticut corporation). It is to be noted that the stock dividend of one share for each outstanding share is not assignable, while the right to subscribe to one new share at par for each share now held is assignable, and the mode of issue of the new preferred stock is not specified, save that it is to be sold for cash and issued as the directors may determine.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, March 22.
Statistics.

PRODUCTION OF ANTHRACITE COAL for week ended March 16th, and year from January 1st.

1889.		1888.	
Tons of 2240 lbs.	Week.	Year.	Year.
P. & Read. R.R. Co.	77,271	1,065,531	575,448
Cent. R.R. of N. J.	87,545	978,593	835,349
L. V. R.R. Co.	150,052	1,406,492	903,145
D. & W. R.R. Co.	77,007	777,500	1,443,391
D. & H. Canal Co.	60,655	737,919	866,652
Penna R.R.	67,182	646,269	805,548
Penna. Coal Co.	24,200	161,997	319,241
N. Y., L. E. & W.	20,000	243,994	167,240
Total	563,112	6,038,655	6,016,014

Increase..... 22,641
The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Production for corresponding period:
1884..... 5,616,217 | 1886..... 6,361,579
1885..... 4,903,589 | 1887..... 6,758,164

PRODUCTION OF BITUMINOUS COAL for week ended March 16th, and year from January 1st:

1889.		1888.	
Tons of 2240 lbs.	Week.	Year.	Year.
Phila. & Erie R.R.	827	19,328	9,938
Cumberland, Md.	54,887	579,908	664,279
Barclay, Pa.	3,000	30,003	40,458
Broad Top, Pa.	8,673	92,979	95,748
Clearfield, Pa.	60,515	677,653	738,325
Allegheny, Pa.	17,064	183,374	189,439
Pocahontas Flat Top.	32,060	319,986	296,384
Kanawha, W. Va.	30,382	354,003	374,077
Total	207,408	2,262,234	2,409,648

* Week ending March 14th.

WESTERN SHIPMENTS.		1888.	
	1889.	Year.	Year.
Pittsburg, Pa.	9,021	130,421	156,958
Westmoreland, Pa.	23,143	345,387	294,659
Monongahela, Pa.	3,189	33,623	61,742
Total	40,353	509,431	513,359

Grand total..... 247,761 | 2,771,665 | 2,923,007
PRODUCTION OF COKE on line of Pennsylvania R. R. for week ending March 16th and year from January 1st, in tons of 2000 lbs.: Week, 83,454 tons; year, 943,136 tons; to corresponding date in 1888, 830,638.

Anthracite.

The anthracite trade is extremely dull, very slight demand is made for coal, and the cutting of prices by the individual producers still continues. We may quote as fair ruling prices: Broken and Egg, about \$3.75; Stove, \$3.90 to \$4; Chestnut, \$3.75; Pea, from \$2.50 to \$3 the Delaware & Hudson quoting \$2.90, while some inferior grades can be purchased as low as \$2.25; Buckwheat, \$2 to \$2.25. The circular prices are as quoted in our issue of last week. Broken coal, \$3.75; Egg, \$3.90; Stove, \$4.15; Chestnut, \$3.90.

Last week we stated that the basis adopted for the regulation of the quotas of the several companies was the average production of the three months of August, September and October last. This average output of each company and the percentage allotted each company at the last division, made three years ago, are given below:

	Output.	New per cent.	Old per cent.
Reading.....	872,441	21.41	21.65
Lehigh Valley.....	696,584	17.14	18.97
New Jersey Central.....	619,654	15.24	15.98
D. & W. Western.....	733,355	18.03	15.54
Del. & Hudson.....	446,200	10.97	10.65
Penn. Railroad.....	439,172	10.80	10.45
Penn. Coal Co.....	168,936	4.15	4.84
Erie.....	90,796	2.26	1.94
Totals	4,067,138	100.00	100.00

The argument in the case of Coxe Bros. against the Lehigh Valley Railroad Company was concluded on Wednesday last, and it is said that the argument, especially that of Mr. Gowen, was an extremely brilliant one, possibly the ablest effort even this talented gentleman has ever made. There is, of course, no intimation as to how the decision will go, but the impression seems to be more general than it was that Coxe Bros. have made out a pretty good case.

Mr. John H. Jones, Chief of Bureau of Anthracite Coal Statistics, has issued the following statement of anthracite coal tonnage for the month of February 1889, compared with same period last year. This statement includes the entire production of anthracite coal, excepting that consumed by employes and for steam and heating purposes about the mines, but does not represent the entire anthracite coal tonnage actually transported by the respective railroad companies, adjustment being necessary in the compilation to avoid duplications, etc.

COMPANIES.	Feb., 1889.	Feb., 1888.	Difference.
Phila. & Reading R.R.	356,687	214,314	Inc. 142,372
Lehigh Valley R.R.	444,250	334,316	Inc. 109,934
Central R.R. of N. J.	334,470	361,064	Dec. 26,594
Del. Lack. & West. R.R.	296,499	624,302	Dec. 327,803
Del. & Hud. Canal Co.	262,446	419,102	Dec. 156,656
Pennsylvania R.R.	253,260	348,434	Dec. 95,174
Pennsylvania Coal. Co.	55,416	157,381	Dec. 101,964
N. Y., L. E. & W. R.R.	94,634	69,409	Inc. 25,225
Total	2,097,962	2,528,322	Dec. 430,660

	Feb., 1889.	Feb., 1888.	Difference.
From Wyoming Region	1,096,683	2,021,973	Dec. 925,290
From Lehigh Region	449,874	52,250	Inc. 397,624
From Schuylkill Region	551,105	454,099	Inc. 97,006

	For year, 1889.	For year, 1888.	Difference.
Phila. & Reading R.R.	905,375	308,786	Inc. 596,589
Lehigh Valley R.R.	984,172	632,351	Inc. 351,821
Central R.R. of N. J.	786,945	690,928	Inc. 96,018
Del., Lack. & West. R.R.	608,915	1,258,186	Dec. 649,271
Del. & Hud. Canal Co.	585,228	810,987	Dec. 225,759
Pennsylvania R.R.	529,966	665,297	Dec. 135,331
Pennsylvania Coal Co.	118,961	280,906	Dec. 161,945
N. Y., L. E. & W. R.R.	200,628	136,574	Inc. 64,054
Total	4,720,191	4,784,015	Dec. 63,824

	For year, 1889.	For year, 1888.	Difference.
From Wyoming Region	2,413,417	3,930,271	Dec. 1,516,853
From Lehigh Region	986,860	100,272	Inc. 886,588
From Schuylkill Region	1,319,914	753,472	Inc. 566,442

* Approximated.

The stock of coal on hand at tide-water shipping points February 28th, 1889, was 837,216 tons; on January 31st, 1889, 807,314 tons; increase, 29,902 tons.

Bituminous.

On another page we quote the principal points in the agreement of the Seaboard Steam Coal Association. The document is rather a lengthy one, and appears to be drawn with the greatest care. As we stated last week, much coal was sold, prior to the going into operation of the agreement, at terms which would conflict with it, and we hear of coal now being sold at prices which are also very considerably below the authorized rate. It is true that there are a number of shippers who are not nominally in the pool, among whom we may cite Messrs. Wigton & Co., and we hear of their having offered coal in this market at very low figures indeed. There are also some of the Clearfield coals which are being sold at \$2.25 f. o. b. at the shipping port, but, on the other hand, several of the companies have put up their money on the forfeit, and, of course, are living up to their agreements. It would be interesting to know how much coal has been sold on contracts made previous to the going in force of the agreement, and it seems to us that each of the producers should be required to file with the commissioner a list of such contracts, for other wise we greatly fear that throughout a great part of this year immense quantities of coal will be found to have been contracted for before the agreement came in force, or at least that options for contracts have been given. If the list of such coal were put upon record it would very probably lessen the amount of coal which would escape the operations of the pool terms.

BOSTON.

March 21.

(From our Special Correspondent.)

The new f.o.b. prices on anthracite meet with the most unfortunate reception—no one cares about them. It is not a question of whether they are too high or too low; people are not buying coal. March is usually a good month, but this year is exceptional. Prices remain virtually unchanged. The individual operators are, however, not selling as much as formerly because tolls have not been reduced and are so high that they cannot ship. Vessels and barges are waiting now at New York for coal which does not come down to tide-water. The authorities say that they will reduce tolls, but their reasons for being slow about it are plainly evident. For the present there is no buying of either companies or outsiders to mention, but there is quite a little coal to come along on old orders at low prices.

The bituminous market is quite active. Many manufacturing companies have placed their contracts, including the York, Everett, Booth, Arlington, Pacific, Hamilton, Appleton, Assabet. The Amoskeag and Merrimack are not reported as closed, though they may be. The sugar houses will buy less this year, as the Trust has shut up some of the Boston refineries. None of the refineries or railroads are reported as buying. The Cumberland coal agents appear to have taken as much early business as any one, but thus far nearly every contract reported has been with the same party as last year. There are, apparently, to be fewer changes than usual in this respect. As to prices, the invariable reply is "\$2.60 f.o.b.," but I fear this is hardly correct. More or less contracts are said to have been made before the pool agreement was signed, and it is claimed that little has been done since. Again, it is said that guaranteed freight or delivered prices are being made on a low average, but one cannot surely tell now what is being done, or whether the pool amounts to anything. The Beech Creek people are not in and their statement that they will observe pool rates and provisions must of course be proved in practice before it is believed. It is a question to what extent the protection clause, that is a guarantee of the lowest rates of the season, is being used but probably to some extent. The situation will be clearer in a few days.

Freights are not much changed, quoting New York 70 to 80 cents, Philadelphia, 90c. to \$1, and Baltimore, \$1@1.05.

Retail trade is dull and prices are held at the decline only by the combination.
The weekly receipts were 11,908 tons anthracite and 26,304 tons bituminous; receipts for the year 188,673 tons anthracite, 186,933 tons bituminous.

BUFFALO.

March 21.

(From Our Special Correspondent.)

Nothing new or starting. Trade dull for anthracite and quiet for bituminous. Prices unchanged.
"The opening freight rate for coal hence to Michigan

ports will be about 60@65c. per net ton," says a vessel agent, "and to Duluth perhaps a shade less."

Messrs. E. L. Hedstrom, J. M. Brinker and R. W. Jones, the well-known coal men of this city, have purchased a large tract of land in Elk County, Penn., known as the "Shawmut Track," consisting of 6000 acres. Under parts of the property are from four to six marble beds in addition to several workable coal beds. The mines have not been worked for twenty years, it is said. The railroad connections are excellent.

The Erie and Western Transportation Company (the Anchor line of propellers of Buffalo) will in future handle the lake traffic of the Baltimore & Ohio Railroad. The freight will be carried over the Erie & Pittsburgh line of the Pennsylvania system. Erie, Penn., will be the receiving and shipping port, and \$100,000 will be spent in docks, new warehouses, etc., there.

If reports are true, there will be very large shipments of coal to Lake Ontario and other ports via Charlotte this year; commencing as soon as the new Charlotte & Lincoln Railroad is ready for operating.

A new coal firm will be formed here about April 1st, namely that of Messrs. Smith, Bartlett & Sears. Col. Howard M. Smith and John S. Bartlett, of Buffalo, and Oliver W. Sears, of Binghamton, are the members. The first and last have been engaged in the coal trade for some years, and Mr. Bartlett was the transportation manager of the N. Y., L. E. & W. R. R.

Indications point to the early resumption of navigation on the lakes this year. Little or no obstruction at Buffalo.

From Cleveland comes the news that the opening freight rate on coal from that port to Chicago and Milwaukee will be 75 cents, and to Duluth and Lake Superior ports 70 cents per net ton. The originator of the statement is unknown; but I think the figures are too high.

The works for providing extra facilities for handling coal and ore at this port are progressing very satisfactorily, and will add very materially to the already large capacity of the docks, chutes, etc.

The full details of the extensive works connected with the building of the wholesale shipping and retail trestles and dockage of the Central Terminal Company in this city have been made public. Work has been commenced and will be pushed as rigidly as possible to completion. The total cost will be in the neighborhood of \$280,000. You have published the essential points of the plans, etc.

Superintendent Ellis thinks the Welland canal will be opened about April 15th; last year it opened about April 23d.

PITTSBURG.

March 21.

Coal.—Trade continues dull; most of the boats that left with tows have returned with empties. The shipments so far exceed nine million bushels. There is still good boating water. The pools, however, are bare of coal.

The nominal rates are:

PRICE OF COAL PER 100 BUSHELS = 7000 LBS.	
First pool.....	\$4.75
Second pool.....	4.50
Third pool.....	3.90
Fourth pool.....	\$3.25
Railroad coal.....	5.00@5.25

Connellsville Coke.—There has been a slight ebb in the tide of coke trade prosperity, but it does not dim the fairness of future prospects of ultimately improving business. A detailed account shows 11,971 out of 13,261 ovens in the region in blast, and 1290 idle; increase over previous week in operation 861 ovens; the idle ovens are due chiefly to the blowing out of parts of Heckla and Mutual. Shipments for past week, 5475 cars; previous week, 5880; decrease, 405 cars. February shipments, 22,725 cars; January shipments, 28,415 cars; decrease, 5690 cars; February tonnage, 417,280 against 524,447 for January; deficiency, 107,167 tons.

Nominal rates at the ovens:

Furnace Coke.....	\$1.25@1.35	Foundries.....	\$1.50
Crushed.....	2.20		

Freight rates from the ovens to Pittsburg, 70c. per ton; to the Mahoning and Chenango valleys, \$1.35; East St. Louis, \$3.20; Cleveland, \$2.80; Chicago, \$2.75.

FREIGHTS.

The following were the rates per ton of 2240 lbs. for the last coal charters:

From Philadelphia to:—Boston, .90@1.05; Charleston, 1.00; Fall River, .80@.90; Georgetown, D. C., 1.00; Lynn, 1.15@1.30; New Bedford, .80@.90; Newburyport, 1.15@1.20; New York, .90; Norfolk, Va., .55@.70; Portland, .90@1.05; Portsmouth, N. H., 1.00@1.10; Providence, .80@.90; Richmond, Va., .70@.80; Savannah, 1.25; Washington, 1.00.
* And discharging. † Alongside.

METAL MARKETS.

NEW YORK, Friday Evening, March 22, 1889.

Prices of silver per ounce troy.

Mch	Sterling Exch'g'e.	Lond 'n Pence.	N. Y. Cts.	Mch	Sterling Exch'g'e.	Lond 'n Pence.	N. Y. Cts.
16	4.88 1/2	42 1/2	93	20	4.88 1/4	42 1/2	93 1/4
18	4.88 1/2	*	93 1/2	21	4.88 1/4	42 1/2	93 1/4
19	4.88 1/2	*	93 3/4	22	4.88 1/4	42 1/2	93 1/4

* 42 9-16.

The application this week for council bills much exceeded last week's tenders, so that the Council

could only allot a much smaller percentage of each person's requirements. This fact tended to strengthen the silver market, and there has been a fair demand for shipments at 42%. Exchange was weaker middle of week, but closes stronger again, with shipments of gold being made to Europe.

The United States Assay Office at New York reports total receipts of silver for the week, 50,000 ounces.

Foreign Bank Statements.—The governors of the Bank of England at their weekly meeting made no change in its rate for discount, and it remains at 3 per cent. During the week the bank gained £193,000 bullion, and the proportion of its reserve to its liabilities was raised from 42.09 to 42.23 per cent, against an advance from 44.43 to 44.81 per cent in the same week of last year, when its rate for discount was 2 per cent. Thursday the bank lost £118,000 bullion on balance. The weekly statement of the Bank of France shows a gain of 1,025,000 francs gold and a gain of 4,425,000 francs silver.

Domestic and Foreign Coin.

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

	Bid.	Asked.
Trade dollars.....	.72	.73
Mexican dollars.....	.72 3/4	.73 3/4
Peruvian soles and Chilean pesos.....	.71	.72
English silver.....	4.83	4.87
Five francs.....	.94	.95
Victoria sovereigns.....	4.86	4.88
Twenty francs.....	3.88	3.92
Twenty marks.....	4.74	4.80
Spanish doubloons.....	15.60	15.75
Spanish 25 pesetas.....	4.80	4.86
Mexican doubloons.....	15.55	15.70
Mexican 20 pesos.....	19.50	19.65
Ten guilders.....	3.96	4.00

Copper.—Very shortly after the publication of our last report the news of the complete collapse of the hitherto famous copper syndicate came to hand in confirmation of the numerous rumors recently current. Up to the very moment of our last week's report going to press it was generally hoped that by the combined action of all the parties most interested in averting this break-down some comparatively satisfactory arrangement could be arrived at to prevent a more serious shrinkage in values. The financial complications and obligations, however, proved to be much greater than was expected, and some of the largest banking institutions in France found themselves in such a critical position that a great financial catastrophe was only escaped by the assistance rendered to them by the French Government and the other great financial houses. The greatest part of the losses incurred by this latest copper deal will have to be borne by the French people, and the feeling against the principal parties involved in the speculation is now exceedingly bitter in that country. So strong has this resentment become that in the French Chamber of Deputies a member yesterday demanded that the financiers who directed the copper ring should be proceeded against by the government under the Penal Code, and this was only negated by a vote of 339 against 312.

The *Société des Métaux* (in whose name all the syndicate's contracts were made) was unable to meet the prompts falling due in London on the 18th inst., and at the same time various disturbing rumors were in circulation, and in the afternoon of that day, when the position of the *Société* became known, the price of Chili bars and G. M. B. copper in the London Metal Exchange dropped down to £35 for spot, at which figure, however, the quantity sold was very small. From that time up to the present large fluctuations have taken place in London, and the principal changes are shown as follows:

	Highest price touched.	Lowest price touched.
March 18..... Spot	£42	Spot £35
March 19..... "	40	35
March 20..... "	40 10s.	39
March 21..... "	42	40 15s.
March 22..... "	41 12s. 6d.	41 5s.

The dealings in three months' copper were very large, and at very irregular prices, but during the last few days these "futures" have come to be relatively higher than the spot prices, which may be regarded as the first indication of returning confidence in market values.

Private cable advices to hand this morning report sale of 1000 tons tough copper, bringing £41 2s. 6d., and cake copper £42 17s. 6d., which is actually below the parity of present quotations for G. M. B. and Chili bars.

The whole position of affairs in the copper market is of course still very unsettled, and a considerable time must of necessity elapse before it can be seen how future values are likely to run. Up to the present time comparatively small quantities have been thrown on the market for sale at best prices obtainable, either in Europe or in this country, and the impression is pretty general here that about the present range of prices will be maintained for some time to come, as the chief sources of supply are practically closed up. This condition no doubt applies more particularly to Lake copper, as at the meeting held in this city on the 4th and 5th inst., between the large producers and the representatives of the *Société des Métaux*, an arrangement was arrived at to suspend for 60 days from the 16th of this month all the producers' deliveries under contracts, and in this way to afford to the *Société des Métaux* some relief in their financial straits. Since that date, however, one of the parties to the arrangement having failed, it seems a remarkable thing if the other party (i. e., the producers) is still bound to keep to the agreement to suspend deliveries.

Consumers in this country are naturally very much annoyed at being compelled to pay 16 1/2 c. for Lake copper, and also at the inability to buy casting copper under 15c., the latter figure being the lowest price named by the large smelters of casting brands. Under present peculiar conditions these prices may be demanded with some amount of success for a very limited period, but will only be paid when consumers are absolutely forced to buy something to meet urgent necessities; but such a level of values cannot last beyond a short time. From the manner in which the metal is coming out on the London market it is certain that it will also come onto this market before long, and this state of affairs is foreshadowed by the fact that some sales of G. M. B. copper took place on the 21st inst. on our Metal Exchange, for March delivery, at 11.50 and then at 11.35, and large quantities were subsequently offered at 11.25 without finding buyers. July delivery was also sold at 10 cents. We do not mean from these remarks to imply that there is anything hopeless or even discouraging in the position and prospects. The losses of the recent inflation may be very serious to the speculators and other outsiders, but the present break down may prove to be the precursor of a period more advantageous to all legitimate traders in the metal. It has been proved in the past that with Lake copper at 10 cents per pound and Chili bars at £40 per ton the world's production of copper would not be sufficient to meet the consumptive demand, and whilst, owing to the great accumulation of stocks, prices may for some time rule even below these figures, we have confidence that when these stocks have been reduced values will rise to a point affording everybody concerned a fair margin of profit.

In Lake copper only one transaction took place during the week, viz., 25,000 pounds March at 15.80.

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

		Lbs.	
To Liverpool—Copper matte.....	1,661	280,000	\$19,000
By S. S. Helvetia..... Sacks.....	309	30,900	3,000
By S. S. Italy..... Bags.....	109	112,516	8,750
By S. S. Arizona..... Bbls.....			
To Liverpool—Copper.....	221	266,000	42,500
By S. S. Germanic..... Casks.....	628	112,013	16,802
By S. S. Strabo..... Cakes.....	112	112,000	16,800
By S. S. Adriatic..... Casks.....			
To Rotterdam—Copper.....	411	56,012	7,001
By S. S. Amsterdam..... Bars.....	12	719	1,800
To Hamburg—Copper bullion.....			
By S. S. Rhaetia..... Bars.....	14	14,709	1,757
To Hull—Old copper.....			
By S. S. Santiago..... Pkgs.....			

Tin.—In sympathy with the decline in copper tin suffered somewhat early in the week. In London the lowest price touched was £92 10s. for spot tin, but afterwards the market rapidly rallied, and closes firm to-day at £94 to £94 2s. 6d. spot, and £94 15s. to £95 three months. Here prices were also subjected to some amount of fluctuation, about 21c. being the lowest figure touched, but at that point heavy orders came from consumers, who at any rate on this occasion came in at the right time. We close to-day at the following quotations: Spot, 21 1/2 @ 21 3/4; March, 21 1/2 @ 21 1/4; April, 21 1/4; May, 21 1/4.

Lead was in rather active demand early in the week and prices advanced to 3 7/2 @ 3.75 spot, and to 3.85 for August and September. Prices have since relaxed again, however, and one lot was sold yesterday at 3.65. At the latter price there are now a good many buyers' with few if any sellers.

The Chicago Market.—Messrs. Everett & Post, of Chicago, telegraph us to-day as follows: The market opened at 3.55c., and steadily declined to 3.45c. Sales will not aggregate over 350 tons, at 3.50c. and 3.45c.

The St. Louis Market.—Messrs. John Wahl & Co. telegraph us to-day as follows: The situation remains substantially unchanged. The demand shows no improvement, and if there is any change at all, it is in the direction of lower prices. Probably 500 tons have changed hands at from 3.50 @ 3.45c.

Spelter has been quite neglected, with little or no business reported. We quote prime Western 4.72 1/2 c.

Antimony still continues very scarce, and we quote Hallett's 12 1/2, Cookson's 14.

IRON MARKET REVIEW.

New York, Friday Evening, March 22, 1889.

American Pig.—There is little change to report in this market. Sales are moderate, and there is no indication of "boom" here, nor much prospect of any immediate improvement. Southern irons, which are growing in favor, and are practically now on the same basis as Thomas iron, continue to be sold at a little below standard rates, except for a few of the choicest brands. Their forge irons are considerably below ours. From out-of-town markets there appears to be a somewhat better feeling and the Western markets report an actual improvement in prices, but this has not been felt here up to the present writing.

Scotch Pig.—The market is unchanged, prices here standing practically below the parity of those in Scotland, so that there is no profit in bringing in the metal. We continue our quotations of last week as follows: Coltness at about \$21; Dalmellington, \$19.50; Gorth-sherrie, \$20 @ \$20.75; Langloan, \$20.50; Glencarnock, \$20, and Eglinton, \$19.25.

Spiegelisen.—We are reported sales aggregating about 1500 tons, and we quote \$28 @ \$28.50 as the present market price for 20 per cent. Ferro-manganese is quoted at \$57 @ \$57.50 for 80 per cent, and we are reported some small sales.

In structural iron and steel there is a better feeling and though prices remain unchanged the market has a firmer tone and some business has been placed this week. We continue our quotations of 1.9 @ 2c. for sheared plates and angles, and 2.3 @ 2.5c. for tees, while beams and channels are 2.8c. on dock.

Some small rail contracts have been made during the week but nothing of special importance. Prices are, as we have been reporting them for some time past, rather firmer, and may be quoted as \$27 at Eastern mills. Pittsburg is quoting also a little firmer at \$27 to \$27.50, and the proposed consolidation of the Chicago mills will add very considerably to the strength of the Western market.

This consolidation will no doubt be effected after the meeting of the stockholders of the several companies which has been called for May. The capital stock of the new company will be \$25,000,000, as already announced by us, of which \$15,000,000 will represent the combined plants of the three companies, \$5,000,000 will be cash as a working capital and \$5,000,000 will remain unissued in the hands of the treasurer of the new concern. The issue of the stock of the different plants will be based upon strict actual value, and no water whatever will be permitted in the issue. The North Chicago has a capital of \$6,000,000, but it has accumulated various valuable interests which are not covered by this figure. The North Chicago will surrender its plant on the north branch of the Chicago River, its plant in South Chicago, its plant in Milwaukee, and its mines in Dodge County, Wisconsin. The Union and Joliet, likewise, in addition to the sale of their plants on the south branch of the Chicago River and at Joliet, will, aided by the North Chicago, put into the control of the new company interests which enable it to command everything from the raw material to the finished product.

The object of the combination is said to be economy. One management will be cheaper than three, and it is expected that improved conditions in the supply of raw material will also bring about a saving. It is also intended to increase the number of articles manufactured, so as to keep the works running continuously, whether the steel rail business be good or not. Iron and steel ships, it is said, can be built at Chicago or Milwaukee as well as at Cleveland, Buffalo or Detroit and probably a ship building yard will be added as an accessory to the new iron consolidated plant. It is also said that the manufacture of tin plate will be introduced in Chicago as the result of this combination.

Merchant Steel.—Some better feeling is reported in this article, but business continues to be of a jobbing nature, and prices are still somewhat demoralized.

Nails.—There is little improvement to be reported in these: prices continue very low and there is nothing encouraging to note. While nails are selling in Pittsburg and Chicago at from \$1.90 to \$2 for steel, there is very little profit in the manufacture of them in the East.

Wrought Tubes.—We hear of a better inquiry and some sales. Prices are: For butt-welded, black, 55 per cent, and galvanized 47 1/2 per cent discount from card rates; lap-welded, black, 67 1/2 per cent, and galvanized 55 per cent off. Boiler tubes are from 55 to 62 1/2 per cent off, according to size.

Old Rails.—Sales of 300 tons of Ts at \$23 on cars are reported and 200 tons double heads at \$24. There is no improvement in the demand.

Scrap Iron.—The sale of 250 tons at \$20 on cars is reported. We quote \$20.75. Stocks are light, and consumers are buying only for immediate requirements.

For other quotations we refer to our table of current prices on another page.

LOUISVILLE. March 20.

[Special report by Messrs. HALL BROTHERS & Co.]

The week under review has ended satisfactorily, both as to quantity and price, and it can be safely said that the market is stronger as actual sales show, and the amount of inquiries indicate a feeling that iron is wanted and the belief that prices long since reached the lowest. Consumers are desirous of supplying their wants through the year, though but few conservative furnaces are as yet willing to sell for delivery beyond July or August, believing that better prices will rule within the next thirty to sixty days.

Quotations which are for cash f.o.b. cars at Louisville will be found in our weekly register of prices.

PHILADELPHIA. March 22.

The iron trade of eastern Pennsylvania is in an even more depressed condition. Consumers everywhere are carrying less material than for months, but they are in no hurry to place orders till matters take a more settled shape. Brokers and representatives of furnace companies and mills are predicting an early and active demand for nearly all kinds of products. Agents who have been traveling through the country say buyers are not willing to buy and the agents are disappointed, but think that everything will shape itself up all right by the middle of April and indications point that way. Notwithstanding the dullness no farther concessions have been made in prices. In point of fact some few makers of iron are holding quotations at a little stronger figures. Pig iron makers think that the present production will be comfortably marketed during the second quarter of the year. Some different opinions are of course ex-

pressed, a few looking for a continued depression. Only small sales have been made of foundry and forge. Forge is particularly dull as the mills are not running as much as usual. A good deal of business in the aggregate has been done in the past six days.

A few small transactions have been reported by brokers in muck irons, but there is not much doing. Some little Scotch iron is selling, and a few inquiries are to hand for Bessemer.

Bar iron is dull, and makers are apprehensive, lest they may not be able to continue full time much longer. The large buyers are not in the market, but as an offset to this there are signs that railroad companies and pipe-line builders will soon be buyers.

Grooved skelp is low, but not much is being done. Nails continue demoralized and business is very light. A retail trade continues at the sheet-iron stores, but very few orders are coming to the mills. In fact, the whole iron trade is at a stand-still and nothing encouraging can be said. The shipbuilding interests are quite active, and we will probably receive promised orders in a few weeks. During the past six days a few hundred tons were booked, but this is a weekly occurrence. Quotations remain unchanged. The usual retail business was done this week in structural material. A few small orders were booked for steel rails at current quotations. The steel rail makers feel much encouraged at the indications of the past few days, but there are no orders of importance to report. There are several inquiries in to-day for old rails, and probably by next week some large transactions will be closed. The scrap iron market is very dull, and no changes in prices are reported. There are a great many requirements for various kinds of iron and steel in sight, and manufacturers feel that everything will improve as soon as the corner is reached, whenever that may be. For quotations see table of current prices on another page.

PITTSBURG. March 21.

[From our Special Correspondent.]

Raw Iron.—The market since our last shows little change as relates to values; there is, however, a falling off in the volume of business, consumers during the past three weeks having laid in a reasonably good supply. As most of them will have sufficient stock on hand to last for some time, they will to a certain extent be out of the market unless holders offer inducements, which they decline to do. A furnace man remarked that he could have closed several sales at a reduction of 25 cents, which he declined to do, preferring to wait and take chances, as iron at present prices is certainly at a low figure, being satisfied at the present rate of consumption that consumers will soon require stock to keep their plant in operation. There will certainly be a stubborn resistance to any further decline, and it looks now as though both mills and furnaces would cease production in preference to making reductions in price. Then again, there are indications that matters are shaping for improvement, which may come quicker perhaps than most people expect. A leading dealer has this to say: "Supply and demand are still fairly proportioned, although the dullness in finished iron is reflected in the raw material, causing a less confident feeling and more disposition to entertain proposals at lower figures than were asked a short time ago. This may, of course, be only temporary, as

anything like a fairly active market would soon stiffen prices, which are already down to about cost in most cases. At the same time, the surroundings are not very encouraging, and it seems impossible to say what may be done unless a turn for the better should soon appear. At the same time the disposition among consumers is to operate with the utmost caution; once the outlook becomes settled the demand will be large, seems to be the prevailing opinion.

Coke and Coal Smelted Lake Ore.

Table listing various types of coke and coal with prices per ton, including Bessemer, Gray Forge, and White Bessemer.

Coke, Native Ore.

Table listing native coke products such as Silvery, Extra, and No. 2 Foundry, with prices per ton.

Charcoal.

Table listing charcoal products like Hot Blast, Cold Blast, and No. 2 Foundry, with prices per ton.

Muck Bar.

Table listing muck bar products like Neutral, April, and Neutral, spot, with prices per ton.

Steel Billets.

Table listing steel billets products like Neutral, April, and Neutral, spot, with prices per ton.

Ferro-Manganese.

Table listing ferro-manganese products like 80 per cent and 80 per cent, with prices per ton.

Scrap Material.

Table listing scrap material products like Old Car Axles, Old Car Wheels, and O. H. Steel, with prices per ton.

CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, March 22

The Alleged Salt Trust.—Rumors concerning the formation of this trust have been flying thick and fast this week, but definite information has been scarce. The following from a press dispatch seems to be the most reliable: C. F. Burger, representing the Eastern manufacturers, had a conference with the manufacturers in East Saginaw at the annual meeting of the Salt Association, but no conclusion was reached. Subsequently the President and a member of the executive board of the Michigan Association visited New York, and a proposition was made for the formation of a trust, the purchase of which was the purchase of all plants operated independently of saw mills, the product controlled by the Michigan Association and manufactured in connection with mill plants, to be turned over to the National trust at stipulated prices. This proposition was laid before a secret meeting of Michigan manufacturers last week in East Saginaw, and the members

present voted to go into the trust on the basis proposed. The idea is to shut down all works where fuel costs so much that there is only a narrow margin of profit, and the product of each district to be regulated by the area it can control; this being, of course, regulated by freight rates. The entire salt-producing territory of the country will be included in the trust, which is said to have a capital of \$25,000,000.

Heavy Chemicals.—The improved tone noticed in this department last week seems to have been sustained, but the actual improvement in prices has been slight. The sudden death of one of our largest importers, who at the same time was one of the most highly esteemed members of the trade, has been the principal event of the week, and has caused universal regret. The alleged formation of the salt trust has also been freely discussed, but the lack of definite information on the subject leaves every one in the dark. Liverpool advices are not particularly encouraging, and the week on the whole is devoid of interesting features.

Carbonated soda ash, 48 per cent, is in good demand at 1.23 1/4 @ 1.26 1/4 c. Caustic soda ash, 48 per cent, is moving moderately in small quantities, not varying much from 1.25c. Small lots from store of both carbonate and caustic ash command 1.30c.

Refined Alkali is in fair request at 1.15 @ 1.20c. for 58 per cent, while 1.25c. is asked for 48 per cent.

Caustic soda has barely been sustained at the figures given last week, 2.17 1/2 @ 2.20c., and it is probable that 2.15c. would not be accepted. Seventy per cent is held at higher figures, 2.20c. being a fair quotation. Sixty per cent is nominally unchanged.

Sal soda lacks animation at 95c. for English.

Bleaching powder is quoted as low as 1.70c. in some quarters; the market is probably 1.75. The situation is not encouraging. It is difficult to account for the indifferent demand. Despite the fact that less has been imported this year than last, prices are at least ten cents per 100 pounds lower.

Acids.—The attempt to secure protection for our American acid trade from the encroachments of Canadian establishments does not seem to be meeting with the support that was expected. A number of local manufacturers aver that they have no knowledge of any importations of acid from Canada, and do not fear any, and consequently they do not deem the present movement of sufficient importance to warrant the expenditure of either time or money. It has also been suggested that the matter should properly be placed in the hands of the Tariff Committee of the Manufacturing Chemists' Association as this is the especial duty of that committee, and any independent action would evidence a lack of respect for the regular association. In reply to these arguments, the supporters of the movement repeat that the present steps are designed to preclude the possibility of future competition, and although the importations at present may appear to be insignificant, there is every reason to believe that ultimately they will be serious. In regard to the manufacturing Chemists' Association, a prominent manufacturer said this week, that with all due respect to that social body, he believed that independent action would be more expeditious than that of the association. We have given space to the opposing

IMPORTS AND EXPORTS OF METALS AT NEW YORK MARCH 12th TO MARCH 20th, 1889, AND FROM JANUARY 1st

Large table with multiple columns showing import and export data for various metals like Spelter, Nickel, Antimony, Pig Lead, Tin, Steel Sheets, Forging, Steel and Iron Rods, Scrap Iron, Sheet Zinc, Sheet Iron, Charcoal Iron, Copper, and Copper Matte. Includes sub-totals and year-to-date figures.

CURRENT PRICES.

These quotations are for wholesale lots in New York.

CHEMICALS.

Table of chemical prices including Acetic, Muriatic, Nitric, Oxalic, Sulphuric, Alkali, Alum, Aqua Ammonia, Ammonia, Arsenic, Asbestos, Asphaltum, Barites, Bleach, Borax, Bromine, Chalk, China Clay, Chrome Yellow, Cobalt, Copper, Coppras, Cream of Tartar, Emery, Feldspar, Fuller's Earth, Gypsum, Iodine, Kaolin, Lead, Lime Acetate, Litharge, Magnesite, Manganese, Mercuric Chloride, Mineral Wool, Mica, Phosphate Rock, Phosphorus, Plumbago, Potassium, Potash, Pyrites, Quartz, Rotten Stone, Soda Ash, Sulphate of Alumina, Sulphur, and Tannin.

Table of building materials including Bricks, Hackensacks, Haverstraw, Cement, Portland, Roman, Keene's coarse, Keene's fine, Slate, Red roofing, Black roofing, Lime, Rockland, St. John, Glens Falls, Labor, Masons, Plasterers, Carpenters, Plumbers, Painters, Stonesetters, Tilers, and Bricklayers.

BUILDING MATERIAL.

Table of rarer metals including Aluminum, Arsenic, Bismuth, Cadmium, Calcium, Cerium, Chromium, Cobalt, Didymium, Erbium, Gallium, Glucium, Iridium, Lanthanum, Lithium, Magnesium, Manganese, Molybdenum, Niobium, Osmium, Palladium, Platinum, Potassium, Rhodium, Ruthenium, Rubidium, Selenium, Sodium, Strontium, Tantalum, Tellurium, Thallium, Titanium, Thorium, Tungsten, Vanadium, Yttrium, and Zirconium.

THE RARER METALS.

Table of iron and steel prices including American Pig-Iron, Scotch Pig, Clyde, Dalmeilington, Summerlee, Shotts, Langloan, Bessemer Pig, Spiegelisen, German, English, Ferro Manganese, Steel Blooms, Steel Billets, Steel Nail Slabs, Steel Wire Rods, Structural Iron and Steel, Steel Plates, Tank and Ship, Shell, Iron Plates, Common tank, Refined, Shell, Flange, Extra flange, Bar Iron, Merchant Steel, Cast Iron Pipe, Wrought Iron Pipe, Boiler Tubes, Rail Fastenings, Wrought Scrap, Cast Scrap, Old Car Wheels, Old Rails, Nails, and Wire Nails.

IRON AND STEEL.

Table of iron and steel prices including American Pig-Iron, Scotch Pig, Clyde, Dalmeilington, Summerlee, Shotts, Langloan, Bessemer Pig, Spiegelisen, German, English, Ferro Manganese, Steel Blooms, Steel Billets, Steel Nail Slabs, Steel Wire Rods, Structural Iron and Steel, Steel Plates, Tank and Ship, Shell, Iron Plates, Common tank, Refined, Shell, Flange, Extra flange, Bar Iron, Merchant Steel, Cast Iron Pipe, Wrought Iron Pipe, Boiler Tubes, Rail Fastenings, Wrought Scrap, Cast Scrap, Old Car Wheels, Old Rails, Nails, and Wire Nails.

Table of Philadelphia prices including Foundry No. 1, Foundry No. 2, Gray Forge, Bessemer Pig, Steel Rail Blooms, Foreign Bessemer, Spiegelisen, Scrap, Selected, No. 1, Cargo Scrap, Muck-Bars, Merchant Iron, Plate Iron, Tank Iron, Skelp Iron, Angles, Beams and Channels, Nails, Steel Rails, and Old Rails.

Philadelphia Prices.

Table of Baltimore market quotations including Atlantic Coal, Balt. & N. C., Big Vein Coal, Conrad Hill, Cons. Coal, George's Crk. C., Lake Chrome, North State (Baito), Ore Knob, Silver Valley, and various other coal and iron products.

STOCK MARKET QUOTATIONS.

Table of stock market quotations including Birmingham, Ala. (Alabama Iron, Ala. R. Mill Co., Ala. Con. C. & C. Co., Alice Furnace, Bess. Land Co., Bir. Fur. & Mg., Broken Arrow, Decat. L. Imp., Decatur Min. L., Enterprise Mfg., Eureka, Hen. S. & M. Co., Mag. Ellen, Mary Pratt, Sloss I. & S., Tenn. C. & I. Co., Williamson, Woodstock I. Co.), Pittsburgh, Pa. (Allegheny Gas Co., Chartiers Val. Gas, Hazelwood Oil, La Noria Mining, New York & Cleveland Gas Coal, Ohio Valley Gas, Pennsylvania Gas, Philadelphia Gas, Pittsburg Gas, Silvertown Mining, Whouse B. Co. Lm., Whouse B. Co. Lm., Wheeling Gas), and Foreign Quotations (Altares Gold, Arizona Copper, Callao Bis, Carlisle, Colorado United, Columbian, Comstock, Cons. Esmeralda, Denver Gas, Dickens Custer, Eberhardt, El Callao, Empire, Flagstaff, Garfield, Gold Hill, Hex, Cal., Josephine, Kohinoor, Mason & Barry, Montana Lt., New California, New Consolidated, New Emma, New Hoover Hill, New La Plata, North Mexican, Old Lout, Pittsburg Cons., Quebrada, Richmond Cons., Ruby & Dunderberg, Russell Gold, Sierra Buttes, Stanly, U. S. Placer, Viola Lt., Belmez, El Callao, Golden River, Lexington, Rio Tinto, Tharsis).

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES

Main table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES, ASSESSMENTS, DIVIDENDS, NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES, ASSESSMENTS. Lists various mining companies and their financial details.

G. Gold, S. Silver, L. Lead, C. Copper. * Non-assessable. + This company, as the Western, up to Dec. 10th, 1881, paid \$1,400,000. & Non-assessable for three years. † The Deadwood previously paid \$775,000 in eleven dividends, and the Terra \$75,000. Previous to the consolidation in Aug., 1883, the California had paid \$31,320,000 in dividends, and the Con. Virginia, \$24,90,000. ‡ Previous to the consolidation of the Copper Queen with the Atlanta, Aug., 1885, the Copper Queen had paid \$1,350,000 in dividends, and \$1,300,000.

NEW YORK MINING STOCKS QUOTATIONS.

Table with columns for NAME AND LOCATION OF COMPANY, March 16-22, SALES, and NON-DIVIDEND-PAYING MINES. Includes companies like Adams, Alice, Argenta, Bassick, etc.

*Ex dividend. Dealt in at the New York Stock Ex. Unlisted securities. †Assessment paid. Dividend shares sold, 19,217. Non-dividend shares sold, 96,490. Total New York, 116,407.

BOSTON MINING STOCK QUOTATIONS.

Table with columns for NAME OF COMPANY, Mch. 15-21, SALES. Includes companies like Atlantic, Bodie, Bonanza Development, etc.

Boston: Dividend shares sold, 19,342. Non-dividend shares sold, 18,745. Total Boston, 38,087.

COAL STOCKS.

San Francisco Mining Stock Quotations

Table with columns for COMPANY, March 15-21, CLOSING QUOTATIONS. Includes companies like Alpha, Alfa, Belcher, Belle Isle, etc.

Table with columns for NAME OF COMPANY, Par va. of 100 shs., Mar. 16-22, Sales. Includes companies like American Coal, Buck Mountain Coal, Cameron Coal & Iron Co, etc.

*Of the sales of this stock, 51,335 were in Philadelphia, and 141,410 in New York. Total sales, 314,189.

views simply to show how divergent these can be among acid manufacturers. It seems to be impossible for these gentlemen to agree upon anything save a determination to force one another out of the business. The slightest move on the part of any one firm awakens the suspicions of every other man in the trade, and concerted action is impossible.

The local market continues rather quiet with no improvement in prices. A fair volume of business in jobbing lots is reported, however, and stocks do not seem to be anywhere in excessive supply. Sales reported are principally in sulphuric, which is firm at former quotations. Muriatic and nitric are not particularly active, the consumption of the latter having noticeably decreased. Oxalic is unchanged in price and sales are light. There seems to be very little, if any, inquiry for acetic in this market at present and very few manufacturers are known to be selling it. A fair quotation is 2c., although large orders could be placed at a lower figure.

Fertilizers, etc.—Nothing important in the way of actual business is reported this week, but prices appear to be quite uniformly upheld. The price list is continued as follows: Azotine, \$2.75; dried blood (city), low grade, \$2.65@2.70 per unit; Western, high grade, \$2.75 per unit for ground material; tankage, high grade, \$2.50@2.6 per ton; low grade, \$2.4 per ton, as to quality. Fish scrap, \$2.50@2.6 per ton f.o.b. factory. Sulphate of ammonia, \$3.35@3.40 per cwt.

Refuse bone-black, guaranteed 70 per cent phosphate, is quoted at \$19.50 per ton. Dissolved bone-black is 95c.@1 per unit for available phosphoric acid, and acid phosphate 85@90c. per unit for available phosphoric acid.

Steamed bones, unground, \$19.50; ground, \$25@26.

Charleston rock, undried, \$5@5.25 per ton; kiln dried, \$6@6.25 per ton, both f.o.b. vessels at the mines. Charleston rock, ground, \$10@10.50 ex steamer at New York.

Muriate of potash—Spot prices are continued at 1.82½@1.90c., according to quantity, at which figures several lots are now attainable. There have been a few small sales from second hands at 1.77½@1.80c. As predicted last week, the opening of the Elbe has enabled the syndicate to reduce its prices for forward deliveries to 1.80@1.82½c. Freight is still high and scarce.

Double manure salts, basis of 48 per cent potash, is reported a little higher, ranging from 1.20@1.25c. on the spot. High grade sulphate of potash, basis of 90 per cent, can be obtained on the spot at 2.35@2.40c., and the official price of 2.50c. for forward deliveries is therefore nominal.

Kamit—Spot is held at \$11, and forward deliveries \$10 per ton. These are now the official prices. No business is reported.

Nitrate of soda is in light demand, but no weakening in price is apparent. We quote on the spot 2.37½c. and to arrive 2.20@2.25, as to the location. It is estimated that the supply on the spot amounts to about 60,000 bags. There were no arrivals at this port during the fortnight ending March 15th. The total deliveries thus far in 1889 show a large increase over 1888, 1887 and 1886. The demand is now light, but prices have been held firm. Shipments from Chili to all ports aggregate 161,000 tons, against 78,000 tons same time last year.

Brimstone is quiet at \$20.50 for best unmixed seconds on the spot, and \$20.00 for the same to arrive. Thirds are held at \$19.75 per ton on the spot, and \$19.00 to arrive. On another page, we print some interesting figures showing the shipments and prices of Sicilian brimstone for a number of years past, as prepared by a well-known member of the trade.

Liverpool. March 9.

[From our Special Correspondents.]

Chemicals.—Messrs. J. P. Brunner & Co write us as follows: For some lines of chemicals there has been a better demand this week, but in some cases prices are easier. Soda Ash.—There is a good inquiry for carbonated, principally high test, but buyers find a difficulty in placing orders, as makers are very fully sold in this ash, and in some cases are unable to book any fresh orders for a couple of months ahead. On the spot nearest values are: Caustic ash, 48% 1@1.1.1.; high test, 1@1.1.1. Carb. ash, 48%, 1@1.1.1., high test, 1@1.1.1. Soda crystals are rather slow of sale, and dull at £2 8s. 9d.@£2 10s. Caustic soda met with a good inquiry in the early part of the week, and over 500 tons were sold for prompt delivery at £5 13s. 9d.@£5 15s. for 60%, and £6 11s. 3d.@£6 12s. 6d. for 70%. There is nothing now offering in 70% at under the higher figure, and most makers hold for 2s. 6d.@5s. per ton more money, but the demand has slackened off again, and the last day or two very little business has been reported. We quote 74%, £7 3s. 9d.@£7 5s.; 76%, £8 10s.

Bleaching powder is very weak. Resales have been made at £7 5s., while makers hold for £7 7s. 6d., but at the close there are no buyers even at the lower figure. The restriction in make still stands at 40 per cent, the committee having decided not to make any further restriction at present. Chlorate of potash very irregular. There is a fair inquiry, but the demand is readily met by sellers and sales have been made at 5d. down to as low as 4½d., all for prompt delivery. For forward delivery there are inquiries, but sellers will not go on except at a considerable advance over spot quotations. Bicarbonate of soda in fair request at £4 12s. 6d. to £4 15s. per ton for one cwt. kegs, with usual allowance for larger packages. Sulphate of ammonia shade easier at £11 15s. for good gray 24 per cent minimum f.o.b. Liverpool.

BUILDING MATERIAL MARKET.

NEW YORK, Friday Evening, March 22.
The real estate market has been particularly active this week. It is thought that the high prices now ruling for land will discourage purely speculative building by irresponsible builders this year, and if this proves to be the case it will be a source of considerable satisfaction to building material men. Speculative building creates a temporary activity, but is inevitably followed by a harvest of bad debts and failures, and a season of dullness, which gives the trade a set back.

Bricks.—Fortunately for the river brickmakers, the demand for consumption has this week improved, and the over-supply which depressed the market at the time of our last report has been worked off, so that no reduction in prices has resulted; indeed, a firm tone may be said to prevail. The representatives of the manufacturers in New York uniformly quote \$8@8.50, and report that a ready outlet is found for all arrivals, which is probably true. Arrivals this week have aggregated about a million bricks per day. Jerseys are also being received. Long Island stock is also offering, but nothing better than \$7.75 has thus far been obtained.

Lime continues in good demand, with arrivals much less than the market could take.

Building Stones.—The spring demand is just beginning to be felt and more or less activity is reported.

Roofing Slates.—The inquiry for slate is, of course, limited at present, but dealers seem to be confident that the light stocks at the quarries will serve to sustain prices. Last year business was comparatively quiet until August 1st, owing to the late spring, and yet 1888 proved to be one of the biggest years in the roofing slate trade.

CONTENTS.

	PAGE.
Platinum	273
African Mines and English Mining Companies	273
The Outcome of the Copper Corner	274
Services to the State and to Mining of the Arkansas Geological Survey	274
The New Gold Field of Arizona	275
Use of Cupric Chloride in Leaching Silver Ores and the Russell Process	275
Annual Reports of Mining Companies	275
Santa Clara Gold Field, Lower California	276
"A Word on Metal Ties"	277
Soft Coal Trades Iron-clad Agreement	278
Suggestions for New York City Transit	278
Statistics of Sicilian Brimstone	279
The Pietzka Revolving Puddling Furnace	279
An Air Propeller	280
Tiffany's Display of Jewels and Silverware for the Paris Exposition	280
The Eiffel Tower	280
English Saltput to be Taxed for Surface Damages	280
The Issue of Minor Coins	280
Important Electrical Patent Decision	280
Mineral Land not Locatable when Patented as Agricultural	280
Iron and Soda in Southern Russia	280
Australian Cross-Continent Railway	280
Michigan Ship Canal Scheme	280
Poppies as Protectors of Embankments	280
Atomic Weight of Ruthenium	280
A Swiss Cave	280
Books and Maps Received	280
Mining and Metallurgical Patents	280
Metallurgy of Steel	281
Personals	283
Industrial Notes	283
Contracting Notes	283
MINING NEWS:	
Alabama	283
California	283
Colorado	284
Dakota	284
Indiana	284
Michigan	284
Missouri	284
Montana	284
Nevada	284
Ohio	285
Oregon	285
Pennsylvania	285
Utah	285
West Virginia	285
FOREIGN MINING NEWS:	
Canada	285
Cuba	285
England	285
Mexico	285
Spain	286
MEETINGS:	286
DIVIDENDS:	286
ASSESSMENTS:	286
ORE MARKET:	286
MINING STOCK MARKET:	287
BOSTON MINING STOCKS:	287
ST. LOUIS MINING STOCKS:	287
ELECTRIC STOCKS:	287
PIPE LINE CERT:	287
MARKETS:	
COAL: New York	288
Boston	288
Buffalo	288
Pittsburg	288
METALS: New York	288
Philadelphia	289
Pittsburg	290
CHEMICALS AND MINERALS:	
ALS.	290
BUILDING MATERIALS:	294
MINING STOCKS:	
New York	287
Baltimore	291
Birmingham	291
Pittsburg	291
London	291
Paris	291
San Francisco	293
Boston	293
FREIGHTS:	288
Advertisers' Index:	xxv

Horsford's Acid Phosphate, Useful in all forms of Dyspepsia.

ASSESSMENT NOTICE.

EUREKA CONSOLIDATED MINING COMPANY.
Location of principal place of business, San Francisco, Cal.; location of works, Eureka, Nevada.

An Assessment, No. 11, of Fifty Cents a share has been levied on the stock of this company, delinquent April 27th; delinquent sale, 20th May, 1889.

This assessment can be paid at the office of LAIDLAW & CO., 14 Wall street, New York, on or before April 19th, and with advertising charges added, up to and including May 10th, 1889.

MINE SUPERINTENDENT OF LONG AND varied experience in mining iron ore is open to an engagement. Best of reference. Address IRON ORE, care of ENGINEERING AND MINING JOURNAL.

DIVIDENDS.

ASPEN MINING AND SMELTING COMPANY, No. 54 Wall street, NEW YORK, March 11, 1889.

Dividend No. 5 of TWENTY CENTS PER SHARE has this day been declared on the stock of this company (200,000 shares), payable at the office of the company on and after the 15th day of March, to stockholders of record. The transfer-books will be closed on Wednesday, March 13th, at three o'clock P.M., and reopened on Monday, March 18th, at nine o'clock A.M.
J. L. TILTON, Secretary.

COLORADO CENTRAL CONSOLIDATED MINING COMPANY.

The regular dividend, No. 27, of FIVE CENTS per share (\$13,750), has been declared to the stockholders of this Company, payable on April 10th, at the Farmers' Loan and Trust Company. Transfer-books close on March 30th, reopening on April 11th.

W. E. MANTIUS, Assistant Treasurer.
NEW YORK, March 14th, 1889.

DAILY MINING COMPANY, MILLS BUILDING, 15 BROAD STREET, NEW YORK, March 20, 1889.

DIVIDEND NO. 25.
A Dividend of TWENTY-FIVE (25) cents per share has been declared for February, payable 30th inst. Transfer-books close 25th inst.
LOUNSBERY & CO., Transfer-Agents.

HOMESTAKE MINING COMPANY, MILLS BUILDING, 15 BROAD STREET, NEW YORK, March 16, 1889.

DIVIDEND NO. 128.
The regular monthly dividend, TWENTY CENTS PER SHARE, has been declared for February, payable at the office of the company, San Francisco, or at the Transfer-Agency in New York, on the 25th instant. Transfer-books close on the 20th inst.
LOUNSBERY & CO., Transfer-Agents.

IRON SILVER MINING COMPANY, 23 BROAD STREET, NEW YORK, March 11, 1889.

Dividend No. 25, of TWENTY CENTS per share, (\$100,000) will be payable at the office of the Treasurer of the Company, 145 Griswold street, Detroit, Mich., on and after April 2. Transfer-books will be closed March 21, at 3 o'clock P. M., and re-open April 5, 10 o'clock A. M. Checks will be mailed to Stockholders as usual. If any change in address, notify JOHN M. NICOL, Treasurer, 145 Griswold street, Detroit, Mich.

HOMER A. HOIT, Assistant Secretary.

ONTARIO SILVER MINING COMPANY, MILLS BUILDING, 15 BROAD STREET, NEW YORK, March 20, 1889.

DIVIDEND NO. 154.
The regular monthly dividend of FIFTY CENTS per share has been declared for February, payable at the office of the Company, San Francisco, or at the Transfer Agency in New York, on the 30th inst. Transfer-books close on the 25th inst.
LOUNSBERY & CO., Transfer-Agents.

THE EMPIRE

MANGANESE & IRON CO.

DIRECTORS:
JAMES GILFILLAN, EX-U. S. TREASURER, 115 BROADWAY, NEW YORK.

N. J. BOTSFORD, OF BOTSFORD & NOE, 52 PARK PLACE, NEW YORK.

JAMES D. HENDERSON, OF HENDERSON & STOUTENBOROUGH, 270 PEARL ST., CITY.

D. M. YEOMANS, PRESIDENT NEW YORK & OHIO R. R., 35 WALL ST., NEW YORK.

W. S. CHAMBERLIN, 115 BROADWAY, NEW YORK.

OFFICERS—W. S. CHAMBERLIN, PRESIDENT; N. J. BOTSFORD, VICE-PRESIDENT; JAMES GILFILLAN, SECRETARY AND TREASURER.

A small amount of stock to be sold at \$5 PER SHARE, par value being \$10. This company has a number of valuable Manganese properties in Cuba. They have already been opened, and over 2000 tons of the ore already marketed. Two miles of tramway is now being built, and other arrangements are being made for the shipment of large quantities of the ore both to the United States and to Europe. An analysis of two different lots runs as follows:

	Per cent.		Per cent.
SILICA	462	IRON	126
SULPHUR	062	SILICA	72
PHOSPHORUS	002	PHOSPHORUS	070
METALLIC MANGANESE	6080	SULPHUR	070
MOISTURE	218	METALLIC MANGANESE	5561
IRON	66	MOISTURE	168

It will be seen by the above that the ore is very desirable. From estimates which have already been made it is believed that this company will be able to pay from 20 to 30 PER CENT upon the PAR VALUE of the stock, which would make the investment upon the present price FROM 40 TO 60 PER CENT. There is nothing improbable in these figures, as manganese is an essential element in the manufacture of steel, and this company has an unlimited amount of material and a market for the same. Shipment of ore in large quantities is expected to commence in the early part of June.

Several thousand shares of the stock have already been taken by business men, and as it is intended to sell only about 5000 shares more at this price, it is believed that it will be all taken up WITHIN A WEEK OR TEN DAYS.

The company is organized under the laws of New Jersey, with a capital stock of \$500,000, in shares of \$10 each, \$100,000 of stock remaining in the treasury. There is no liability whatever attached to the stockholder.

No certificate will be issued for less than 10 shares. Make checks or drafts payable to the order of

W. S. CHAMBERLIN, Agent,
115 BROADWAY, NEW YORK.