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THE output of the Calumet & Hecla mine in 1891 is stated, upon excellent authority, to have been 62,340,000 pounds, which though a little less than the figure published in the ENGINEERING AND MINING JOURNAL, January 2d, 1892, is greater than the "corrected figure" we published, on what we considered reliable authority, in our issue of March 5th, 1892.

THE use of tungsten in the manufacture of tungsten steel has created a very considerable demand for wolfram, the principal ore of that metal, and the supply being limited its market price has risen to a higher figure than has been obtained for many years. It would appear from recent experiments, of which we have been informed, that the advantages of tungsten steel will prove so important that this alloy will come into quite general use, perhaps taking the place of nickel steel. In view of the high value of tungsten at the present time it is worth the while of prospectors to look for its ores.

OUR much esteemed contemporary, *The American Machinist*, in its issue of March 3 refers again to the advertisement of a coupon book in the ENGINEERING AND MINING JOURNAL. We had already answered *The American Machinist's* criticism in a previous issue of our journal. There seems to be nothing more to be said in the matter except to express our sincere regret that so good a paper as *The American Machinist* should talk so positively about things it evidently does not understand. If it will take the trouble to examine the coupon book it will see that it has made itself very ridiculous.

THE Department on Mines and Mining of the World's Fair, Chicago, desires to secure for exhibition in one of its divisions several of the elaborate models of mines that have been employed in litigation between owners of various mining properties. Such an exhibition would be of great value and interest to the mining industry and especially as a means of educating the public at large, as there is probably no way in which the internal arrangements and workings of a mine and the general geological structure of the country in which they are opened can be shown so well as by these sectionalized models. There are a large number of models of this kind which have been used in litigation for the instruction of courts, and are now in the possession of the mining companies which prepared them, and which will doubtless be willing to loan them to the Mines Department of the World's Fair for exhibition. Mr. F. J. V. SKIFF, chief of the mining department of the World's Fair will be pleased to hear from them on this subject.

### THE WORLD'S PRODUCTION OF PIG-IRON.

In our issue of March 19th we recorded the production of pig iron in Germany, Great Britain and the United States, representing about 84 per cent. of the world's total make of pig iron on the basis of 1890, showing that there had been a decrease in the output of each of these countries, ranging from 4.4 per cent. in the case of Germany to 10 per cent. in the case of the United States. The production of the United States was given as 8,415,113 metric tons (2,304 pounds); Great Britain, 7,346,566 metric tons; and Germany, 4,452,019 metric tons. We have now the figures for France and Belgium, which also show a decrease as compared with 1890. France produced 1,919,185 metric tons in 1891, against 1,962,196 metric tons in 1890; while Belgium produced 688,056 metric tons in 1891, against 787,836 metric tons in 1890. The decrease in France amounted to 2.2 per cent., and in Belgium to 14.5 per cent. The total output in 1891 of these five countries, which produce about 90 per cent. of the world's make of pig-iron was, therefore, 22,820,939 metric tons. Assuming that the other iron producing countries made the same output as in 1890, the total production in 1891 was 25,228,939 metric tons, against 27,146,000 metric tons in 1890.

### A FREE SILVER ADVOCATE'S PREACHING AND PRACTICE.

THE great high priest of free silver, Senator WM. M. STEWART, of Nevada, has been neatly unmasked by the New York *Evening Post*. Every one knows that Senator STEWART has been the noisiest of the advocates of free silver "in the interest of the poor workmen of the country," and he has been the most eloquent denouncer of the infamous "gold bugs" who advocate an honest currency in which every dollar is equal to a gold dollar.

THE *Evening Post* publishes a certified list (given on another page of this issue) of 26 mortgages recorded in Alameda County, Cal., in favor of WM. M. STEWART, all but one of them payable, principal and interest, in gold coin. It appears then that the money Senator STEWART received for preaching the virtues of free silver to the workmen, and for telling them how they are oppressed by the "gold ring" in having to pay their debts in currency worth one hundred cents on the dollar, he has securely loaned out to the poor, on mortgages at 8 per cent., both interest and principal payable in GOLD.

THE loans, all in small amounts, are evidently to the class he so greatly pities, because they cannot pay their debts in depreciated silver. Verily, Senator STEWART, or "Slippery Bill," as he is familiarly called by his old cronies of "the Coast," is a champion hypocrite. Silver is good enough to pay his dupes with, but they must pay their debts to him in gold. This

should prove an instructive object lesson for the workmen who vote for free silver.

#### THE OUTLOOK FOR COPPER.

The condition of our copper market is highly satisfactory; the consumption of the metal, especially for electrolytic purposes, is enormous, and will largely exceed that of last year. Were it not for the very large productive capacity of our chief mines there would indeed be some danger of one of those sudden and extravagant advances in price which are so injurious to the manufacturing industry, and ultimately to the producers also. This danger would undoubtedly be increased were it possible to organize or maintain such a "copper-fastened" combination as the old French syndicate, or as some of the speculators would have the trade believe, is now in contemplation. Fortunately nothing of the kind is intended by the producers, nor would it be possible if they desired it.

The understanding which the producers are endeavoring to arrive at and which is likely to be decided at a meeting in London on the 13th proximo is intended to regulate the output of the mines in accordance with the requirements of the market, which are to be estimated by a free exchange of views between producers. Our American mines have the capacity to overstock the market, but they are willing to control output to about 310,000,000 pounds, which would probably supply our home market and allow for export only about 40,000 tons.

If the great European producers should also act in a conservative manner there can be no question but that the copper market can be maintained steady at moderate, but still fairly remunerative, prices for the metal. We have shown in these pages that a price of 12½ cents or even 13 cents a pound for Lake and electrolytic copper is not exorbitant, and there is no desire among the chief producers in this country to see the price ever advance beyond these figures.

#### THE MIKE AND STARR DECISION—THE DISSENTING OPINION DELIVERED BY MR. JUSTICE FIELD.

The essential portions of the dissenting opinion of Justices FIELD, HURLAN, and BROWN in the above cases will be found elsewhere in this number of the ENGINEERING AND MINING JOURNAL. The astonishing character of several features of the majority opinion of the Court was pointed out two weeks ago. It will be seen that a very different atmosphere pervades the dissenting opinion, which betrays a practical acquaintance with the actual conditions of mining. I wish to call attention here to several of its leading features:

1. As to the important ruling of the court below, by which the date of the issue of the placer patent was substituted for the date of the application for the patent, it will be remembered that the majority opinion declares this ruling to be erroneous, but proceeds at the same time to decide, that though erroneous, it could not have affected the result of the trial, and hence does not justify a reversal of the judgment. The minority is very explicit to the contrary. "The ruling," it says, "could not have failed to mislead the jury and to direct their attention to matters not properly opened for their consideration." Among these matters, as I showed in my former article, there were such tolerably pertinent things as the proof of two lode-locations, actually made in due form, and two certificates thereof, publicly recorded. These proofs were, as all the Judges of the Supreme Court concur in declaring, erroneously admitted by the ruling which fixed the wrong date as the limit of evidence pertinent to the issue. It is not at all certain that the jury would have believed, in the absence of these later proofs, the suspicious story of earlier discoveries; and it is, on the other hand, highly probable that, if these proofs of location, and also the evidence from conversations, etc., wrongfully admitted by the court below, had been excluded (as the majority decision requires) the jury would not have found that the knowledge of any lode or lodes concerned had been brought home to the placer-applicant; for the remaining evidence as to such lodes would have shown, at the most, a fact discovered and kept secret.

2. With regard to the evidence offered to prove the alleged earlier discoveries, the dissenting opinion is vigorously contemptuous. It says, "There was no vein or lode of gold or silver-bearing rock found in the tunnel, and there is an erroneous impression conveyed by the opinion of the Court in that respect;" and clinches this conclusion with a terse analysis of the evidence itself, quoted the whole of it in a foot-note. I can add nothing to the force of this statement. It is difficult to understand how the majority of the Court could have escaped it. After careful study of the majority opinion, I can find but one explanation, viz., that the Court declined to weigh the evidence as to these lodes, holding that the question was one of fact for the jury, and that, there being some evidence (whatever it was worth), unimpeached and uncontradicted, which satisfied the jury, the record does not present grounds to justify a reversal of the verdict. This is, at first glance, a not unreasonable proposition. Certainly the Supreme Court could not be expected to re-try the facts. But in this instance the real question was whether, after striking out a mass of evidence improperly admitted, it could be assumed that the jury had actually been satisfied with the remainder. This would be in any case a

serious assumption; in the present cases it appears, in the fierce light of the minority opinion, to be not only serious but comical.

3. Both the majority and the minority opinion deal with that one of the two cases which involves the so-called "Goodell" lode; while the other case involves the so-called "Gardiner" lode. Both these lodes were alleged to have been discovered in the Mike tunnel, which crossed them nearly at right angles. One of them was cut about 75 feet from the mouth of the tunnel and the other one an indefinite distance beyond. In fact, as to this *other one*, there is no distinct evidence. The witnesses talk of one, two and three "other veins;" and there is nothing in the testimony identifying either of the veins discovered in this tunnel with the "Gardiner" or the "Goodell" lode. But all the testimony which the majority opinion of the Supreme Court describes as *prima facie* sufficient refers *exclusively to the vein alleged to have been discovered 75 feet from the mouth of the tunnel*, and the diagram included in the printed records of both cases shows that this point is within the so-called "Gardiner" location, and, therefore, *that the alleged lode must be the "Gardiner" lode*. But the majority opinion declares this testimony to have justified the jury in finding that the "Goodell" lode had been discovered! In other words, the court decided the "Goodell" case in view of testimony which applied exclusively to the "Gardiner" case.

The minority opinion seems to involve the same oversight; but here the error is of no consequence, since the evidence as to *any lodes whatever* in the tunnel is pronounced to be ridiculously insufficient. In both opinions, however, it is clearly assumed that both cases rest on the same testimony, and that the decision in one necessarily implies a similar decision in the other.

The source of this error is not hard to find, and it does not reflect special discredit upon the Supreme Court, although it certainly seems to call for correction by that tribunal. The two cases were, in fact, heard as one case on appeal, because the assignments of error in both cases were the same, and it was supposed by both parties that the questions of law common to both cases would be decisive. The printed records transmitted to Washington were almost identical; and the record in the "Goodell" case contained all the testimony as to the "Gardiner" lode, though this lode was really not all involved in that case. It is, therefore, not surprising that Justice BREWER, sitting down to write the majority opinion in the "Goodell" lode case, and finding in the printed record of that case a lot of evidence about an unnamed lode, should overlook the diagram (which shows that the said lode cannot possibly be in the ground claimed as belonging to the "Goodell" lode, but must be—if it is *anything* involved in the cases—the "Gardiner" lode) and should assume all this testimony to apply to the case before him.

4. In the minority decision, the same error amounts to no more than a typographical one, easily corrected by the simple substitution of "Gardiner" for "Goodell," and of "No. 3" for "No. 2;" for the grounds of that opinion apply to both cases alike. But the reasons given in the majority opinion not only do not apply to the particular case discussed therein, but cannot apply to the two cases alike, so as to justify the decisions in both. For with regard to the "Goodell" lode there was not an atom—not even a pretense—of any testimony as to the existence in it of any valuable minerals; no record or recollection of any assay; no expert description of the "lode;" no exhibition of samples to the jury; no expression of opinion, even, from any witness, that it was a valuable lode. Unless the Court, therefore, is willing to take the position that, on the strength of *one* lode discovered, *two parallel* claims may be held, one of which does not contain the apex of the lode at all, it has committed in one of these cases an unintentional injustice, which it ought to repair.

5. The most widely important question of all, namely, that of the proper construction of Section 2333 of the Revised Statutes, is decided in two opposite senses by the two opinions. The majority opinion, which is decisive, for the present, so far as it goes, goes far enough to unsettle vastly more than it settles. With much appearance of positiveness, it declares that a lode "known to exist" within the meaning of the section is a vein or lode whose existence is known as "contradistinguished from one which has been appropriated by location," and that "it must either have been known to the applicant for the placer patent, or known to the community generally, or else disclosed by workings and obvious to any one making a reasonable and fair inspection of the premises for the purpose of obtaining title from the government." The minority opinion says that the known lode contemplated in the section must be known as to enable the placer applicant "to state its existence and extent in his application for a patent of the placer claim, and to tender the price per acre required." This involves the correlative proposition that if he wishes not to claim it, but explicitly to except and disclaim it, it must be possible for him to state its position and extent, and thus define the land which he does not propose to buy and pay for. It need hardly be said that this is a sensible and a practicable view. But I purpose to discuss this question more fully hereafter, and to inquire particularly, in that connection, whether the late controlling decision leaves to the owners of mineral ground under placer patents any title at all, or any way of perfecting title

R. W. RAYMOND.

## BOOKS RECEIVED.

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

- A Guide to Electric Lighting.* By S. R. Bottone. Published by Macmillan & Co. London and New York, 1892. Pages, 189. Price, 75 cents. Illustrated.
- Bulletin of the Geological Society of America.* Proceedings of the meeting held at Washington, August, 1891. Published by the Society, Rochester, N. Y., 1892. Pages 152. Illustrated.
- Bulletin of the Geological Society of America.* Preliminary Notes on the Discovery of a Vertebrate Fauna in Silurian (Ordovician) Strata. By Charles D. Walcott. Published by the Society, Rochester, N. Y., 1892. Pages 19. Illustrated.
- Costa Rica,* being Bulletin No. 31 of the Bureau of American Republics. Published by the Bureau, Washington, D. C., 1892. Pages 146. Illustrated.
- Notes and Examples in Mechanics,* with an appendix on the Graphical Statics of Mechanism. By Irving P. Church, C. E. Published by John Wiley & Sons, New York, 1892. Pages 146. Price, \$2. Illustrated.
- Proceedings of the Eighth Annual Convention of the Association of Official Agricultural Chemists.* Edited by Harvey W. Wiley, secretary. Published by the Government. Washington, D. C., 1891. Pages, 253. Illustrated.
- Quarterly Report of the Mining Department of Victoria.* Published by the Government. Melbourne, 1892. Pages, 63. Price, 50c. Illustrated.
- Road Construction and Maintenance.* Prize Essays, reprinted from the *Engineering Record.* Published by the *Engineering Record*, New York, 1892.
- The Iron Founder.* A comprehensive treatise on the art of moulding. By Simpson Bolland. Published by John Wiley & Sons, New York, 1892. Pages, 382. Price, \$2.50. Illustrated.
- Transactions of the American Institute of Electrical Engineers.* Vol. VIII. 1891. Published by the Institute, New York, 1892. Pages, 635. Illustrated.

## NEW PUBLICATIONS

HISTORY OF THE MANUFACTURE OF IRON IN ALL AGES, AND PARTICULARLY IN THE UNITED STATES, FROM COLONIAL TIMES TO 1891; also a Short History of Coal Mining in the United States, and a Full Account of the Influences which Long Delayed the Development of all American Manufacturing Industries. By James M. Swank. Second Edition, thoroughly revised and greatly enlarged. Pp. 574. American Iron & Steel Association, Philadelphia, Pa., publisher, 1892.

The second edition of Mr. James M. Swank's "History of the Manufacture of Iron in All Ages" is a great improvement upon the first, although that deserved the praise which it so widely received upon its appearance in 1884, and has been a treasure of information as well as an entertaining narrative to all who have become acquainted with it. But not content with the excellence thus achieved Mr. Swank has thoroughly revised the book, and added much new material, increasing its original 436 pages to 574, or one-fourth more, and perfecting it in accuracy and comprehensiveness. A part of the additional material is naturally drawn from the history and statistics of the last seven eventful years of the iron and steel trades, and the metallurgy on which they depend. But the earlier historical notices have also been largely rewritten, and there are entirely new chapters on early discoveries of coal in the United States and on the connection of the Washington and Lincoln families with the colonial iron manufacture. The book is as fair to see as it is good to read.

R. W. R.

IRRIGATION CANALS AND OTHER IRRIGATION WORKS, including the Flow of Water in Irrigation Canals, and Open and Closed Channels Generally, with tables facilitating the application of the formulæ of Kutter, D'Arcy and Bazin. By P. J. Flynn, C. E. San Francisco, 1892. 711 pages, 92 tables, 211 illustrations. Price \$8.

In his preface the author states that he has aimed at making the work useful not only to the engineer in active practice, but also to the engineering student. The articles are therefore arranged in the order in which they should follow each other. The work is divided into two parts. The first part treats of irrigation canals and other irrigation works, and the second part of the flow of water in open and closed channels generally. In preparing the work on irrigation canals the best authorities have been consulted, and due acknowledgment given. In the work on the flow of water over 90% is original, but some of it has appeared in Mr. Flynn's other publications. In order to simplify and facilitate the application of the modern formulæ of Kutter, D'Arcy and Bazin, the author has reduced them to the Chezy form of formulæ, and then has constructed three tables for open channels and two tables for circular and egg-shaped pipes, sewers and conduits. By the use of these tables any problem relating to open or closed channels likely to arise in practice can be rapidly solved. The author gives a collection of 69 formulæ from different authorities on hydraulics, which he claims as the most complete that has ever been published in the English language.

The statements made by Mr. Flynn in his preface appear to be fully justified by the work itself. The first half of the book, devoted to irrigation canals is an admirable presentation of the subject. The facts are derived chiefly from India and Egypt where the best work has been done. The author quotes, approvingly the statements of other writers, that the construction of irrigation works in America has generally been done very badly. He says: "Regarded simply on the question of construction it is too apparent that faults are numerous, alignments have been bad, grades and velocities established apparently without any consideration, and flumes, headworks, etc., constructed, of which a respectable mechanic would be ashamed. Still, bad as the conditions are they have their value to the engineer, if nothing more than in showing the mistakes to be avoided in entering upon similar works in new countries." Mr. Flynn treats successively of the general principles of irrigation, quantity of water required, shape and dimensions, slopes and grades of canals, safe mean velocities, silting, headworks, weirs, regulators, percolation, evaporation, surveys, distributaries, etc. This part of the work is handsomely illustrated.

The second part of the work, relating to the flow of water in canals,

ditches, flumes, pipes, etc., will be of general interest to all engineers who have anything to do with the flow of water, whether interested in irrigation or not. It is full of tables for promptly giving the velocity and quantity of flow for any shape and dimension of pipe, canal or conduit. Most of the tables are based on Kutter's formula. This, as is well known, is by far the best formula for flow of water that has ever been devised, but has a most formidable appearance and the labor of making calculations by it is very great. Mr. Flynn has simplified the form of the formula and has placed in his tables values of the coefficient for almost every conceivable condition of flow as to character, shape, dimension and slope of conduit. Tables are also given, based on D'Arcy's formula, which is believed to be reliable for pipes of small diameter.

We regret to notice that the author has made something of a slip in devoting seven pages of his book to a criticism of the modification of Kutter's formula as printed in the twenty-first edition of Molesworth's pocketbook, pointing out its serious inaccuracy and quoting a letter from Mr. Molesworth, who admits the error and explains that it arose from oversight in proofreading, but failing to state that Molesworth's twenty-second edition, printed in 1888, has the formula printed correctly, which fact, if known to the author, would have made his seven pages of criticism unnecessary. We trust he will leave them out in the next edition of the work. He would also suggest a careful inspection of the tables for errors, as we noticed two in the table on page 277. The figures under  $d = 10'$  printed 1 and .5, should be respectively 2.01 and 1.0. On page 253, fifth line, .09 should be .009.

## 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 Production of Silver in Germany\*

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The letter of Mr. E. O. Leech, director of the U. S. Mint, in your issue of February 20th, does not at all explain the vast difference in the figures given by him as representing the production of silver in Germany and the actual production of silver from ores raised and treated in that country, to which difference Mr. Bassermann directed your readers' attention. According to Mr. Leech, the ores raised in Germany in 1889 yielded only 32,040 kilos. of silver, and he quotes from Dr. Soetbeer, as an explanation, "that the precious metal in the Mint's statistics is traced to its sources, and that these countries are credited with the silver which produced the ore." Germany is accordingly credited with that amount only, which is "presumed" (where does the exactness of statistics come in if such amounts are presumed?) to have been obtained from domestic German ores. With all due deference to the authority of Mr. Soetbeer, I beg to say that he does not seem to know what enormous quantities of argentiferous ores are annually raised and smelted in Germany, nor that he assays them for their silver contents, nor that he receives information from the German smelting works, how much of their production of silver comes from domestic and how much from imported ores. Therefore Mr. Soetbeer's defense of the statistical figures of the U. S. Mint, as far as the production of silver in Germany is concerned, is based on suggestions only and not on facts.

I will try to show by a few figures how misleading the statistics are representing the domestic output of silver in Germany, which have been "presumed" by Mr. Leech. I have no exact figures at my disposal just now, but my intimate knowledge of most of the German smelting works, and the domestic ores they treat, makes the following figures of the output exact enough for the purpose: Mansfeld produced in 1889, from its own ores, 86,714 kilograms of fine silver; Freiberg, approximately, 32,000; Upper and Lower Hartz, 40,000; Silesia, 40,000; Rhineland, Napau, Westphalia, etc., 78,000; total, 276,714 kilograms. This figure, representing the output of domestic silver in Germany, is nearly nine times the amount given by Mr. Leech. As the statistics of argentiferous ores raised in Germany were certainly available to him, as to everybody else interested in them, the large discrepancy does not give the impression that Mr. Leech had "sifted" his statistical material very carefully. If Mr. Leech only took in account the production of refined lead in Germany, which is obtained almost entirely from domestic ores, which are argentiferous throughout Freiberg, Silesia, Upper and Lower Hartz, Siegen, Ems, Mechernich, etc., and if he would have taken the yield of silver therefrom even as low as 700 grammes per ton of refined lead, he would have arrived at a figure of about 70,000 kilos, and adding thereto the production of Mansfeld, which, as he could easily ascertain, produces now from 80,000 to 88,000 kilos per annum from its copper-schist, he would have arrived at a figure representing five times the amount given by him. I cannot imagine how Mr. Leech has come to his figure of 32,040 kilos; as far back as 1876 Mansfeld alone produced that amount.

The figure representing the production of gold in Germany in 1889, viz., 1958 kilos, has been taken from the imperial German statistics without alteration. If the principle should be carried out "that the precious metal is traced to its sources," this figure is wrong again, and even much more than in the case of the silver. There is, to the best of my knowledge, only one mine in Germany now being worked which produces auriferous ores, namely, the Rammelsberg, in the Lower Hartz. The production of gold from the ores of the Rammelsberg varies; it may be taken, at the utmost, as 80 kilos per annum. All other gold produced in Germany in 1889, viz.: 1,878 kilos, comes from foreign imported ores or mattes; therefore the statistics of the mint ought to show, say, 80 kilos only, instead of nearly 25 times this amount.

THEO. HÆRGE, Ph.D.

JESMOND HOUSE, SWANSEA, March 15, 1892.

## Failures in Boomed Towns; Middlesborough, Ky.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The perusal of an article on Middlesborough, Ky., in a recent issue of the ENGINEERING AND MINING JOURNAL leaves on the mind of even the casual reader the impression that the subject has run away with the author. Like the hardened reprobate at the revival meeting who "came to scoff and remained to pray," he begins with a glowing description of towns based on nothing but wind, and ends with quite an accurate

and truthful description of formations of coal and ores that even from his own account challenge admiration. When to his statement is added a few facts of vital importance that he either has willfully forgotten or blindly failed to observe, it can be readily understood why, after referring to Fort Payne, which he states is "already dead and will soon be buried," he is forced to admit that Middlesborough "is not a complete failure yet."

Middlesborough is to-day an object of general interest on both sides the ocean. Her *raison d'être* is fourfold, and based on situation and climate, on coal, iron and timber resources. As to climate, the records of observers confirm the favorable testimony of the natives and of sojourners. As for timber, experts admit that the future supply of the hard woods of the country is to come from this region. Here are vast forests of every variety of poplar, ash, oak, walnut, chestnut, etc. The utilization of these forests, in conjunction with cheap iron and steel and coal, is certain to build up important industries.

As to coal, Mr. Fleming's account is sufficiently truthful. He admits the fact that covering great areas in the Bennett's Fork district of the lands belonging to the American Association are eight well defined seams of coal, over 35 ft. in thickness altogether, all lying above water level, nearly horizontal, with no draining or hoisting required for years and years to come, of a quality fully equal to the best of the famous Pittsburg seam, and of almost identically the same chemical analysis, unsurpassed for domestic steam, coking and gas purposes. The analysis he gives of the coal and the coke are borne out in actual and extensive daily shipments of coal to all points south and west for gas purposes, and to Alabama furnaces for blast furnace use. Average analyses of regular shipments of 125 tons daily of furnace coke to Florence, Ala., show over 90% of fixed carbon, with 7% to 8% ash and 4% to 8% sulphur.

Although the coal has been on the market less than one year, it is already being shipped in large quantities to gas works in Knoxville, Chattanooga, Atlanta, Macon, Columbus, Augusta, Raleigh, in the South, and to Richmond, Ky., Paris, Clarksville, Tenn., Louisville and St. Louis. The universal testimony of consumers reports a gas yield of from 9,000 to 10,000 ft. of gas of candle power equal to that of "Pittsburg," with more tar and ammonia, and excellent coke.

In regard to iron Mr. Fleming's statements are more guarded. No one in authority at Middlesborough claims that extensive and reliable deposits of brown ores have yet been opened in the immediate vicinity. That the famous Oriskany ores occur in regular position in the neighborhood is known, but their extent and value is by no means fully established. That extensive and extremely valuable formations of red fossil ores do exist and are well opened up even Mr. Fleming is forced to admit. As a basis for cheap mixtures for iron making these ores are beyond question abundant, as the immense operations of the Watts Syndicate have established since Mr. Fleming's visit to this region over a year ago. But the one vital fact in connection with the iron business at this locality seems to have utterly escaped his observation, namely, that within a distance of from 75 to 100 miles, or 40 to 50 cents per ton freight rate, lie enormous bodies of both brown and magnetic ores of the very highest quality, and in districts to which this is the nearest available source of coal and coke. Lying along the Marietta & No. Georgia R. R. are immense bodies of brown hematite ores at Starr's Mountain and Ducktown and other localities within a mile of the railroad. A sample shipment of 50 cars of the brown ore from Ducktown was forwarded here last fall, which gave an average analysis from 10 cars of over 58% iron, 8% silica, trace of sulphur and less than .02% of phosphorus. This ore is offered delivered here on contract at not over a 4½ cents per unit of iron. Every one of the 50 cars bringing the ore here was reloaded with coal for Atlanta and beyond.

Lying to the eastward of this point, about 100 miles distant, are the wonderful deposits of the North Carolina magnetites, whose vast extent and supreme importance few people even now appreciate. These ores are of especial purity, but quite silicious and low in iron, and of practically limitless extent. The problem as to how to make them available has been already worked out in the magnetic concentration works at Ogden, N. J., and Brewsters, N. Y. That within a short time abundant supplies of magnetic concentrates carrying 65% to 68% metallic iron, no sulphur, and less than .02% of phosphorus will be available within 100 miles of Middlesborough, and that every car that brings the ore to her doors will be filled with returning coal and coke is a fact pregnant with meaning to the future of this region, and too great to be overlooked in any candid narration of its resources.

Mr. Fleming still further omits to state that the product of the furnaces and steel works of Middlesborough will be several hundred miles nearer in distance, and from .75 to \$1 per ton in freight rates, to all the great consuming markets of the East and West than the furnaces and mills of Alabama—itsself a fact too prominent to be overlooked.

The growth of the coal traffic over the Norfolk & Western Railroad from the Pocahontas region has been phenomenal. From the small beginning of but seven years ago there are shipped annually from Norfolk alone over 2,000,000 tons of coal per annum. That in the not distant future an important coaling station will be established at Port Royal or some other point south of Hatteras is already patent to observant and thoughtful men. That day will be hastened by important railroad changes now under negotiation. When the day comes that the great Southern lines are practically consolidated into one, and in the hands of managers who control them, not as many of them are now controlled—notably the E. T. V. & G. R. R.—to further the private interests of the directors, but as railroads simply, there will take place a revolution in the industrial character of this section. When that day comes, and long trains of cars loaded with coal and coke for tidewater and export are filled on the return trip with the pure ores of North Carolina at low rates the importance of Middlesborough as a coal and iron centre will become apparent, even to such superficial observers as Mr. Fleming.

Middlesborough has come to stay. That mistakes have been made in working out the scheme is admitted. That the conception was a grand one and has been on the whole admirably worked out is asserted. The severe depression that has swept over the South has wrecked no one of her leading companies. The two parent companies—the American Association and the Town Company—both suffered by the gale, but have both met all engagements, and now reorganized and infused with new life and abundant capital, and guided by careful, prudent and conservative management are working in harmony to a common end. The city itself feels the thrill of a new life.

The causes that led to the inauguration of the scheme of building here a city still exist. The vast expenditure of capital has provided already the comforts and elegancies that many cities of a generation would envy. The water works, that have cost over \$400,000, are providing the city with abundance of the purest water; the canal "rectification," of which Mr. Fleming speaks, has been (at an enormous cost) a complete success, and converted an unsightly creek into a trim and manageable canal; the sewerage system has, at great cost, been completed and has assured the healthfulness of the city; the long lines of macadamized streets and artificial stone pavements, substantial brick buildings, neat and even elegant private residences, elegant hotels, well lighted streets, schools, churches, public library, etc., combine to make it a desirable dwelling place. Its inhabitants are loyal, and even during the depression of the past winter, have believed that its future was secure, its foundation as solid as that of the hills and mountains that surround it.

O. W. DAVIS, JR.,  
Secretary Mingo Mountain Coal and Coke Company.  
MIDDLESBOROUGH, Ky., March, 1892.

#### THE LATE HENRY WADSWORTH CLARKE.

Thirty-six years ago Henry Wadsworth Clarke was my classmate in the high school at Syracuse, N. Y., where he continued to reside until his death, which occurred, after many months of pain, on the 23d of February last. During this long period we met but seldom; but the ancient friendship was maintained by correspondence, and each of us followed with interest the doings of the other.

Mr. Clarke adopted the profession of a civil engineer, in which he rose to distinction. His work as the engineer in charge of the resurvey of the State boundary between New York and Pennsylvania (1877 to 1886) and between New York and Pennsylvania (1881-2) commanded the confidence of all parties interested, a conspicuous proof of which was furnished by the willingness of the representations of the other States named to accept as conclusive the determinations he had made. His successive reports of this work have been analyzed in the *ENGINEERING AND MINING JOURNAL*, and have received the high praise which they deserved.

Apart from a creditable military career during the war of the Rebellion, and a political activity which was approved by many successive re-elections to important administrative office, Major Clarke's life was devoted to the labors of his profession, in which he took a keen interest and delight. His death removes a patriotic citizen, a skillful workman, a loyal friend, an honest man.

R. W. RAYMOND.

#### WHY DIP IS MORE LIKELY TO BE REGULAR THAN STRIKE WITH FISSURE VEINS.

Written for the Engineering and Mining Journal by Albert Williams, Jr., M. E.

Faults may throw a vein out of plane as to either dip or strike, or both; perhaps more frequently the former. But, barring the effects of faulting, experience has shown that most fissure veins are tolerably uniform in their downward trend, while more or less wavy in their horizontal course, and that the dip often remains constant even where the average strike may be distorted by large scallopings. Reference here is not to the outcrop, which may be apparently twisted from the real course by the manner in which the topographical contours cut the plane of the vein, but to the flexures shown underground, where no such cause misleads observation. The splitting of veins into offshoots and the irregularities where two parts of a vein widen apart to inclose a horse, also occur in such ways as to affect both dip and strike; or either; but again the effect is more commonly to deflect the strike than the dip. While there are few positive laws thus far established regarding ore deposits (about the safest deduction of all being that what we do not know about them far exceeds what we do), the characteristics just referred to seem to be sufficiently frequent to have some significance; and though this frequency may not be enough to lead to anything that could be fairly called a law, yet even if it is established in a preponderance of cases only—and this at least may be conceded—it has a direct bearing upon the choice of plan to be adopted in mining where not much is known in advance as to the character of the ground to be opened. Probabilities are certainly better than nothing to work upon.

If, then, it is really true that the dip of fissure veins is likely to be more reliable in point of uniformity than their strike, the question naturally comes up, Why should this be so?

The most satisfactory answer seems to be that a large proportion of the veins are on the lines of *fault* fissures. This is pointed to by the occurrence of smooth walls, slickensides and clay selvages, which perhaps might also be accounted for by assuming small movements of the ground up and down during a long time, where the throw is not large enough to be dignified by the name of fault, but when these marks are very pronounced and there is found besides in the vein crushed rock indicating violent disturbance, the testimony becomes stronger, and when, as sometimes (though rarely) happens, the amount of throw can be measured and disjointed rock formations actually matched, then the evidence becomes conclusive. As to such veins as most probably were filled by hot ascending solutions, on the solfataric theory, there are parallel examples in the case of existing thermal springs (whether metalliferous or not), for these are often found in lines along the tops of evident fault fissures. Now, faulting means a movement more in an up-and-down direction than in any other. This being so, it is easy to understand why, when a rupture of rock masses has taken place, one being heaved up or the other slid down, or both walls moving in opposite ways or in the same direction, but with different degrees of motion, the fracture along the line in which the force was applied should have been more or less straight, while in other directions the result might have been a warped surface, since there the line of least resistance would be determined rather by the character of the ground than by the direction of effort, that is, where the impulse was most intense the break would be a clean one, whereas sidewise it might be irregular. Indeed, if it is conceivable that, in faulting, the up-and-down surfaces might have split off in waves, the continuance or renewal of the movement would cause the walls to act upon each other like huge planing machines, or rather like two slabs which the stone-dresser is surfacing, thus grinding off the inequalities with irresistible power and leaving the wall faces smooth and slickensided, with broken rock in the vein and clay gouges along the edges, just as in fact they are seen in the distinctly typical fissure veins.

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

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

At the request of the Alloys Research Committee I began in April, 1890, to investigate the effects of small admixtures of certain elements on the mechanical and physical properties of iron, copper, and lead. The committee desired me to extend an investigation I had previously made upon the application of the "periodic law" of Newlands and Mendeleef to the mechanical properties of metals. This law, as originally expressed, states that "the properties of the elements are a periodic function of their atomic weights." It had already been shown that the effect of impurities added to gold is nearly proportional to their atomic volume, the larger the volume of the atom the greater being its effect;† and it became interesting to determine whether this holds good for other metals.

The committee considered it desirable that iron should be the metal first examined; but the problem has fortunately been attacked by M. Osmond,‡ the results of whose recent investigations have gone far to show that there are two distinct varieties of pure iron, the  $\alpha$  or soft and the  $\beta$  or hard form; and further that the action of impurities on iron does appear to be in accordance with the periodic law. The foreign elements, whose influence on the critical points of iron he has studied experimentally with more or less completeness, are ranged as follows in two columns in the order of their atomic volumes, found by dividing their atomic weight by their specific gravity:

I.	II.
Carbon..... 3.6	Chromium..... 7.7
Boron..... 4.1	Tungsten..... 9.6
Nickel..... 6.7	Silicon..... 11.2
Manganese..... 6.9	Arsenic..... 13.2
Copper..... 7.1	Phosphorus..... 13.5
	Sulphur..... 13.7

He points out "that the elements in column I., whose atomic volumes are smaller than that of iron (7.2), delay during cooling *ceteris paribus* the change of  $\beta$  or hard iron into  $\alpha$  or soft iron, as well as that of "hardening carbon" (*carbone de trempe*) into "carbide carbon" (*carbone de recuit*). For these two reasons they tend to increase, with equal rates of cooling, the proportion of  $\beta$  or hard iron that is present in the cooled iron or steel, and consequently the hardness of the metal. Indeed their pres-

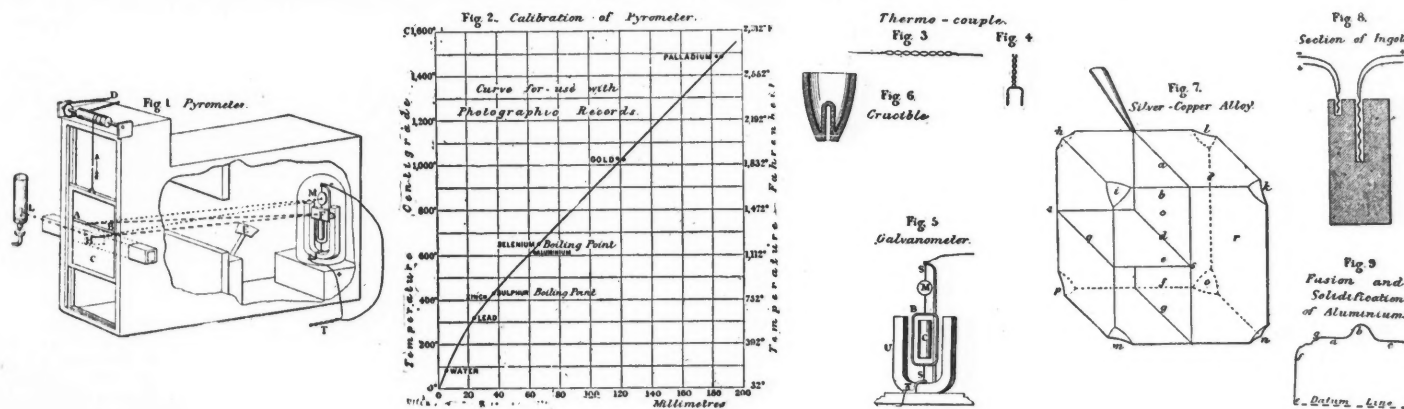
is effected by the presence of impurity, may enable the cooling gold to assume a crystalline structure which is detrimental to its tenacity, if not destructive of it.

The difficulties of obtaining for mechanical tests masses of iron with only definite amounts of a single impurity are very great, and it is therefore very difficult to extend Osmond's research; but of the practical importance of his experiments there can be no question, and their full significance may become more apparent by investigating the action of impurities on some other metal, the behavior of which suggests strong probability that it can exist in an allotropic state. In view, however, of the importance of Osmond's research, it was considered desirable to confirm his main results, adopting an independent method of observation, as will be stated subsequently.

Lead, which is one of the metals the committee selected for investigation, probably exists in more than one modification. Muschenbroeck and afterward Guyton de Morveau\* showed that the cohesive force or tenacity of lead is increased by hammering or drawing; and the latter speaks quite clearly of molecular strain produced by the mechanical treatment. Bolley† has shown that "chemically active" lead may be prepared by electrolytic action; and W. Spring‡ has gone far to show that the polymerization (or increase in the number of atoms in a molecule) of lead-tin alloys may take place at temperatures below their melting points. The observation made by Coriolis,§ that lead increases in hardness by successive meltings, even if protected from oxidation, may not be without significance. I have made a great many experiments on the mechanical properties of lead as affected by a small quantity of impurity; but as yet it has not been found possible to obtain definite or even concordant results. The tenacity and extensibility of lead seem to be greatly influenced by the temperature at which the metal is cast; and the difficulty of avoiding the presence of flaws and blow holes is very great. This portion of the inquiry has therefore been set aside for the present, as it is probable that more valuable evidence of allotropic changes will be afforded by thermal than by mechanical measurements.

PYROMETER.

In order to carry out the investigation a really trustworthy pyrometer is required. The admirable investigations of Callendar|| with the pyrometer of Siemens have restored the confidence in it which had been



ence is equivalent to more or less energetic hardening produced by rapid cooling. On the other hand, elements whose atomic volumes are greater than that of iron (column II.) tend to raise, or at least to maintain near its normal position during cooling, the temperature at which the change of ( $\beta$ ) hard to ( $\alpha$ ) soft iron takes place. Further, they render the inverse change during heating more or less incomplete, and usually hasten the change of dissolved or "hardening carbon" to "carbide carbon." Thus they maintain iron in the ( $\alpha$ ) soft state at high temperatures, and must therefore have the same effect in the cooled metal. In this way they would act on iron as annealing does, rendering it soft and malleable, did not their individual properties, or those of their compounds, mask this natural consequence of their presence. The essential part played by foreign elements alloyed with iron is therefore either to hasten or to delay the passage of iron during cooling to an allotropic state; and to render the change more or less incomplete, in one direction or the other, according to whether the atomic volume of the added impurity is greater or less than that of iron. In other words, foreign elements of low atomic volume tend to make iron itself assume or retain the particular molecular form which possesses the lowest atomic volume, while elements with large atomic volume produce the inverse effect.

It will be evident that if iron itself can exist in two widely different states, each with properties of its own, the mechanical properties of given samples of iron and steel must depend upon the relative proportions of the two modifications of iron present in the mass. And it will also be evident that the nature of the influence of impurities on iron is far more complicated than in the case of gold, their primary effect on iron being either to hasten or to delay the passage of the metal from its normal state to another, which possesses widely different molecular aggregation, and consequently different properties. In the case of gold, it is possible that the molecular constitution of the precious metal is simpler than that of iron; each molecule may consist of but few atoms, and therefore there may not be the same scope for pronounced change of properties which could follow re-arrangement of atoms in the molecules. The action of an impurity may probably be more direct in the case of gold, as its influence is not initially exerted in re-arranging the atoms in a molecule, but in affecting the mutual relations of the molecules themselves. Or it may be that the lowering of the freezing point, which

shaken by a report of a committee of the British Association.¶ The action of this instrument depends on the variation of resistance presented by a heated platinum wire placed in one branch of a divided circuit, and it is trustworthy for temperatures up to 500° C. or 900° F. Messrs. Callendar and Smith\*\* have shown that with platinum resistance thermometers a degree of accuracy of the order of 0.01° C. or 0.02° F. may be attained at temperatures between 100° and 450° C. or 212° and 840° F.

In the present investigation it is necessary to measure much higher temperatures; and fortunately an accurate method is at hand. Early in 1889 I had occasion to employ the pyrometer devised by M. H. Le Chatelier, and was satisfied as to its being extremely trustworthy and convenient up to temperatures over 1,000° C. or 1,800° F. The instrument in fact enabled me to confirm the fundamental observations of M. Osmond respecting the critical points of iron and steel, and to demonstrate the results in a lecture delivered before the members of the British Association in September, 1889.†† Le Chatelier's pyrometer I believe had not previously been employed in this country and it may be well to describe it in some detail, as such an instrument has long been needed, and can hardly fail to be of much use to engineers. The pyrometer‡‡ consists of a thermo-couple of platinum, and platinum containing 10% of rhodium. Thermo-couples have long been used; but, as is pointed out by Barus§§ in an elaborate memoir only recently published, the earlier investigators unfortunately employed unsuitable metals, iron and palladium, which, from the readiness with which they absorb gases and consequently undergo molecular change, are of all metals probably the least suited for thermo-electric pyrometry. Osmond's work alone would show that iron is specially unsuitable for high temperature thermo-couples. Le Chatelier's pyrometer is based on the measurement of the electric current produced by heating a thermo-junction inserted in a circuit with a galvanometer of considerable resistance. As already stated, this thermo-couple consists of two wires, each about 0.5 mm. or 0.02 inch diameter, one of which is of pure platinum and the other of platinum containing 10% of rhodium. The junction of the wires may simply be effected by twisting them together in either of the forms indicated by the sketches, Fig. 3 or Fig. 4.

\* Report to the Alloys Research Committee, British Institution of Mechanical Engineers.  
 † Philosophical Transactions of the Royal Society, Vol. 179, 1858, pp. 339.  
 ‡ Comptes Rendus, Vol. cx., 1890, pp. 346. The results of his experiments are given in detail in the Journal of the Iron and Steel Institute, 1890, part 1, p. 38.

¶ Annales de Chimie, Vol. lxxi., 1809, pp. 189-199. † Liebig und Kopp, Jahresbuch, 1849, p. 278. ‡ Bulletin de l'Académie Royale de Belgique [3], Vol. xi., No. 5, 1836.  
 § Annales de Chimie et de Physique, Vol. xlv., 1836, p. 103. ¶ Philosophical Transactions of the Royal Society, Vol. cxxxviii., 1887, p. 161. † Report of the British Association, 1874, p. 242. \*\* Proceedings of the Royal Society, Vol. xlvi., 1890, p. 220.  
 †† Nature, vol. xli., Nov., 1889, pp. 11, 32. ‡‡ Journal de Physique, vol. vi., Jan., 1887, p. 23. §§ Bulletin of the United States Geological Survey, No. 54, 1889.

The junction may be welded, or soldered with gold, no flux being used; but neither of these methods seems to possess any advantage over a double twist. This junction may be viewed as a battery; for when it is heated a current of electricity is generated, no other source of electricity being employed. It is asserted that even long wires of the platinum-rhodium alloy are homogeneous, and therefore do not give rise to subsidiary currents, which would disturb the effect of the main current produced by heating the junction; but very careful experiments to determine whether this is the case have yet to be made. From analogy with platinum-gold alloys, it may be doubted whether the platinum-rhodium alloy is of absolutely uniform composition. The thermo-electric properties of platinum-rhodium wire are said to be hardly altered by stress, or by exposure to rapid alternations of temperature; nor does the nature of the gaseous atmosphere in which the couple is placed appear to render its action untrustworthy. The present experiments have shown that the wires must certainly be protected from the vapor of silver, or from contact with carbon or silicon. The free ends of the platinum and platinum-rhodium wires are soldered to copper terminals, which are kept at a constant temperature by being plunged into test tubes, filled with alcohol and immersed in water, the temperature of which can be observed with a thermometer. The thermo-couple measures the difference of temperature between its heated junction and the copper terminals.

The galvanometer which appears to be best suited for use in connection with the couple is a reflecting dead-beat one, which bears the names of Dèprez and d'Arsonval; it is now well known in this country. That employed in the following experiments\* has an internal resistance of 200 ohms. The arrangement of the several parts is shown in Fig. 5, in which *U* is a magnet, *B* a coil of wire suspended by a german silver wire *SS* and moving freely round an iron core *C*, and *M* is a mirror carried by the same wire *S*. The steadiness of the spot of light upon the screen when the circuit is closed is remarkable.

GRADUATION OF PYROMETER.

The electromotive force produced by heating the thermo-junction to any given temperature is measured by the movement of the spot of light on the scale graduated in millimetres. A formula for converting the divisions of the scale into thermometric degrees is given by M. Le Chatelier; but it is far better to calibrate the scale by heating the thermo-junction to temperatures which have been very carefully determined by the aid of the air thermometer, and then to plot the curve from the data so obtained. Many fusion and boiling points have been established by concurrent evidence of various kinds, and are now very generally accepted. The following table contains certain of these:

Deg. F.	Deg. C.		Deg. F.	Deg. C.	
212	100	Boiling point of water.	1,733	945	Melting point of silver.
618	326	Melting point of lead.	1,859	1,015	" " potassium sulphate.
676	358	Boiling point of mercury.	1,913	1,045	" " gold.
779	415	Melting point of zinc.	1,929	1,054	" " copper.
838	448	Boiling point of sulphur.	2,732	1,500	" " palladium.
1,157	625	Melting point of aluminum.	3,227	1,775	" " platinum.
1,229	665	Boiling point of selenium.			

The known temperatures employed for calibrating the thermo-junction referred to in this report are the boiling point of water 100° C., the melting points of lead 326°, zinc 415° and aluminum 625°, the boiling points of sulphur 448°, and selenium 665°, and the melting point of potassium sulphate 1,015°. The melting point of silver, 945°, is one of the points which rests on more evidence than any other; I find, however, that when it is carefully determined and interpolated in the curve, the number is only 920° C.; this is doubtless owing to retention of gas by the metal. The melting point of gold, 1,045° C., and Violle's† determination of that of palladium, 1,500°, are generally accepted. These several fixed temperature have been used as the basis of the calibration.

In Fig. 2 these temperatures are taken as ordinates, while the abscissæ are the deviations of the spot of light which marks the temperature at the thermo-junction. It will be evident, since these points fall so close to an even curve, that much confidence may be placed in the trustworthy nature of the pyrometer. It may be noted that the position here marked for the boiling point of water, namely at about 90° C., is of course not the true boiling point of water, but is the difference between the true boiling point, 100° C. and the observed temperature 10° C. of the cold junction of the pyrometer. In the various determinations the latter temperature varied from 10° to 15° C., or 50° to 60° F.

It was hardly to be expected that the determination of the melting point of palladium would yield a figure which falls so fairly into line with lower melting points; and it may be well to add a few details as to the manipulation. A globule of palladium weighing about 2 grammes or 30 grains may readily be melted by placing the metal in a cavity in a sound piece of charcoal. The charcoal near the button is ignited, and a stream of oxygen from a fine clay tube about 1 mm. or 0.04 inch diameter is directed into the cavity. A very manageable source of intense heat is thus obtained; and a fused globule of gold or palladium may be tilted on to the junction conveniently placed in the cavity, and then allowed to cool there. The globule may in fact be melted on or shaken off the junction as readily as a drop of wax; and the slight arrests of the spot of light, which mark the true points of fusion and solidification, can readily be detected by a practiced observer. It has already been shown by M. Le Chatelier that soldering the junction with gold in no way diminishes its sensitiveness; and this appears to be true of palladium. The wires, however, after brief exposure to the alloying metals at this very high temperature, rapidly become destroyed and broken. In some cases, as in that of determining the melting point of potassium sulphate, the thermo-junction may be plunged without covering into the midst of the mass, which is gradually being raised to its fusion point. In the case of a metal, the thermo-junction may either be surrounded by a portion of the metal; or a strip or globule of the metal may be placed in a crucible filled with some substance difficult of fusion—silica or calcined magnesia—in close proximity to the thermo-junction. The temperature is very gradually and steadily raised, until the metal begins to fuse; a Fletcher oxygen furnace answers well. The moment at which fusion begins is indicated by an arrest in the movement

of the spot of light, followed, if the mass of metal be small, by a rapid forward movement when the fusion is complete. The point that the spot of light has attained on the graduated scale at the moment of its arrest is the point to note as the melting point of the metal. A little practice will enable this point to be readily determined; but all uncertainty in the matter is removed by reducing the spot of light to a fine vertical line and securing a photographic record of its movement.

The following plan may therefore be recommended when a high degree of accuracy is required. The vertical line of light, from an argand gas burner *L* and mirror *H*, Fig. 1, is reflected from the mirror *M* of the galvanometer, and is allowed to fall upon a sensitized plate through a carefully adjusted horizontal slit *AB*; Eastman's gelatine films have been found to answer well. The slit entirely crosses the plate, which is made to travel upward at a uniform rate by gearing *D* driven by clock-work; the regularity of the rate of travel may be tested by a time-signal in seconds, produced by periodically obscuring, by the interrupter *E* worked by a clock, the light from a second fixed mirror *F* placed immediately below the suspended mirror *M* of the galvanometer, so as to send a fixed beam of light to the zero of the galvanometer-mirror scale, that is, to the further end of the horizontal slit *AB*. The amplitude of the deflection of the galvanometer-mirror *M* will of course depend on the temperature to which the thermo-junction *T* is heated. The same source of light illuminates both mirrors; and the result is, first, a beaded datum-line from the intermittent light of the fixed mirror *F*, which gives the rate of travel of the plate; and second, a continuous curve which is photographically traced by the line of light from the galvanometer mirror *M*, this photographic curve being the resultant of the movements of the tiny spot of light and of the sensitive plate.

The nature of the photographic curve in the case of a melting point may be illustrated by that which represents the fusion and solidification of a mass of aluminum weighing 10 grammes or 150 grains. The thermo-junction was in this case protected by a thin covering of pipe clay 1 mm. or 0.04 in. thick. While the plate is at rest the spot of light traces the straight line *ef*, Fig. 9; then as the plate advances it traces the somewhat sinuous curve *fg*, owing to the necessarily irregular heating of the mass of metal; but it is arrested at *a* when fusion begins, and a line parallel to the datum line is traced until the mass is fluid, when the temperature is raised above the melting point, as is shown by the portion of the curve marked *b*. The gas being then turned off, the metal cools and freezes, as is indicated by the second arrest *c*, at a point slightly below its melting point.

It will be evident that a chronographic record might replace the photographic one. In fact, in beginning the investigation the chronographic method was employed. The time taken by the spot of light from the galvanometer to pass each division of a transparent graduated scale was noted on the paper ribbon of a delicate Bain instrument by an electric signal, side by side with a series of electric time signals from a clock beating half-seconds. This method, though very delicate, involves much labor in the translation of the ribbon and in plotting the curves, and is therefore much less convenient than the photographic one, which gives a curve automatically.

(To be continued.)

SENATOR STEWART'S GOLD MORTGAGES.

The New York *Evening Post* publishes in its issue of the 5th inst. the following list of mortgages held by Hon. William M. Stewart, of Nevada, one of the most persistent advocates of free coinage in the United States,

The following mortgages given to William M. Stewart, of Nevada, certified by Rod. W. Church, County Recorder, Alameda County, Cal., dated Oakland, Cal., March 23, 1892:

Mortgage Record.	Mortgagor.		Date of Mortgage.	Amo't.	Payable in
	Book.	Page.			
1..	405	453	Wm. C. & Eliza Spencer.....	Oct. 20, 1891	\$400 Gold Coin
2..	376	281	George L. Field.....	Aug. 30, 1890	2,250 Lawful Money.
3..	375	233	Frederick L. Taylor.....	Dec. 1, 1890	879 Gold Coin
4..	375	237	Frederick L. Taylor.....	Dec. 1, 1890	585 Gold Coin
5..	375	241	John Owens.....	Dec. 1, 1890	573 Gold Coin
6..	375	245	John Owens.....	Dec. 1, 1890	573 Gold Coin
7..	375	249	Anna Roaben.....	Dec. 3, 1890	639 Gold Coin
8..	375	253	Louis W. Schroeder.....	Dec. 3, 1890	360 Gold Coin
9..	375	261	John B. Moisant.....	Dec. 2, 1890	561 Gold Coin
10..	375	257	Frederick Bauman.....	Dec. 3, 1890	591 Gold Coin
11..	375	265	George Brown.....	Dec. 5, 1890	676 Gold Coin
12..	375	269	George Brown.....	Dec. 5, 1890	2,559 Gold Coin
13..	375	273	George F. Taylor.....	Dec. 6, 1890	360 Gold Coin
14..	375	277	Romulus C. Galligo.....	Dec. 6, 1890	600 Gold Coin
15..	375	281	Geo. A. & Adelaide M. Courro.....	Dec. 9, 1890	900 Gold Coin
16..	375	285	Thos. Corbett.....	Dec. 9, 1890	999 Gold Coin
17..	375	289	Wm. F. Castman, Jr.....	Dec. 9, 1890	579 Gold Coin
18..	375	293	Reuben Ryder.....	Dec. 8, 1890	375 Gold Coin
19..	375	297	Adam Bloch.....	Dec. 8, 1890	610 Gold Coin
20..	375	301	John Becanne.....	Dec. 9, 1890	573 Gold Coin
21..	375	305	F. W. Van Sien.....	Dec. 10, 1890	1,065 Gold Coin
22..	375	309	George T. Wright.....	Dec. 10, 1890	2,127 Gold Coin
23..	375	321	George Brown.....	Dec. 17, 1890	339 Gold Coin
24..	375	325	Lorans Fjord.....	Dec. 15, 1890	372 Gold Coin
25..	375	329	George Vance.....	Dec. 16, 1890	456 Gold Coin
26..	375	337	Job Palter.....	Dec. 1, 1890	1,580 Gold Coin

Rob. W. Church, County Recorder, County Recorder's Office, Alameda County, Oakland, Cal., March 23, 1892.

The Salt Mines of Orenbourg, Russia.—About 45 miles distant from Orenbourg are found the largest deposits of rock salt in the Russian Empire. The exploitations situated at Iletz, in the Cossack territory, have been taken over by an Orenbourg company. These deposits of salt have been explored for more than three square versts. The thickness of the bed of salt is not yet determined, the borings having been abandoned at a depth of about 476 ft. The deposits were worked as open mines from 1806 to 1809; since then this method of working has been abandoned and the extraction made by pits. Two pits are sunk; the first serves for the extraction of the salt, the second for ventilation and the descent of the workmen. The working lasts the whole of the year. The number of workmen varies from 250 to 300, the wage does not exceed 80 copecks per day, and the annual production of the mine is about 1,500,000 poods.

\* Constructed by M. Carpentier, 20 Rue Delambre, Paris. † *Philosophical Magazine*, Vol. viii. (Series V.), 1879, p. 501, and Vol. xlii., 1832 p. 147; *Comptes Rendus*, Vol. lxxxix., No. 17, p. 702, 703.

## THE BUCYRUS AMALGAMATOR.

The Bucyrus amalgamator, which is now being introduced by the Bucyrus Steam Shovel and Dredge Company, of Bucyrus, O., consists of a strong wrought iron tank, lined with amalgam plates. In one end of the tank is mounted a revolving cylinder 78 in. in diameter, having openings in each end, through which the material is received and discharged. This cylinder is formed by two cylindrical screens, with an angular space between them, the inner screen being of heavy steel plate, with coarse holes punched in it, and the outer screen of fine wire cloth. Of the material dumped into the cylinder, the coarse gravel is retained by the inner screen and ejected by the revolving bucket in the discharge end of the cylinder. The finer gravel is retained by the second screen after passing through the first, and also ejected, while the sand and gold particles sift through both screens into the tank. The arrangement of screen cylinders and internal helix for conveying the material is shown in the accompanying drawings.

About one-third of the cylinder, being the part containing the material, is submerged in the tank, and the material to be treated is thereby subjected to thorough washing and tumbling during its passage through the cylinder. The length of the internal helix is 72 ft. and that of the outer helix is 120 ft.

The gold-bearing sand and gravel, after passing through the screens into the tank, tends to settle to the bottom, under the cylinder. It is prevented from doing so by jets of water issuing from small inclined nozzles in the bottom of the tank, which maintain the sand and gold in suspension, and which are so directed as to cast it repeatedly over the amalgam plates with which the tank is lined. Every particle is brought in this way, it is claimed, a great number of times in direct contact with the plates, so that none of the gold has a chance to escape. The same jets are so directed as to have the effect of working the sand toward the rear end of the tank, whence it escapes as tailings, through a suitable valve.

The pressure of water required for these jets is about 20 lbs. per square inch, and the quantity about 600 galls. per minute. By suitable arrange-

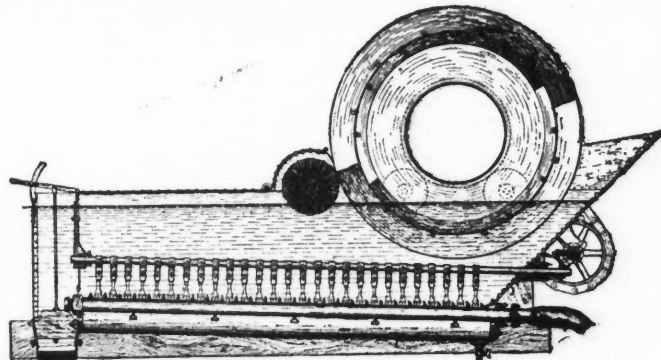


Fig. 1. - Longitudinal Section.

## THE BUCYRUS AMALGAMATOR.

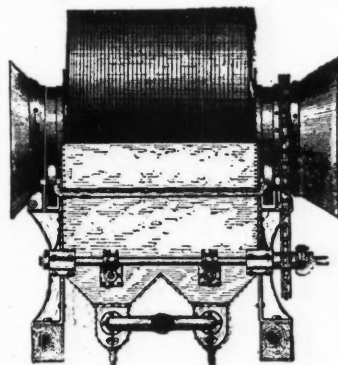


Fig. 2. - Cross Section.

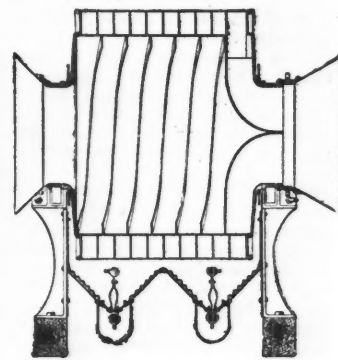


Fig. 3. - Longitudinal Section of Revolving Screen.

ment to drain off the tailings the same water can be used over and over again, only enough of a supply being necessary to make good the losses by seepage and evaporation.

## THE COEFFICIENT OF ELASTICITY OF NICKEL STEEL.\*

By E. Mercadier.

In 1887 and 1888 the author pointed out a method (founded on Kirchoff's theory of vibration of circular disks) by which it was possible to determine the ratio  $\frac{\lambda}{\mu}$  of Lamé's constants for any sonorous body, and, consequently, the value of its coefficient of dynamic elasticity. The application of this method to various specimens of commercial steel showed that only slight variations existed between them in respect of their elastic properties (using the word in its usual sense as referring to vibratory motions without permanent deformation). The ratio  $\frac{\lambda}{\mu}$  of their constants varied only about 5% above or below the mean value, and their coefficient of dynamic elasticity varied barely 1% from its mean value (20,700 at 15°). The ratio of the coefficients of dynamic and static elasticity for these specimens was about 1.035. They contained, however, less than 1% of foreign substances (carbon, silicon, phosphorus, sulphur and manganese).

Alloys of steel with chromium and nickel are now used for industrial purposes, and the proportion of nickel in these is sometimes as high as 25%. The author has examined the elastic properties of specimens of nickel-steel from Creusot, the specimens being in the form of circular disks which were reheated to a red heat after being cast. Nos. 1 and 2 contained 5.55% of nickel; Nos. 3 and 4, 25.01%. Disks 1 and 2 (although from the same melt) did not show the same degree of homogeneity, for the ratio  $\frac{\lambda}{\mu}$  had the value 2.29 for the first, and 1.60 for the second; the disks were far from being isotropic. On the other hand their coefficients of dynamic elasticity only differed by 2% from the mean value (19,922). The disks 3 and 4 were almost isotropic, their values for  $\frac{\lambda}{\mu}$  being nearly equal to unity. This remarkable result appears to indicate that the incorporation of nickel (in sufficient quantity) with steel tends to make it isotropic. At the same time it produces a considerable variation in the coefficient of dynamic elasticity, reducing it (for 3 and 4) to 18,600, whereas that of pure steel is 20,700 (a variation of 10%).

\* *Comptes Rendus*, 1891, 113, 3336.

The ratio of the coefficients of dynamic and static elasticity is 1.035 for pure steel, 1.17 for steel containing 5.55% of nickel, and 1.54 for steel containing 25% of nickel. Tests of the latter made in the manufactory by the ordinary static methods gave values of the coefficient varying from 12,000 to 6,000, according to the size of the specimen and the mode of treatment; the specimens yielded such very different results that under the circumstances it was impossible to regard the coefficient of static elasticity as having any real and determinate significance.

## MINERAL PRODUCTION OF THE UNITED KINGDOM IN 1891.

A synopsis of the statistics of the mineral production of the United Kingdom for the year 1891 has just been issued. The total quantity of all minerals raised during the year was 197,693,592 tons, as compared with 194,605,887 tons in 1890, being an increase for 1891 of 3,087,705 tons, or 1.59%. This total is divided as follows: Coal, 185,479,126 tons, against 181,514,288 tons in 1890; ironstone, 7,229,150 tons, against 8,117,476 tons; fire-clay, 2,394,065 tons, against 2,405,727 tons; oil shale, 2,352,471 tons, against 2,212,250 tons; other minerals, 238,780 tons, against 256,146 tons. The principal increase was in the output of coal, viz., 3,864,838 tons, while the chief decrease was in ironstone, viz., 888,326 tons. The total number of persons employed in and about all the mines of the United Kingdom in 1891, and inclusive of those employed on private branch railways and tramways, and in washing and coking coal on premises adjacent to and belonging to the mines, was 707,411, against 674,434 in 1890, an increase of 32,977. Exclusive of those employed in the latter capacity, the number of persons engaged was 687,878, of whom 5,819 were females, the aggregate increase being 32,581. The total number of fatal accidents was 961 (against 899 in 1890), and the total number of deaths caused thereby was 1,030 (against 1,206), being an increase of 62 in the number of fatal accidents, but a decrease of 176 in the number of lives lost. There was thus one fatal accident for every 716 employed against 729 in 1890, and one death for every 668 persons employed, th-

ratio being one in 543 during the preceding year. In the ten years from 1874 to 1883 the ratio of fatal accidents was one in 594, and of deaths one in 495, persons employed. Comparing the number of fatal accidents and deaths in coal mines with the tonnage of coal raised there was last year one fatal accident to every 217,007 tons of coal brought to the surface, and one death to every 201,934 tons; while in 1890 the ratios were one for every 226,023 tons and one for every 167,763 tons respectively.

**Utilization of Nickel Scrap.**—The object of a recent invention of the *Société de Laminage du Nickel*, says *Iron*, is the utilization of the waste of nickeled plates, or nickel-plated sheets of any metal, and by any process, for the manufacture of anodes for nickel-plating. The parings of nickeled plates being scoured by acid in order to dissolve the metal on which the nickel has been fixed, the latter remaining unattached, shavings or parings, more or less fine, of nickel in a pure state are obtained. These shavings can be reunited in linen, cotton, wool, silk, etc., bags, of suitable dimensions for placing in the nickel-plating baths. The shavings may, further, be reunited in nickel sieves, or in any manner whatever consistent with the more or less acid or basic condition of the bath. In any case, the total constitutes an anode presenting, in addition to the advantages of the ordinary anodes employed up to the present, that of offering a considerable surface combined with a light weight. This anode is therefore essentially favorable to an excellent nickel-plating. For the same reason the nickel-shavings, obtained in the manner indicated above, are in a favorable condition to be attacked by acids.

**Invention of the Steam Engine.**—An extraordinary archaeological find is reported (we know not with what accuracy) from Helsingfors, in Finland. It consists of a huge chest with complicated fastenings of iron, which, together with the other details of its structure, point to a date early in the middle ages. On being opened, the *St. James' Gazette* says, it was found to contain a quantity of ancient ironwork and a large roll of parchments, which were at once placed in the custody of M. Nicholas Rizeff, one of the chief magistrates of the town. The manuscripts begin with the following words: "Suger presb. abb. S. Dion dixit". Then comes a complete and detailed treatise in Latin on steam considered as a force and on its applications—in short, a very accurate discourse on modern physics. It is stated that the ironwork forms a rudimentary steam engine, the cylinders, pistons and other parts of which had been taken to pieces, but are wonderfully fashioned, considering their antiquity. Each piece bears the inscription, "Suger parens Gallie fecit." Suger was the well known administrator under both Louis VI. and Louis VII. During the absence of the latter in the Holy Land he acted as regent, and for his able services received from the King the title of "Père de la patrie." He himself died in 1152, when on the point of starting on a crusade.

THE DISSENTING OPINION BY MR. JUSTICE FIELD IN THE  
MIKE & STARR CASE.\*

I am unable to agree with my associates in the disposal of this case. The decision, and the opinion upon which it is founded, will do much, in my judgment, to weaken the security of patents of the United States for mineral lands, and leave them open to attack and overt row upon mere surmises, notions, and loose gossip of the neighborhood which ought not to interfere with any rights of property resting upon the solemn record of the government.

The controversy relates only to the Goodell lode claim set up in the first defense. The location certificate of this lode claim bears date on the 10th day of March, 1870, and recites that the claim was located on the 1st of February, 1879. The averment that its original locators, on the 1st of February, 1879, went upon the premises and sunk a shaft and run a tunnel thereon, which uncovered and exposed the vein, lode and deposit, and that they thereupon proceeded to locate the same, was not supported by the evidence produced. The location of the claim was not preceded by the discovery of the existence of the precious metals within it. The statute of the United States respecting mining claims upon veins or lodes of quartz or other rock in place, bearing gold and silver, declares that "no location of a mining claim shall be made until the discovery of the vein or lode within the limits of the claim located." (R. S., Sec 2320.) One of the locators, John Hayes, was examined as a witness, and testified that he helped the surveyor to survey the lode claims—the Goodell and Gardiner claims—and drive down the stakes; that afterward he filed the certificate of location; that he knew the discovery shafts of the claims, and had been in them; that there was no discovery of any vein or lode of valuable mineral deposits within them; and that those shafts were sunk in 1879. And the tunnel alleged to have been then run was commenced and completed years before.

On the 11th of March, 1879, the locators filed with the county clerk and recorder of Lake County—the county within which the alleged lode lies—a location certificate of the lode claim, and on the 13th of April, 1881, the defendant, which had succeeded to their interest, made application for a patent for the same. The plaintiff below and in this court, the Iron Silver Mining Company, filed in the Land Office its adverse claim to the application for a patent under assumed conformity with the provisions of section 2325 of the Revised Statutes, and this action is brought by that company to determine, as between the parties, the right to the possession of the land embracing this alleged lode in pursuance of section 2326. The case was tried before a jury, and the only direct evidence offered to show the existence of a known vein or lode bearing gold or silver within the placer claim was contained in the testimony as to the tunnel run, called the Mike tunnel, and discoveries made in it. It was shown that the tunnel was commenced in January, 1877, and completed on the 24th of April following. It extended 400 ft., but it disclosed within it only veins of decomposed porphyry and manganese iron. The statement that it intersected and crossed three veins is only correct in that they were veins of that character. There was no vein or lode of gold or silver-bearing rock found in the tunnel, and there is an erroneous impression conveyed by the opinion of the court in that respect. The material evidence in the record as to what was found in the tunnel is given in the note below from which it will appear, as stated above, that only veins of decomposed porphyry and manganese iron were found there. No gold or silver was discovered in it, except in one instance, and then merely a trace of gold at about 75 ft. from the mouth of the tunnel, from which only three-quarters of an ounce was obtained. This discovery did not establish the existence "of a lode, vein or deposit of mineral in quartz or other rock in place carrying carbonates of lead and silver," as averred in the answer of the defendant. It did not of itself constitute a vein or lode in gold or silver-bearing rock; it was loose gold and was not sufficient, of itself, to induce further work upon the tunnel, or even to lead to a location of a mining claim in it. From the completion of the tunnel up to the time when this case was on trial, extending over eight years and a half, no work was done upon the tunnel, nor was any attempt made to use it, or to develop any pretended mine in it. By the law there must have been a location upon the vein in it, if there was one, before any right to such vein could be initiated; and had such location been made, the right thus acquired was lost and forfeited by abandonment years before this action was commenced. But as I shall show hereafter, the mere indication or presence of gold or silver is not sufficient to establish the existence of a lode. The mineral must exist in such quantities as to justify expenditure of money for the development of the mine and the extraction of the mineral. It would create surprise among miners to be told that a trace of loose gold, such as is shown here, was found at any one spot in a tunnel leading to a placer claim, it would establish the existence of a vein or lode in the placer claim, and form the basis of a proceeding to despoil a purchaser from the patentee, years after the purchase, of a large portion of its mining property.

Evidence was also offered against the objection of the plaintiff to show that there were other lodes in the vicinity of the placer claim of the plaintiff and also of the placer claim of Wells and Moyer; and also that parties in the neighborhood believed—not that they knew—that there was a vein or lode lying under those placer claims, and also of conversations in 1877 with one Stevens, who acquired his interest by purchase with one Leiter from the patentee more than a year after the patent was issued, as to his opinion of the existence of mineral at a place where he had at the time men at work, and "underlying all the ground there;" but it was not shown that the place thus loosely designated embraced the premises in controversy.†

The jury found for the defendant. To reverse the judgment entered upon its verdict the case was brought to this court on writ of error.

The contention between the parties to this action is as to which of them is entitled to the possession of the land embracing the alleged lode claimed

\* This opinion, like that of the majority of the Court, published by us March 26th, relates to "Case No. 2," involving the "Goodell" lode; and both the majority and the minority of the Court treat Case No. 3, involving the "Gardiner" lode, as presenting the same points of law and the same testimony, and therefore requiring the same decision.

† At this point the whole of the evidence concerning a lode (evidently the alleged "Gardiner" lode) is cited in a foot note.—ED. E. AND M. J.

by the defendant. In the case of the same plaintiff against Campbell and others, recently decided (135 U. S., 286), it was held that to an application for a patent for a lode claim within the boundaries of a patented placer claim, the holder of the patent was not bound under the statute to interpose any objections he might have; that such objections were required only from parties seeking a right to a patent as against the lode claimant, and not from one who already had a patent. But before that decision was made, the plaintiff here had interposed objections to the application of the lode claimant, setting up his adverse claim to the premises under the placer patent; and the present action has followed that proceeding, the plaintiff supposing that it was bound, in order to protect its rights, to interpose and set up its adverse claim.

Assuming that the plaintiff is thereby estopped from denying its obligation to contest the right of the lode claimant in this way—which may well be doubted—I proceed to consider the questions presented for a reversal of the judgment obtained.

The presumption in favor of its validity attends the placer patent, as it does all patents of the government of any interest in the public lands, which they purport to convey. So potential and efficacious is such presumption that it has been frequently held by this court, that if under any circumstances in the case the patent might have been rightfully issued, it will be presumed as against any collateral attack, that such circumstances existed. (*Smelting Mining Co. v. Kemp*, 104 U. S., 636, 646.) As was said by the Circuit Court in the *Eureka Case*, a patent for a mining claim is iron-clad in its potency against all mere speculative interferences. (*Sawyer*, 302.) The burden of proof therefore rested upon the defendant to show affirmatively that it was entitled, as against that patent, to the possession of the lode claim, on the ground that the lode was excepted from the patent in express terms.

A lode claim of the same richness as a placer claim is of much greater value than the difference in price per acre fixed by the government. By the depth to which such a lode usually extends a much larger quantity of mineral is obtained from it than from a placer claim covering the same extent of surface ground; it is, therefore, as a general rule, far more remunerative. As the lode claim of the defendants in this case embraces a little over ten acres, it is difficult to believe that the applicant for a placer claim embracing it, if it was known to exist at the time, would have neglected to apply for it, when it could have been obtained at the trifling expense of twenty-six dollars. The possibility of others invading the placer boundaries, if within them there was a known vein of lode, would naturally have been the occasion of much uneasiness to the owners of the placer claim, to avoid which we may well suppose they would readily have incurred expenses vastly above the government price of the lode claim. Clear and convincing proof would seem, therefore, to be necessary to overcome the presumption thus arising, that the applicant for the placer patent did not know at the time of the existence of any such lode. Especially would this seem to be required where, as in the present case, knowledge of such lode by the patentee is averred only after the mine patented has passed into other hands, and extensive explorations have been made and large expenditures incurred in developing it, in supposed possession of the title to the entire property.

The exceptions to the operation of the patent are founded upon section 2333 of the Revised Statutes, which is as follows:

"Where the same person, association, or corporation is in possession of a placer claim, and also a vein or lode included within the boundaries thereof, application shall be made for a patent for the placer claim, with the statement that it includes such vein or lode, and in such case a patent shall issue for the placer claim, subject to the provisions of this chapter, including such vein or lode, upon the payment of five dollars per acre for such vein or lode claim, and 25 ft. of surface on each side thereof. The remainder of the placer claim, or any placer claim not embracing any vein or lode claim, shall be paid for at the rate of \$2.50 per acre, together with all costs of proceedings; and where a vein or lode, such as is described in section 2320, is known to exist within the boundaries of a placer claim, an application for a patent for such placer claim which does not include an application for the vein or lode claim shall be construed as a conclusive declaration that the claimant of the placer claim has no right of possession of the vein or lode claim; but where the existence of a vein or lode in a placer claim is not known, a patent for the placer claim shall convey all valuable mineral and other deposits within the boundaries thereof."

This section, as we have said on more than one occasion, makes provision for three distinct classes of cases:

1. Where one applies for a placer patent, who is at the time in the possession of a vein or lode included within its boundaries, he must state the fact, and then, on payment of the sum required for a vein or lode claim and 25 ft. on each side of it at \$5.00 per acre, and \$2.50 an acre for the placer claim, a patent will issue to him covering both claim and vein or lode.

2. Where a vein or lode, such as is described in a previous section of the Revised Statutes—that is, of quartz or other rock in place bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposits—is known to exist at the time within the boundaries of the placer claim, the application for a patent, therefore, which does not also include an application for the vein or lode, will be construed as a conclusive declaration that the claimant of the placer claim has no right of possession to the vein or lode.

3. Where the existence of a vein or lode in a placer claim is not known at the time of the application for a patent, that instrument will convey all valuable mineral and other deposits within its boundaries. (*Iron Silver Mining Co. v. Reynolds*, 124 U. S., 374, 382; also *Reynolds v. Iron Silver Mining Co.*, 116 U. S., 687, 696.)

In *Iron Silver Mining Co. v. Reynolds* (116 U. S. 687, 692), the court, after stating the substance of this section, added that it was not easy to define the words "known to exist" in the act, stating that it was not necessary to inquire in that case whether this knowledge must be traced to the applicant for the patent, or whether it was sufficient that the existence of the lode was generally known; and what kind of evidence was necessary to prove this knowledge, and observing that it was perhaps better that these questions should be decided as they arose. They did not arise there because the court took the evidence from the jury on the ground that the defendants were trespassers.

When the same case was again before the court at October Term, 1887, it was expressly held that the statute did not except veins or lodes "claimed or known to exist" at the date of the patent, but only such as were "known to exist," and that it fixed the time at which such knowledge was to be had as that of the application for the patent. (*Iron Silver Mining Co. v. Reynolds*, 124 U. S., 374, 382.) The same doctrine was declared in *United States v. Silver Mining Co.* (128 U. S. 673, 680).

To bring, therefore, a vein or lode of quartz or other rock in place bear



ing precious metals within the exceptions of the statute, and of course within those of the patent to the extent to which they are operative, the vein or lode, according to the decisions referred to, must have been known to exist at the time application was made for the patent. The applicant could not, of course, speak of discoveries not then made; necessarily, his knowledge must have been limited to the time of his application. The court below, however, held that it was sufficient if the lode in controversy was known to exist at the date of the patent, and not at the date of the application for it. It stated expressly that it would not enter into any consideration of the validity of the exceptions made in the patent, whether they conformed to the statute or not, but would follow the patent, and so ruled during the whole trial, both in the admission of testimony and in the instructions to the jury, giving them to understand in the most explicit terms that if a lode was discovered and a location made before the issue of the patent for a placer claim, that lode was excepted from the patent, although such discovery and location were made subsequent to the application for the patent.

In thus holding there was a plain departure from the express and repeated decisions of this court, for which error alone the judgment ought to be reversed. The ruling could not have failed to mislead the jury, and to direct their attention to matters not properly open for their consideration. But independently of this error, there were material objections to evidence admitted on the trial to establish the existence of this supposed lode even upon the theory of the court below as to the time when such existence must have been known, and to its instructions upon portions of such evidence, and to its refusal to order a verdict for the plaintiff upon the grounds stated.

At the outset of this case it becomes important to determine what is meant by a "known lode" within the purview of the statute, which, if not applied for by the patentee, is excepted from the patent; and also when a right to such a lode is initiated by a claimant, and to that consideration I will not direct attention. And first, what is meant by a lode or vein of quartz or other rock in place bearing gold or silver? The first reported case in which a definition was attempted is the *Eureka Case*, (4 Sawyer C. C. 302, 311.) The court, after observing that the word was not always used in the same sense in scientific works on geology and mineralogy, and by those actually engaged in the working of mines, said: "It is difficult to give any definition of the term as understood and used in the acts of Congress, which will not be subject to criticism. A fissure in the earth's crust, an opening in its rocks and strata made by some force of nature in which the mineral is deposited, would seem to be essential to the definition of a lode in the judgment of geologists. But, to the practical miner, the fissure and its walls are only of importance as indicating the boundaries within which he may look for and reasonably expect to find the ore he seeks. A continuous body of mineralized rock lying within any other well-defined boundaries on the earth's surface and under it, would equally constitute, in his eyes, a lode. We are of opinion, therefore, that the term, as used in the acts of Congress, is applicable to any zone or belt of mineralized rock lying within boundaries clearly separating it from the neighboring rocks." And this court in *Iron Silver Mining Company v. Cheeseman* (116 U. S. 530, 534), followed this citation by observing: "This definition has received repeated commendation in other cases, especially in *Stevens v. Williams*, 1 McCrary, 480, 488, where a shorter definition by Judge Hallett, of the Colorado Circuit Court, is also approved, to wit: 'In general it may be said that a lode or vein is a body of mineral, or mineral body of rock within defined boundaries in the general mass of the mountain.'" To constitute, therefore, a known lode, within the meaning of the statute, a belt or zone of mineralized rock lying within the boundaries clearly separating it from the neighboring rock must not only be ascertained, but must be so far developed or defined as to be capable of measurement. A right to a lode can only be initiated by location, and the statute declares that no location can be made until the discovery of a lode or vein bearing metal. And to embrace the lode within the patent of a placer claim the applicant must, if it be known, pay for it at the rate of five dollars per acre. But he cannot pay any sum, or offer to pay so as to be effectual, until he can ascertain the number of acres contained in the lode claim desired, that is, until the ground can be measured. Nor could the officers of the land department accept any sum from the applicant until such measurement, upon a mere speculative opinion as to the extent of the supposed lode. In *Sullivan v. Iron Silver Mining Company* (109 U. S. 550) this question was considered by the Circuit Court, but was not passed upon by this court, it not being deemed to necessarily arise on the pleadings. The plaintiff in that case had brought an action upon a patent for a placer claim. The defendant had located within it a lode claim after the patent was issued, and he set up in defense that the lode was known to the patentee at the time of the application of the patent, and, not having been embraced in it was by the statute excluded from the patent. The plaintiff demurred to this answer, and the court held it was insufficient in not averring that the lode had been discovered and located or recorded at the time of the application. But this court, without passing upon the necessity of such location or record, held that as a matter of pleading it was sufficient to aver that the lode was known to exist by the patentee at the time of his application for a patent, and was not included in his application, observing that, by the elementary rules of pleading, facts may be pleaded according to their legal effect, without setting forth the particulars that lead to it. The question as to what constitutes a known lode remained, therefore, unaffected by that decision.

For the reason stated above it would seem that not merely must a discovery of mineral be made to constitute a known lode within the meaning of the statute, but that such development of its extent must be made as to enable the applicant to comply with the law in tendering the requisite price. The Circuit Judge, Mr. McCrary, who rendered the judgment of the Circuit Court, thus reversed on a point of pleading, felt that the construction placed by him upon the statute was the only one which made it consistent with itself or practicable in application:

"The first thing," he observes, "that strikes us as important in the construction of this language (of section 2323) is that we are referred back to section 2320 for a description of the vein or lode which is referred to, and which is not to pass to the patentee, unless he has complied with this provision of the statute: 'Where a vein or lode, such as is described in section 2320.' What sort of vein or lode is described in section 2320?"

"By reference to that section, we see that it relates entirely to vein or lode claims, and that the description which it contains is a description of the metes and bounds of a vein or lode claim, . . . not the lode simply, but a lode claim; one that has

been located; which has boundaries, which has been developed; it gives us its dimensions; it declares it shall have been located; it says it shall be a claim in which there has been a discovery of mineral, etc.

"I am of the opinion that a vein or lode that has never been claimed, that has not been located, that has not been marked out by metes and bounds, and in which there has been no actual development, or, to use the language of the statute, 'discovery of a vein or lode within the limits of the claim located,' is not a vein or lode such as is described in section 2320. The description must refer to these things; the section describes nothing else, and to its description we are plainly referred. It follows that the language . . . must refer to a vein or lode which has been located, which has boundaries, which has a locality, which has had some sort of development, or else it cannot be such a vein or lode as is described in section 2320." (5 McCrary, 274, 277, 278.)

The case of *Noyes v. Mantle* (127 U. S., 318), does not, when properly understood, militate, as supposed, against this view. The court in its language there used had reference to the rights of parties other than the applicant for the placer patent, when it said that the statute did not apply to lodes or veins within the boundaries of a placer claim which had been previously located under the laws of the United States, and were in the possession of the locators, and could apply only to lodes or veins not taken up and located so as to become the property of others. The statute has reference to cases where the same person, association or corporation is in possession both of the placer claim and of the vein or lode within its boundaries. In such cases, if the lode claim is known to the applicant to exist, he must designate it in his application; but it cannot, of course be known to him to exist, whatever his conjectures may be, until the lode is discovered and located so as to enable him to state its existence and extent in his application for a patent of the placer claim, and to tender the price per acre required.

If there be any variance between these views and those expressed in *Iron Silver Mining Co. v. Reynolds* (124 U. S. 377-384), as to the manner in which knowledge of the existence of a lode within the boundaries of a placer claim may be obtained, it is because of a more careful consideration of the subject in later years than formerly and of larger experience in mining cases.

As stated above, there can be no location of a lode or vein until the discovery of precious metals in it has been had. And then it is not every vein or lode which may show traces of gold or silver that is exempted from sale or patent of the ground embracing it, but those only which possess these metals in such quantity as to enhance the value of the land and invite the expenditure of time and money for their development. No purpose or policy would be subserved by excepting from sale and patent veins and lodes yielding no remunerative return for labor expended upon them. Such exceptions would only be productive of embarrassment to the patentee, without any benefit to others. In a suit brought by the United States to cancel certain placer claims against the plaintiff in this case, alleging, among other things, that the patents were obtained by false and fraudulent representations, that the land contained no known veins or lodes of quartz or other rock in place bearing gold or silver or other metals, the Court, speaking of the evidence in the case as insufficient to sustain the allegation, said: "It is not enough that there may have been some indications, by outcroppings on the surface, of the existence of lodes or veins of rock in place bearing gold or silver or other metal to justify their designation as 'known' veins or lodes. To meet that designation the lodes or veins must be clearly ascertained and be of such extent as to render the land more valuable on that account, and justify their exploitation."—(U. S. v. *Iron Silver Mining Co.*, 128 U. S., 673, 683.) See to the same purport *Deffenback v. Hauke* (115 U. S., 392, 404) and *Colorado Coal Co. v. United States* (123 U. S. 307, 328).

In the case at bar, as stated above, the alleged location of the lode of the defendant was not preceded by the discovery of any precious metals within it. There was, therefore, in fact no lode to locate, and of course no location initiated or measurement possible. (R. S. 2320.) No weight ought to be given to a defense resting upon such a basis. The court below should have insisted upon proof of the discovery of mineral in the alleged lode claim of the defendant, or have directed a verdict as moved in favor of the plaintiff. And when the motion was refused, if the views I have expressed of what constitutes a known lode within the meaning of the statute, and as to the knowledge of such lode at the time of the application for the patent, be correct, the instructions as refused should have been given, and their refusal was error for which judgment should be reversed.

Much of the evidence received at the trial was also subject to serious objections. To show that the alleged lode of the defendant was known to exist before the patent was issued, the court below allowed evidence, against the objection of the plaintiff, to be introduced, that there were other lodes in the vicinity of the placer claim of the plaintiff and also of the placer claim of Wells and Moyer; and also evidence that parties in the neighborhood believed that there was a vein or lode lying under those placer claims, and also evidence of conversations in 1877 with one Stevens, who only acquired his interest, by purchase of one Leiter, from the patentee more than a year after the patent was issued, as to his opinion of the existence of mineral underlying all the ground where he had men at work, although the ground thus loosely designated was not shown to have covered the premises in controversy.

[Here follows a scathing analysis of the irrelevant and worthless hearsay testimony admitted by the court below.—Ed.]

It would be a waste of time to argue that such statements, if made, do not even tend to prove any such knowledge of a lode within the claim, for a disregard of which in his application one-fifth of the rights acquired by the patent can be defeated, years after the patent has been issued, the property gone into the hands of third parties, who have put up extensive works, and incurred large expenditures in its development. Frail, indeed, would the support of a patent be if testimony to such vague and loose conversations of a party not interested in the land in controversy at the time as owner could be received to impair the title of a bona fide purchaser from the patentee of the government, as the plaintiff in this case was. And yet, referring to it, the Court below instructed the jury that it tended to prove knowledge of the existence of a lode equally in Moyer, the patentee, as it did in Stevens, thus assuming that it did prove such knowledge by Stevens; that no distinction could be raised between them, and that if the jury found that the existence of a lode was known to Stevens, they might find upon the same evidence that it was known to Moyer, the patentee.

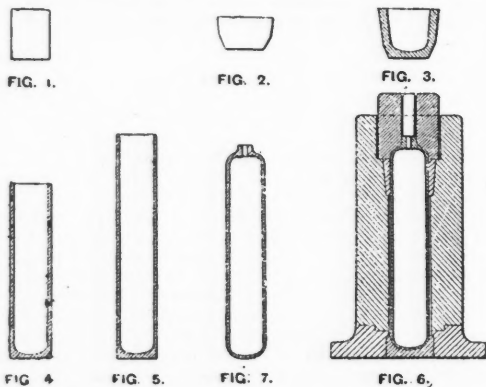
The record in this case affords a good illustration of what may be expected if loose testimony of the character mentioned can be received upon

a trial of this kind. It contains a mass of hearsay testimony, irrelevant gossip, geological impressions of the neighborhood, and loose recollections of miners of what had transpired years before or of what they believed to exist, all mingled together and admitted by the Court as going to prove the existence of a lode and knowledge of its existence on the part of the placer applicant. If out of such materials a patentee can be deprived of his property years after the issue of a patent, that instrument will be worse than useless to him. It will prove a delusion and a snare, luring him on to large expenditures, only to make more complete his ultimate ruin. It will afford no security against mere surmises, suppositions, and beliefs, but leave him to be overwhelmed by them.

In my opinion the judgment should be reversed and a new trial awarded. I am authorized to state that Mr. Justice Harlan and Mr. Justice Brown concur with me in this dissent.\*

#### MANUFACTURE OF CYLINDERS FOR HOLDING GAS UNDER HIGH PRESSURE

C. F. Cayley and R. S. Courtman, of London, Eng., have patented a new method for the manufacture of metal tubes or tubular vessels for containing gas under pressure from a solid block of metal, preferably of steel. The process is carried out according to this invention by a series of operations which will be understood upon reference to the accompanying illustrations. Fig. 1 shows a solid block used for the production of the tubular vessel, and which must be of such dimensions as to give the required weight to the finished article. It is then pressed, or otherwise worked into the form shown in Fig. 2, after which, while hot, it is placed in a suitable mold and worked into the form of a hollow cup shown in Fig. 3.



It is then reheated and placed on a mandrel, and subjected to a series of drawing operations through a die, by which it is brought into the form represented in Fig. 4. If the finished article is to be a short tube, the closed end can be now removed and the manufacture completed by a process of cold drawing, which will bring the article to the required length and thickness. When a tubular vessel is required, it may be first annealed and then cold drawn into the shape shown in Fig. 5—that is to say, of a length exceeding that of the finished vessel. When the cold drawing is completed, the surplus length is cut off from the top of the tube, and the lower end is worked to the required shape and thickness. The open end is again heated, and the vessel placed in the mold represented in Fig. 6 for the purpose of closing the open end and forming the neck of the vessel, which is accomplished by a series of dies. Fig. 7 shows the form of the completed vessel.

**The Billiton Tin Mines.**—A new contract with the Dutch Government concerning these mines is being considered according to the Amsterdam correspondent of *Industries*. The document provides that the concession, lapsing on May 1st next, shall be extended to the 30th of April, 1927. The net profits will henceforth be divided between the contracting parties from the beginning of the new contract, the state receiving five-eighths, and the company three-eighths of the net profits. All balance sheets have to be approved by the Government, and the company is not allowed to deduct debenture interest or anything except working expenses from the gross receipts. Such charges have to come out of the company's share of profits. In the case of a liquidation the state is to share in the balance of assets over liabilities to the extent of five-eighths. For new concessions in Blitong the company has a right to be preferred. Its concession will lapse if the mines are not worked for three consecutive years.

**Air Pressure During Solar Eclipses.**—Observations of air pressure during a total solar eclipse reveal an influence of the latter phenomenon on the former, according to Herr Steen in *Annalen der Hydrographie*. He studied the eclipse of August 29th, 1886, in this respect, using the records—at intervals of a quarter of an hour—of fourteen Norwegian ships between Panama and Madagascar, of which four were in the zone of totality and at least four others quite close to it. Having first eliminated the daily period of air pressure, he groups the observations of the ships and forms means; and he finds both these and the individual records reveal two maxima of air pressure, separated by a minimum. In the totality zone the first maximum is 35 minutes, and the second 2 hours 15 minutes, after the middle of the eclipse: in the partial zone, the first is 25 minutes before, and the second 1 hour 40 minutes after, the middle. This double wave Herr Steen explains thus: During a solar eclipse day is changed to night for a short time, and the transition is much like the ordinary change from day to night in the tropics, where the twilight is but short. There the curve of air pressure has regularly a maximum about 10 p. m., some time after sunset, and a minimum about 4 a. m., shortly before sunrise; while a second maximum appears about 10 a. m. It is natural a total solar eclipse should act similarly.

\* In another dissenting opinion of the same judges, "No. 3," between the same parties, relating to the "Gardner" lode-claim, is declared to present the same questions, to have been tried "on the same testimony," and to require the same decision.

#### THE TEMPERATURE DEVELOPED IN INDUSTRIAL FURNACES.

In a communication to the Paris *Academie des Sciences*, M. Le Chatelier states that by means of his pyrometer he has discovered that the temperatures which occur in melting steel and in other industrial operations have been over estimated. These exaggerations he attributes to several causes. When estimates of temperature disagree there is a natural tendency to adopt the highest, because there is an instinctive desire to establish some sort of proportionality between the light emitted from a heated body, the amount of fuel required, and the temperature. But the fact is that both the amount of light emitted from a body, and the quantity of fuel required to heat, increase much more rapidly than the temperature. Moreover, the calorimetric method has been that most frequently adopted for determining high temperatures. In this the assumption is made that the specific heat of the iron rods or balls used is constant, which is inaccurate. In the case of the flame of the Bessemer converter Mr. Langley has fixed the temperature of the issuing flame at 2,000° C., because platinum appears to melt rapidly in it. M. Chatelier has, however, found that platinum does not fuse in the flame, but only appears to do so because it alloys itself with drops of molten steel carried over by the blast.

M. Le Chatelier takes as points of comparison the melting points determined by M. Violle, viz., sulphur, 448°; gold, 1,045°; palladium, 1,500°; platinum, 1,775°. He finds the melting heat of white cast iron, 1,135°, and that of gray cast iron, 1,220°. Mild steel melts at 1,475°, semi-mild at 1,455°, and hard steel at 1,410°. The furnace for hard porcelain at the end of the baking has a heat of 1,370°. The heat of a normal incandescent lamp is 1,800°, but it may be pushed to beyond 2,100°.

**Cheok Hung Cheong**, a Chinese gentleman, stated in an address before the members of the British House of Commons recently that the coal fields of China covered an area of 419,000 square miles.

A new discovery of platinum has been reported from Mulga Creek, 14 miles distant from Broken Hill, N. S. W. The new deposit is in close vicinity to the sedimentary deposit recently unearthed, and is thought to be of considerable extent.

**Artificial Production of Clouds.**—Some experiments in connection with the artificial production of clouds by burning resinous matter were lately made in the *Jardin d'Acclimation*, Paris, under the auspices of the *Société des Agriculteurs de France*, but were only partially successful on account of the wind carrying the clouds away as soon as formed. The promoters of the idea contend, however, that in the absence of the exceptionally unfavorable meteorological conditions which attended the experiments, thick and permanent clouds may be formed, for protecting too forward crops against late frosts, and covering military operations.

**The Newberry-Vautin Gold Chlorination Process.**—The secretary of the Newberry-Vautin (Patents) Gold Extraction Company reports that the Melbourne (Australia) agent of the company has forwarded the following returns of gold won by the Newberry-Vautin process at custom works in Australia in 1891: The United Pyrites Company, Sandhurst, 3,366 oz. 8 dwts.; the Ballarat Pyrites Works, 1,680 oz. 1 dwt.; the Dayiesford Pyrites Works, 3,871 oz. 6 dwts.; North Queensland Pyrites Company, 668 oz. 16 dwts.; total, 9,586 oz. 11 dwts. The total amount of gold produced by the United Pyrites Company, Sandhurst, the Ballarat Pyrites Company, the North Queensland Pyrites Company, and the Daylesford Company, since the adoption of the process at their works to the end of last year was 37,493 oz. 9 dwts. The Ballarat Pyrites Works only commenced operations in the middle of last year.

**The Action of Light on Silver Chloride.**—At the last meeting of the Physical Society (English), Mr. H. M. Elder, M.A., read a paper on "A Thermodynamical View of the Action of Light on Silver Chloride." In the decomposition of silver chloride by light chlorine is given off, and a colored solid body of unknown composition—sometimes called "photochloride"—is formed, the reaction being indicated by the formula  $n \text{AgCl} = \text{Ag}_n \text{Cl}_{n-1} + \frac{1}{2} \text{Cl}_2$ . If the experiment be carried out in a sealed vacuum the chloride is darkened up to a certain point, but regains whiteness when left in the dark. These facts have led the author to believe that the pressure of the liberated chlorine is a function of the illumination or intensity of light falling upon the chloride, in the same way as the pressure of a saturated vapor is a function of the temperature. Since illumination is a quantity in many respects analogous to temperature, he considers it not unreasonable to apply thermodynamic arguments and regard chlorine in presence of silver chloride and photochloride as the working substance in a "light engine." He therefore supposes a Carnot's cycle to be performed on the substances at constant temperature, the variables being pressure, volume and illumination.

**An Improved Horseshoe.**—The London General Omnibus Company is about to make a thorough trial of an improved horseshoe, which is said to have been subjected to severe tests on the European Continent with very satisfactory results. The arrangement, which is the invention of a Frenchman named Pigot, is a very simple one, consisting merely in affixing to the underpart of the shoe two strips of cork, one on each side. The cork strips are held in position by two very thin sheet-iron plates firmly fastened together by a rivet. The outer edges of these plates are slipped between the shoe and the hoof. The inner edges are turned upward, forming flanges, between which and the inner edge of the shoe the cork blocks are tightly fixed. Between these flanges is fitted a screwed bolt with nuts at either end, so that when the nuts are tightly screwed against the flanges, the whole is perfectly immovable. In order to hold the cork still firmer in position, the corners of the flanges are turned down over it, thus forming a couple of sockets, into which the cork, which at first slightly projects over the surface of the shoe, is jammed and compressed more firmly every day by the weight of the horse. These shoes are said to enable the horse to obtain such a grip upon a slippery surface that slipping is almost impossible and straining is greatly diminished. The Brussels Tramway Company, after trying them for six months, has adopted them for general use. The extra expense is estimated at \$7.50 a year for each horse, against which is to be credited a saving on the wear of the shoe and increase in the efficiency of the animal.

## THE TICONDEROGA HOT AIR ENGINE.

The Ticonderoga Machine Company, of New York, has placed one of its air engines in the works of Moore & Wyman, South Boston, Mass., and the installation is of special interest from the size of the motor, it being the largest engine ever built by this company. As will be seen by Fig. 1, two furnaces are used to heat the generators. For burning wood but one furnace is used. The generator contains valveless pistons, connected by means of a link with an overhead walking beam, which connects by lever and crank directly with the main shaft. Fig. 2 represents the rear view of the engine, showing generator, working cylinders, furnaces, connecting pipes, etc., in section. The furnaces raise the air in the generator to a temperature of 600° F. The air heated to this temperature is forced through the wire-screen cloth and tubes to the upper part of the generator or reverser, and in making this change the air is cooled 480° and has a temperature when in the upper part of the generator of 120°. The cooling of the air is effected by a wire-screen cloth and the tubes which show in the annular space between the inner and outer cylinders of the generator. The tubes are surrounded by circulating water. It will be seen by reference to Fig. 2 that the inner cylinder of the generator does not extend the entire length of the outer cylinder; thus the air is free to move between the two from top to bottom.

The movement of the air in the generators is effected by the piston, which has a corresponding movement with the piston in the working cylinders. The generating cylinders and working cylinders are connected by pipes at the bottom to the cylinder directly opposite; while at the top they are connected to the ones diagonally opposite. The movement in the working cylinders is attained in this manner: As the piston stands in Fig. 2 air is forced by its own expansion, due to heat, from the generator into the working cylinders, exerting a pressure of 90 lbs. (temperature 600°) on the bottom of the working piston shown and on the top of the other working piston. These pistons work against a pressure of 45 lbs. on their opposite sides, this pressure coming from the other generator, which is cooled to 120°. When the working pistons are at the end of their strokes

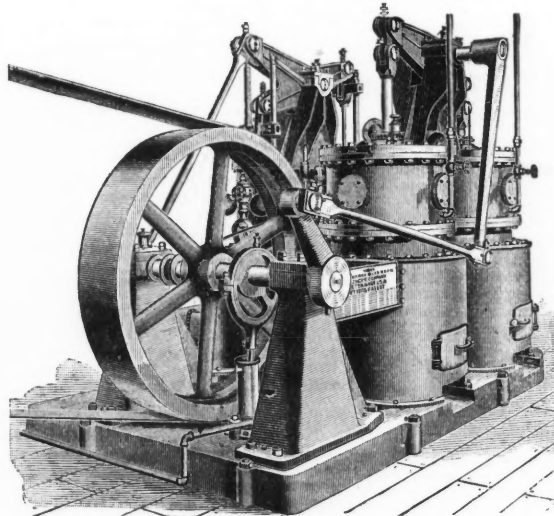


FIG. 1.

TICONDEROGA HOT-AIR ENGINE.

the air in the opposite generator becomes heated and produces 90 lbs. pressure while the air in the other generator is cooled to 120° (45 lbs.).

In direct connection with the engine is an air pump which has pipe connections with an air tank. This tank is in turn connected with the cylinders, and loss from leakage is compensated for by the pump. The tank pressure is also used to start the engines after furnaces have developed sufficient heat to take up the work. Pressure from the tank is controlled by the levers connected with valves. These levers admit the air to the cylinders at opposite ends, and the engine, thus given one revolution, is started. A governor of the ordinary ball type is used, which actuates a by-pass valve and regulates the admission of air to the cylinders.

The speed of this engine is from 100 revolutions in the large, to 150 revolutions in the smaller sizes. This type of engine is particularly adapted, it is claimed, for use in arid sections of the country or where water is scarce or unfit for ordinary boiler use. The circulation of the cooling water would be attained by means of a pump connected with a suitable tank or retainer. The water could be used over and over again without any great loss. Among the advantages claimed by the builders are: Absolute safety from explosion, and economy in space, as boiler and engine are practically one; silence in operation, there being no exhaust in valves, and economy in fuel. The engine recently built for Moore & Wyman develops 25 H. P.

A lifeboat of aluminum has recently been built at Stralsund, Norway, says *Engineering*.

Production of Pig Iron at Bilbao, Spain, in 1891.—The exports of pig iron of Bilbao make during 1891 amounted to 88,990 tons, of which Germany took 26,857 tons; Italy, 24,248; France, 15,364; Great Britain, 13,072; and Belgium, 9,449. The quantity exported, says *Industries*, represents about one-third of the whole make, of which "La Vizcaya" works contributed 65%, "San Francisco," 28%, and "Altos Hornos," 3%. The last-named works make as much pig iron as any of the other two, but it utilizes almost the whole of its production in the manufacture of wrought iron and steel. These works have a Bessemer plant with all modern improvements.

## DECISIONS OF THE COURTS AFFECTING THE MINING INDUSTRY.

Supreme Court of the United States.

## SOUTH CAROLINA RIVER PHOSPHATE BEDS.

In the suit of the State of South Carolina v. the Coosaw Mining Company, the Supreme Court (U. S.), on Monday, 4th inst., affirmed the judgment of the Circuit Court of the United States for the District of South Carolina, in favor of the State. This is a matter of very great importance to the latter, involving, as it does, its right to control the phosphate rock and phosphatic beds in the Coosaw River, which are exceedingly valuable.

In an opinion by Mr. Justice Harlan the court holds that the act of 1872 did not give the Coosaw company a perpetual and exclusive grant, as claimed by it, but merely gave it an exclusive grant for the balance of the 21 years covered by the original contract of 1870.

Department of the Interior.

## MINING CLAIM—SURVEY—MINERAL MONUMENT.

The general rule as to the connection of a mining claim with the public surveys is not abrogated by the departmental decision heretofore rendered in the case of Eugene McCarthy, January 27th, 1892.—*Secretary Noble*, March 15th, 1892.

A monument is to be erected over the tomb of the late John Ericsson, at Filipstad churchyard, in Sweden.

The gold fields near the sources and on the tributaries of the Segama River, in Borneo, have, it is said, proved too far away and the difficulties of communication too great for miners to be attracted. Quite recently, however, new discoveries have been made in Darvel Bay, particularly on the River Dewata and in the district lying between Lahad and Tabanak.

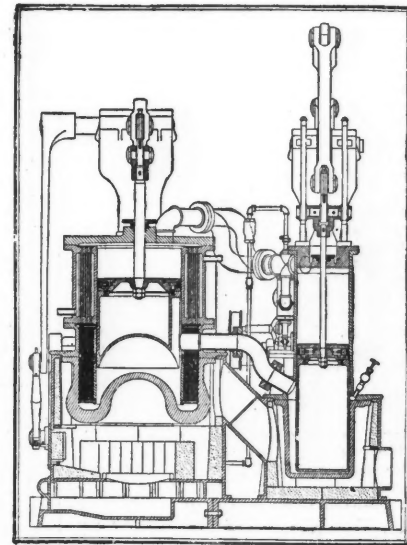


FIG. 2.

Manufacture of Smokeless Gunpowder.—In the manufacture of smokeless gunpowder, nitro-starch has hitherto been employed with the addition of nitro-benzol; but this is objectionable, chiefly on account of its volatility, which causes the explosive, when stored, not only to alter in projective capacity, but also to suffer from a considerable increase of gas pressure. According to a recent invention of the *Dynamite Actien Gesellschaft Nobel*, of Vienna, Austria, smokeless gunpowder is produced by the employment of nitro-starch, or nitro-dextrine, with the addition of non-volatile matter, such as di- or tri-nitro-benzol, di- or tri-nitro-toluol, di- or tri-nitro-xytol, and mono-di- or tri-nitro-naphthalene. The following is a suitable way of manufacturing this powder: One to 30 parts by weight of either of the above named nitro-derivatives of benzol, toluol, xytol or naphthalene is intimately mixed in any suitable mixer with 99 to 70 parts of nitro-starch or nitro-dextrine, moistened with water, after which the mixture is pressed into cakes at a pressure of about 1,000 to 2,000 kilogrammes per square kilometre. The cakes are then broken and granulated and rounded, sorted, blacklead or polished, and dried, which may be done in the ordinary manner.

## PATENTS GRANTED BY THE UNITED STATES PATENT OFFICE.

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

TUESDAY, APRIL 5TH, 1892.

- 472,035. Process of Enameling Sheet Metal Articles. Hubert Claus, Thale, Germany.  
 472,076. Regenerative Metallurgical Furnace. Henry C. Rew, Chicago, Ill.  
 472,159. Attachment for Mining Cages. John W. Carty, Youngstown, Ia.  
 472,177. Mining Machine. Charles O. Palmer, Cleveland, O.  
 472,363. Mining Machine. Adam Keil, McKeesport, and Anton R. Westerdahl, Pittsburg, Assignors to Samuel S. Brown, Pittsburg, Pa.  
 472,387. Method of Treating and Concentrating Pyritiferous Ores. James W. Neill, Leadville, Colo.  
 472,404. Brick Kiln. William Sercombe, Hamworthy, Poole, England.  
 472,422. Metallurgical Process. José B. Alzugaray, Porto, Portugal.  
 472,444. Electric Mining Pick and Drill. John Fish, South Bend, Ind., Assignor of one-half to George M. Fish and Manning Fish, Joliet, Ill.  
 472,502. Apparatus for Coating Metal Plates. Edwin R. Jones, Swissvale, Pa.  
 472,503. Mining Machine. Adam Keil, McKeesport, and Anton R. Westerdahl, Pittsburg, Assignors to Samuel S. Brown, Pittsburg, Pa.

## PERSONALS.

Mr. Thomas D. Owen, superintendent of the Grasselli Chemical Company, of New York, has severed his connection with that company.

Mr. William Fenwick, London agent of the Cresson & Clearfield Coal Company, is at present in this city on business connected with his company.

Mr. A. C. Milliken, general manager of the Pottsville Iron and Steel Company, Pottsville, Pa., has resigned that position. He will soon make a trip to Europe.

Mr. P. B. Risque has resigned the management of the Bimetallic Mining Company, Phillipsburg, Montana, and Col. W. Thomas Hart, has been appointed to the position.

Messrs. Hunt and Clapp, metallurgical engineers and inspectors, have removed their office and testing laboratory from 95 Fifth Ave., Pittsburg, Pa., to 116 Water St., in that city.

Mr. W. de L. Benedict, mining engineer, formerly of 32 Liberty street, this city, starts for California today on professional business, to be absent about three or four weeks. On his return Mr. Benedict will occupy offices at No. 18 Broadway.

Mr. C. E. Palmer, mining engineer, of Aspen, Colo., has resigned the management of the Argentinum Juniata Mining Company. He is succeeded by Mr. E. M. Ray. Mr. Palmer retains the management of the Mollie-Gibson Consolidated Mining and Milling Company.

There will shortly be a vacancy on the editorial staff of the Engineering and Mining Journal. Applicants should have editorial and mining or metallurgical experience, literary ability and familiarity with the chief modern languages. Address communications to Managing Editor, Engineering and Mining Journal.

Mr. William L. Abbott, chairman of Carnegie, Phipps and Company, Limited, of Pittsburg, Pa., has resigned that position, but still retains large interests in the company. Mr. Abbott's reason for this step was to be relieved of the cares and responsibilities which this important office entailed. He became connected with the Carnegie interests 21 years ago, and advanced step by step until he was finally tendered the chairmanship of Carnegie, Phipps and Company, Limited, upon the retirement of John Walker some years since. The interests of Carnegie, Phipps and Company, Limited, and Carnegie Brothers and Company, Limited, are now to be consolidated. Steps in this direction are now being taken, and the consolidation will become effective on July 1 next. A new title will be adopted for the new concern, and H. C. Frick, now chairman of Carnegie Brothers and Company, Limited, will be chairman of the new organization.

## OBITUARY.

Sidney Thaxter Pope, late general manager of the South Side Cable roads of Chicago, died at Pasadena, Cal., at the early age of 33, after a highly honorable and industrious career. Mr. Pope was a graduate of the Massachusetts Institute of Technology, and soon after graduating entered the services of the Chicago, Burlington & Quincy Railway. During his ten years of service with this company he had rapid promotions, and left the company only to take the superintendency of the Duluth & Iron Range Railroad, and later the assistant superintendency of the iron mines of the Minnesota Iron Company. This company he left in 1891 to accept the general management of the South Side Cable Railway of Chicago.

## SOCIETIES.

The American Institute of Mining Engineers will hold its sixty-second meeting in the Lake Champlain region, commencing at Plattsburg, N. Y., Tuesday evening, June 21, 1892. Arrangements are in progress for visits to mines and furnaces, and a trip into the Adirondacks. Contributions to the discussion of magnetic iron ore concentration, and also of crushers, granulators and pulverizers, are specially invited. The paper of Mr. Hoffman, read at the Baltimore meeting and describing the Sturtevant mill, furnishes a starting point for debate, whether by criticism or by the description of other apparatus. Members intending to offer papers on these or any other subjects are requested to notify the secretary promptly.

The American Institute of Mining Engineers has issued a circular with reference to the maintenance of an international engineering headquarters at Chicago during the World's Fair. The expense is estimated at \$15,000. The Council of the Institute at the request of the General Committee on Engineering Societies has undertaken to organize and conduct the mining and metallurgical departments of the World's Engineering Congress of 1893 in Chicago. For this purpose it is proposed to contribute \$4,000, but the Institute having no fund available for this purpose, it is proposed to raise the amount by subscription. An appeal is now made to all members for this purpose. Subscriptions should be sent as early as possible to Mr. James B. Lewis, 23 Park Place, New York City, who has consented to act for the present as treasurer of this fund.

## INDUSTRIAL NOTES.

The Mary Lee Coal and Railway Company, of Lewisport, Ala., will erect 190 new coke ovens.

The Penn Chemical Company, of Susquehanna depot, capital \$150,000, was chartered at Harrisburg April 1st.

The exports of cutlery from Sheffield to the United States for the last three months amounted to £23,079 in value.

The Caswell Creek Coal and Coke Company, of Freeman's, W. Va., proposes to construct 50 additional coke ovens.

The sheet mill and rolling mill of the Reading Iron Company closed down April 1st. Over 300 men were thrown out of employment.

Fire has almost, if not quite, destroyed the great chemical works which give employment to the inhabitants of the village of Hochspeyer, in Rhenish Bavaria.

The Raymond Bros. Impact Pulverizer Company, of Chicago, Ill., has issued a new descriptive catalogue of its machines for comminuting hard, soft or fibrous materials.

The Huntingdon Car Works, which have been idle for more than a year, have received a large order from the Pennsylvania Railroad Company for standard coal cars, and the works will resume at once.

Four additional suits have been entered against the Lehigh Iron Company, Allentown, Pa., as follows: By Weston, Dodson & Co., \$7,000; M. S. Young & Co., \$1,200; J. Bhiery & Son, \$519; T. Schell, \$538.

The Ansonia Brass and Copper Company has issued a new catalogue descriptive of Tobin bronze manufactured by it, with several tables giving the results of tensile tests and other interesting information about the material.

Manning, Maxwell & Moore, of New York, report that they have been awarded the contract for one 80-ton and one 20-ton Shaw electric traveling crane by the Midvale Steel Company, of Pennsylvania. The Shaw crane was described in our issue of April 2d.

Renfrew, Pa., is to have a new industry in the form of a plant for the manufacture of lamplack. A patented process is to be employed to produce this material from crude oil. It is claimed by the promoters that one barrel of oil will yield 37 lbs. of lamplack.

The Cambridge Roofing Company, of Cambridge, O., and Chattanooga, Tenn., has issued a new catalogue of its manufactures, comprising steel and iron roofing and siding, eave trough, conductor pipe, etc. It makes a specialty of the Crowl's patent standing seam steel roofing.

The Buffalo Forge Company, Buffalo, N. Y., has just issued a new catalogue of its steel plate planing mill exhausters, which have recently been very materially improved in construction. A notable feature of the catalogue is the large number of hood diagrams and forms of connections for wood-working machinery. The catalogue contains much information regarding the successful application of exhaust fans.

The Stilwell & Bierce Manufacturing Company brought suit against S. N. Brown & Co., of Dayton, O., in 1890, for infringing its patents by the use of a Hoppes live steam feed water purifier. The defense was conducted by the Hoppes Manufacturing Company. The result of the litigation, however, has proved to be a victory for the Stilwell & Bierce Manufacturing Company, the Stilwell patent being broadly sustained and a decree for an injunction against the Hoppes purifier with an accounting and costs being granted.

It has been testified in the gas suit at Cleveland, O., that the cost of the production during six months was \$112,695.49, while \$70,786.01 was received from sale of the by-products—coke, tar and ammonia. In answer to the hypothetical question which placed the cost of coal at \$2.15 per ton in the bin, naphtha at 1.16 cents a gallon and lime at 20 cents a bushel, Engineer G. A. Hyde said that the cost of producing gas would be 48 cents per thousand, and with the value of the by-products deducted it would be 21 cents per thousand.

Otis Steel Company, Limited, held its fourth ordinary general meeting in London on the 22d ult. Mr. J. T. Smith, who presided, referred to the great expansion of the iron and steel trades in 1890 in the United States, and the depression which had followed, reducing prices to a point which had not previously existed. The dullness in the trade had been such that no alternative was left but to compete in the general market for any material in steel for which the machinery could be adapted, and which, while satisfying the men, left little or no profit for the company. He had visited the works, and had come to the conclusion that however much Americans were ahead in regard to labor-saving appliances, in details of management Englishmen were not behind. It had, therefore, been decided that certain changes should be made, many of which had been carried out, the cost sheets showing an improved result. The steel trade had improved, but not to the extent expected. The company was, how-

ever, making a moderate profit, and hoped this half year not only to earn the debenture and preference interest due to it, but to pay the preference interest due January last. It also hoped at the next meeting to pay a dividend on the ordinary shares. The works were good and well situated, and the company possessed a high reputation for the quality of its products.

## MACHINERY AND SUPPLIES WANTED AT HOME AND ABROAD.

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

Any one wishing to communicate with the parties whose wants are given in this column can obtain their addresses from this office.

No charge will be made for these services.

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

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

## GOODS WANTED AT HOME.

- 2,631. Overhead wire tramways. Florida.  
2,632. A second-hand 16 in. x 12 ft. engine lathe. Alabama.  
2,633. Catalogues, price lists, etc., of brick and tile machinery. New York.  
2,634. A shingle machine. Virginia.  
2,635. A brick machine, 10,000 capacity, that can be run by a 10 H. P. engine. Louisiana.  
2,636. A dynamo, constant current, 400 revolutions, 365 ampères, 570 volts; a 325 H. P. (400 revolutions) triple expansion surface condensing engine; a 400 H. P. boiler (150 lbs. pressure)—all necessary attachments; mechanical strokers, injectors, pumps, gauges, cars for carrying material, reverberatory and smelting furnaces, crucibles and building materials. West Virginia.  
2,637. Roofing and an elevator for a house 50 x 100 ft. North Carolina.  
2,638. Two 200-light dynamos, three 50 H. P. water tube boilers, and laundry outfit for a hotel of 100 rooms; also hardware, steam pipe and fittings, belting, steam pump for boiler feed and fire pump, lines of underwriter's hose and fixtures, gas and electric chandeliers and brackets, iron grills and railings, tile and mosaic floors, plumbings, etc. West Virginia.  
2,639. Broom machinery. Georgia.  
2,640. Three miles of 35-lb. steel or iron rails with fastenings, frogs and switches for same, a dummy engine, 3 cars and a steam pile driver; also iron stove fronts and steel I beams. Georgia.  
2,641. Power and wood-working machinery for a sawmill. North Carolina.  
2,642. A light locomotive and cars to haul logs and lumber; also a saw or husk frame carriage and headlocks. Mississippi.  
2,643. Brick machinery. Tennessee.  
2,644. Sheet iron (best), perforated sheet iron, washers, rivets, etc. Virginia.

## AMERICAN GOODS WANTED ABROAD.

- 2,628. Machinery to grind and finish fibrous talc or asbestos. Canada.

## GENERAL MINING NEWS.

## ALABAMA.

The output of the Pratt mines for the fiscal year ending January 31st, 1892, was 1,164,720 tons of coal, against 1,108,190 tons in 1890. There was manufactured during the same period 276,444 tons of coke, against 259,980 tons last year.

## JEFFERSON COUNTY.

SLOSS IRON AND STEEL COMPANY.—This company is preparing to sink a new shaft at its Brookside iron mines.

## ARIZONA.

## PINAL COUNTY.

MAMMOTH GOLD MINES, LIMITED.—The accounts laid before the shareholders, at their last meeting, says the London *Financial News*, show a gratifying improvement in the company's affairs. The bullion produced during 1891 is returned at £45,644, as compared with £27,834 in 1890, and the net profit on the year's working at £16,463, as against £4,357 in the previous year.

## CALIFORNIA.

## AMADOR COUNTY.

GOLD MOUNTAIN MINING COMPANY.—This company, of which W. B. Farwell is the superintendent, contemplates adding 20 stamps more to the new mill, making 40 all told. As soon as the weather will permit, a tramway will be built from the mine to the mill, greatly reducing the

expense of handling ore, which at present is hauled from the dump to the mill by teams. In the meantime an assessment of \$1 a share has been levied to pay for the proposed deadwork.

**PLYMOUTH CONSOLIDATED MINING COMPANY.**—This company will soon commence unwatering the Pacific shaft, 1,800 ft. deep. It is seemingly the intention of the company to commence prospecting again on the lower levels.

#### ELDORADO COUNTY.

**GREGORY.**—This gravel property, near Smith's flat, has been opened so that it shows a body of gravel 40 ft. by 90 ft., averaging \$5 a carload.

#### LOS ANGELES COUNTY.

(From our Special Correspondent.)

The village of Lordsburg is the scene of much excitement just now, rich silver ledges having been discovered in the lower part of San Dimas cañon and five miles northwest of the town. Thus far about 90 claims have been located and a camp of 700 people has sprung into existence.

#### MONO COUNTY.

**BODIE CONSOLIDATED MINING COMPANY.**—The stope above the 500 level of the Jupiter shaft are yielding a fair grade of milling ore.

**MONO CONSOLIDATED MINING COMPANY.**—A small seam of rich ore is being followed on the 600 level. In the south drift from No. 1 upraise above the 600 ft. level the ore is about 4 in. wide, and of fair grade. The stope from No. 1 upraise, above the 700 level, continues in rich ore.

**STANDARD CONSOLIDATED MINING COMPANY.**—In a recent statement Superintendent Leggett, of this company, at Bodie, gives the cost of mining at \$6.29 per ton; milling, \$3.15-9, and incidental expenses at 81-3 cents; total, \$10.06-02 per ton. The cost of mining includes supplies, freight, etc. In his report he also stated that the bullion output was more than the battery assays indicated—going over rather than below the assays; that is that the tailings samples were too high.

#### NEVADA COUNTY.

(From our Special Correspondent.)

**MAYFLOWER GRAVEL MINING COMPANY.**—A bullion shipment valued at \$2,100 has been received, being the first shipment since the mill started up. The new body of gravel found in the north workings runs about \$8 per ton.

**NORTH BANNER CONSOLIDATED MINING COMPANY.**—A narrow ledge of rich ore has been cut by the cross-cut. Its course is such that it will soon unite with the other vein, when good developments are expected.

**OMAHA & LONE JACK CONSOLIDATED MINING COMPANY.**—This company has declared a dividend of 15 cents a share, aggregating \$3,600, making a total of \$26,400 paid under the present management.

#### PLACER COUNTY.

**MAYFLOWER GRAVEL MINING COMPANY.**—A shipment of \$2,100 has been received from this mine, the first since it resumed operations, after drifting through 1,200 ft. of barren channel.

#### SAN BERNARDINO COUNTY.

**SAN JACINTO ESTATE, LIMITED.**—The secretary of this company reports that the total output of metallic tin from the time when smelting operations were commenced in April, 1891, to the end of last year, was 48½ tons (109,200 lbs.), and this year to the end of February, 35½ tons (79,520 lbs.), making a total quantity of 84½ tons.

#### SAN DIEGO COUNTY.

**RUBY MINING AND MILLING COMPANY.**—This company, operating the Wilcox mine, is said to be making excellent developments. The lower tunnel is in 400 ft. and the upper one 200 ft., both of which are in good ore. From 8 to 10 in. of the vein assays \$50 to \$60 a ton. In fact the last mill run yielded \$70 per ton.

#### COLORADO.

Mineral surveys approved by the United States Surveyor General of Colorado, during the two weeks ending April 2d, 1892: Survey number, 7,340; land district, Central City; name of claim, Mauch Chunk Lode; 7,329, Garfield, Red Spruce Lode; 7,345, Central City, Idris and S. S. M. lodes; 7,335, Pueblo, Stop Short Lode; 7,326, Leadville, Orphan Boy Lode; 7,350, Central City, Champion Dirt Lode; 7,342, Central City, Ottawa Lode; 7,348, Durango, Eighty Eight (88) Lode; 7,361, Central City, Sapp Lode. Amended surveys: Survey number, 4,047; land district, Garfield; name of claim, Mackey Lode.

**COLORADO COAL AND IRON COMPANY.**—At the annual meeting of this company at Pueblo, on the 4th inst., the only change in the board was the election of C. F. Meek, who succeeds Mr. Thaxter. The old officers were re-elected. An insider is quoted as saying that it was considered better policy to place the full record of the company's condition before the public than to mislead by clever bookkeeping and artificial strengthening of the stock in the market. He further claimed that the cause of the unfavorable exhibit recently made is the acknowledged depression in the iron and other important industries in Colorado.

#### CLEAR CREEK COUNTY.

During March ore shipments from Idaho Springs, aggregated 1,644,800 lbs., which was a falling off of 188,200 lbs. as compared with the output of the

camp for February. Sixty cars were shipped to Denver and five to Argo.

#### GARFIELD COUNTY.

It is reported that Mr. J. J. Hagerman and W. E. Newberry, of Aspen, together with Eastern capitalists, have purchased the Colorado Fuel Company's great coal fields, consisting of 640 acres near Newcastle, the consideration being \$40,000.

#### LAKE COUNTY.

**ADAMS MINING COMPANY.**—The Wolfstone shaft is being rapidly sunk, according to President Sylvester, and from this, at 750 ft., it is expected to drift into Adams ground and find new ore bodies. In the 700-ft. level carbonate ores are now being produced in fair quantities. In the same level north of Discovery shaft the lessees are developing new bodies of sulphide ore. In the 750-ft. level, from which royalties amounting to over \$169,000 were received from July, 1889, to February 1892, the lessees are running drill holes to relocate the lost ore chute. The output during February amounted to 843 tons, divided as follows: Copper ores, 365 tons; sulphide, 340, and carbonate, 138 tons. The cash balance on December 1 was \$3,369.23; December royalties, \$2,776.63; January, \$3,445.67, and February, \$2,537.24; total, \$12,128.82. There was paid out in dividends January 30, \$7,500; ore account taxes, 1891, \$1,760, and lawsuit expenses, \$2,500, making a total of \$11,760. There are \$8,500 of bonds out yet, which are due August 1st.

**ELK MINING COMPANY.**—In the Elk shaft a fine body of iron-silver ore is reported to have been struck. About 70 tons of ore are being shipped daily, and 70 men are employed.

**MAID OF ERIN SILVER MINES, LIMITED.**—It is reported that a body of ore running high in gold has been struck in the property of this company.

#### PITKIN COUNTY.

**ARGENTUM JUNIATA MINING COMPANY.**—It is reported that a rich strike has been made in the mines of this company at Aspen by means of the diamond drill.

#### SAGUACHE COUNTY.

The following is a statement of Dr. Whitman Cross, of the Geological Survey, concerning Creede: "I spent one day at Creede last October, going to the last Chance and Amethyst mines, and up the gulch about Creede. I was highly impressed with the mines I saw, and thought that many other good veins might exist in the decomposed and esitic breccia about them. Very little development work had been done at that time, but it seemed to me certainly a very favorable country for prospecting."

"All the mines that I saw or heard of were in the great series of volcanic rocks which seemed to be a thick rhyolite flow at the base, as in the cañon just above Jimtown, with a conglomerate or breccia zone above that, and then to the hills an andesite breccia very much kaolinized, and in this were the veins I saw. Should there be a limestone immediately under the eruptive rocks, it would be a good horizon for prospecting of course, but the mines so far proven have nothing to do with any sedimentary rock."

**NELSON TUNNEL AND MILLING COMPANY.**—This company has been organized at Creede, with a capital stock of \$1,000,000, fully paid and non-assessable. The object of the company is to run a tunnel from West Willow, below the Batchelor mine to Batchelor City, a distance of 3,000 ft. and at a depth of 1,000 to 1,100 ft. by which to drain the mines lying higher than this level and also expecting to strike the veins of these mines at greater depth. The following are the officers: A. W. Brounell, president; C. F. Nelson, vice-president; D. F. Kelley, secretary; J. S. Wallace, treasurer; N. J. Swift, manager; E. W. Wagner, superintendent; C. A. Mullin, engineer; M. S. Beal, attorney.

#### SAN JUAN COUNTY.

**SAN JUAN MINING & MILLING COMPANY.**—This company was organized recently under the laws of West Virginia with a fully paid in capital of \$600,000 in \$5 shares. The stock is non-assessable. The officers are: president and treasurer, W. S. Estey. There is no vice-president. W. O. Chapman is secretary. The property of the company consists of the New York mine, located near the town of Eureka. The ore is an argentiferous galena carrying some gold. The assays of the ore vary all the way from \$5 to \$128 per ton in gold, silver and lead. Only development work has been done thus far. The company will build a concentrating mill this spring, as the ore is low grade.

#### SUMMIT COUNTY.

**REVIEW MINING COMPANY.**—Ground has been broken and the grading commenced for the new 60-ton concentrator plant. Three carloads of machinery have arrived, and are being transported to the mill site. The company has also purchased the Mineral hill tunnel, 1,700 ft. long, and is making an upraise to connect with its own workings. This will give about 500 ft. depth, and save two miles in the transportation of the ore.

#### GEORGIA.

#### BARTOW COUNTY.

A large quarry of Caen stone has been discovered near Cartersville.

#### WHITE COUNTY.

**HAMRY MOUNTAIN GOLD MINING COMPANY.**—The 40-stamp mill of this company, which has

been idle for some time on account of litigation, will be put in operation at an early date. This mine is situated six miles east of Cleveland in the Nacoochee belt.

**REEVES & Co.**—The mill operated by this firm four miles west of Cleveland, it is reported, is about to resume operations. The mill has been idle since the first of the year. It is stated that the mine which supplies the mill averages 6 cwts. gold per ton.

#### IDAHO.

Specimens of mica from Idaho will be exhibited at the World's Fair. There are said to be large veins of this material in the state from which sheets as large as 10 x 12 ins. of excellent quality may be obtained. It is proposed to have some of the windows in the Idaho building at the Fair glazed with mica from that State.

(From our Special Correspondent.)

The Mine Owners' Association of the Cœur d'Alene held a meeting at Spokane on the 26th ult., at which every producing mine in the Cœur d'Alene district was represented, and the following statement published. It is intended as a fair, frank statement, and represents their position to the public as well as to their employes. The matter of freight rates with the railroads having been adjusted, the mines were about to open and begin work, and would have done so but for a decision of the Miners' Union notifying the mine owners that they will permit no work at any mine in the Cœur d'Alene excepting at \$3.50 per day for all men underground and at short hours; that is ten hours for the day shift, excepting Saturdays nine hours, and nine hours for the night shift excepting Saturday night eight hours. The following is the mine owners' statement:

"The Mine Owners' Association of the Cœur d'Alene take this method of informing all former employes of the various mines and mills, as well as the public generally, that having reached a satisfactory settlement of all differences with the railway companies relative to freight rates and other matters, all mines will be ready to resume work on or about April 1, or sooner if a sufficient number of the old hands can get back before that date. In order to give them time to get back, it is probable that not more than one or two mines will resume before the date stated, and preference will be given to all former employes."

"Believing most earnestly that the advance of the wages of carmen and shovelers, which was forced upon the mine owners during the past year, was unreasonable and unjust, for obvious reasons, to both employers and miners, the association begs to announce the following scale of wages:

"For all miners, \$3.50 per day of 10 hours.  
"For carmen and shovelers, \$3 per day of 10 hours, except in the shaft mines, where carmen and shovelers will be paid \$3.50 per day; or carmen working in wet places in tunnel mines, where gum clothes are necessary, will be paid \$3.50 per day."

"Where miners or carmen are put on special eight-hour shift, the wages will be the same as for 10 hours."

"This scale of wages, after much consideration, has been determined upon as liberal and fair by the association, and it is hoped that it may meet the approval of all employes as well as the public generally."

"The association also announces that in all tunnel mines, where a majority of the men desire to avoid working Sunday and Sunday night, they may, on giving expression of such desire to the manager, have Sunday and Sunday night off each week."

#### OWYHEE COUNTY.

**DE LAMAR MINING COMPANY, LIMITED.**—The manager's report upon the mine for the month of February states that the mining and milling operations have been of a satisfactory nature. The Wilson vein above third level is 10 ft. wide, assaying gold \$24 and silver \$5 per ton, and the roof of the stope is stated to be looking remarkably well. The Hamilton vein above fourth level is assaying \$34 per ton, while above the third level it is worth \$33 per ton. In the "77 ft." vein above the sixth level west there are three stopes in operation, as follows: First floor—the vein 24 ft. wide, assaying gold \$7, silver \$26; second floor—vein 24 ft. wide, assaying gold \$7, silver \$23; third floor—vein 18 ft. wide, assaying gold \$8, silver \$28. Above eighth level, hanging-wall section, there are two stopes. In the first the vein is 4 ft. 6 in. wide, assaying gold \$23, silver \$27, and in the second stope the vein is 3 ft. 6 in. wide, assaying gold \$23, silver \$32. A new level has been opened up (No. 6 east) and extended 10 ft., the width of the vein being 4 ft., and assaying \$30 gold and \$6 silver. At a point 35 ft. from the "77 ft." vein south, another large vein has been uncovered; it is 10 ft. wide, composed of gray and white-colored granulated quartz. Its assay value, as shown by large samples taken from the sides of the cross-cut that passed through it, is gold \$35, and \$35 silver. There is such a network of veins and branches in its vicinity that it is difficult to establish its relationship with the veins at the seventh level, and it will require a few weeks to do so; judging from its size and surroundings it is a permanent vein, and looks extremely fine. The manager reports that 4,320 tons of quartz were crushed during the month, of the value of \$60,391.28, while the estimated profit for the same period, after deducting current expenses, was \$40,508.82.

## SHOSHONE COUNTY.

(From our Special Correspondent.)

**GRANITE.**—It is calculated that a 1,200-ft. tunnel will be required to reach the ore body in this mine; 800 ft. has already been done. As soon as the ore body is reached a raise will be made to connect with the upper tunnel. The formation is granite and work is done with air compressors and Rand drills.

**MOTHER LOBE.**—An increase in machinery from a five to a ten-stamp mill is contemplated. † †

The situation between the mine owners and the miners union remains unchanged in the Cour d'Alene. Both parties seem firm, although there has been no expression of bitter feeling on the part of either. Several meetings of citizens have been held, in which resolutions favoring the stand taken by the union have been passed. In the meantime no miners are coming into Wardner. Wallace or Mullan and the men in those places are fairly well employed.

**ARGENTINE.**—This company is intending to erect a concentrator. The owners, Messrs. Davey & Son, have made tests and are satisfied that the ore will work successfully. The gangue of the ore is white quartz, and the mineral gray copper and carbonate of iron.

**BUNKER HILL & SULLIVAN MINING AND CONCENTRATING COMPANY.**—The Bleichert tramway at this mine is being repaired under the charge of A. C. Savage, of the Trenton Iron Works, so as to meet the requirements of the original contract. The central station is to be removed and the operating machinery transferred to the mine end of the system. The line is to be raised some 75 ft. where it crosses the town, so as to reduce the grade. Heretofore the system has been operated in two sections, the buckets being transferred at the central station, but this will be dispensed with. Many of the derricks will be taken down and across the town will be a clear span of 1,100 ft. A force of 50 men is already at work.

**CUSTER.**—New ore hodies have been opened up and a hoisting plant put in operation. The hoisting plant is on the lower level, 1,200 ft. underground. A chamber has been cut 40 ft. in height, about 25 ft. wide, and 60 ft. in length. The shaft is started, and is now down 15 or 20 ft. The steam to run the hoist is transmitted from the outside. The plant is capable of doing the work until a depth of 800 ft. is reached. A little before the recent shutdown a body of very rich ore was discovered which had been overlooked. Quite a large quantity of this was sacked and shipped direct from the mine. In order to open up this new and rich ground another raise was started about 100 ft. from the raise connecting with tunnel No. 2 and toward the surface. This is now up about 100 ft., where a fine ore chute has been encountered, upon which a drift is being run on each side of the raise. In both drifts there is a fine showing of galena and carbonate ore.

**GOLD HUNTER.**—A large body of high grade ore was struck in the upper levels a few days ago according to reports.

**KNICKERBOCKER MINING COMPANY.**—This company recently purchased the Knickerbocker Mine of G. H. Knight for \$35,000; also the Daisy Mine from Octave Gray for \$15,000. The mines are located about two miles from Osburn.

**LAST CHANCE MINING COMPANY.**—The Sweeney tunnel in the Last Chance mine at Wardner struck the ledge on Monday quite unexpectedly. It was expected to run at least 200 ft. further before striking it. The tunnel is now in about 2,000 ft. Besides striking the ledge, water was struck also, and this is coming in so plentifully that further work had to be suspended until the mine can be drained.

**MAMMOTH.**—This mine has not shipped any ore for some time, although a few months ago the ledge was encountered in the lower tunnel at a depth of 600 ft. A raise, commenced to connect this with Tunnel No. 2, 220 ft. above, is now nearly finished, and it is probable that shipments will soon be resumed. In the lower tunnel there is a fine face of carbonate ore with a streak of high grade manganese mineral.

## ILLINOIS.

## LA SALLE COUNTY.

Litigation has been begun between the City Council of Peru and the coal producers concerning the rights of the latter to mine coal under the streets of the town.

## KANSAS.

## CHEROKEE COUNTY.

During the week ending April 2d the output of ore from the mining districts of Galena and Empire City was: Rough ore, pounds milled, 1,805,339; rough ore, pounds sold, 1,747,830; zinc ore, pounds sold, 900,660; lead ore, pounds sold, 312,090.

## KENTUCKY.

Statistics furnished by the report of the Inspector of Mines for Kentucky show that during 1891 the output of commercial bituminous coal for the year amounted to 71,977,055 bushels (2,879,082 tons), an increase of 9,898,346 bushels over 1890. In the production of this a maximum of 8,264 persons were employed, the average number being 6,063. The output of cannel amounted to 42,870 tons, a reduction of 6,512 tons from 1890.

## MAINE.

## SAGADAHOOC COUNTY.

**WILSON MINING COMPANY.**—This company has begun its operations for the season at its feldspar quarry at Topsham. A very promising vein has been struck. It is the intention of the company to quarry about 3,000 tons of feldspar and quartz this season.

MICHIGAN.  
COPPER.

**ARNOLD MINING COMPANY.**—As assessment of 25 cents per share on the stock of this company has been levied. This will yield \$10,000 for further development work, and will bring the total amount paid in on the stock up to \$1.10.

**ATLANTIC MINING COMPANY.**—The product of this company for March was 235½ tons as against 214¼ tons in March, 1891.

**CENTENIAL COPPER MINING COMPANY.**—There is but slight chance for this company, according to the *Torch Lake Times*, of finding any pay-rock in the Calumet conglomerate. Developments in the Tamarack Junior and north of shaft No. 5, Calumet, seem to bear this out. The forty-third level, going north of No. 5 shaft, Calumet, exposes the rich courses of the lode nearer the Centennial boundary than any other opening. This level is in 1,000 ft. north of No. 5, and is still in rich ore, but it is 1,700 to 1,800 ft. deeper than anything reached in the Centennial and the No. 3 Centennial shaft is over 4,000 ft. further north than the end of this level. The *Times* considers that the proper thing to do is to develop the Osceola amygdaloid.

**CENTRAL MINING COMPANY.**—This company reports for 1891: Receipts from copper, \$157,945; receipts from interest, \$1,676; total, \$159,621. Expenses, \$195,415; deficit, \$35,793. In 1890 there was a balance of \$22,608, and \$1 per share was paid in dividends. The ingot produced in 1891 was 1,313,197 lbs., against 1,413,391 lbs. in 1890. The surplus assets, December 31st, 1891, were \$159,701. The report says: "The expenses have been unusually large, while the product has been small, and realized an average price of nearly 3 cents per pound less than that of the present year, the result being a deficit, as shown by the foregoing figures. The increase in expenses is due to the large amount of exploratory and development work. The openings on the Northwestern veins failed to show anything of value, and have been discontinued. The development of the Central vein in that portion under the 'slide,' by which it was shifted 240 ft. to the west of the old workings above, has so far failed to open any 'pay ground' in either the 30th, 31st or 32d levels. We are still extending the 31st and 32d levels, but the prospects at present are not encouraging. The portion of the vein above the 'slide' has produced nearly all of the copper taken out of the mine this year, and has improved latterly in productiveness in the extreme southerly workings at the 29th level, where apparently a new ore body has been exposed, which now extends upward above the line of the 28th level. The 30th level has not yet reached the point where it should intersect the good ground shown in the level above, but we hope to find that it exists there and continues in depth. The 'slide' or shifting of the beds of rock composing the formation conforms with their dip, which is here about 28° from the horizon. It separates the mine into two distinct parts, the eastern part lying above 'the slide' and the western part below it. We are not inclined to believe that the part below the 'slide' will prove to be barren in all places, and are still extending two levels into entirely unproved ground. The eastern part can still be followed downward on top of the 'slide,' and may prove productive in depth. In the existing situation we have little to guide us in attempting to forecast the future, but having heretofore met with alternations of productive and unproductive ground, we have some reason to look for an improved condition of affairs in the near future, and in any event can only do our best with the material we may find."

**FRANKLIN MINING COMPANY.**—The product of this company for March was 200½ tons of mineral, against 205½ for February and 200 tons for March, 1891. For the quarter the production has been 609½ tons, against 606½ tons in 1891.

**OSCEOLA MINING COMPANY.**—The Opechee shaft has reached the 21st level and a station is being cut. When the station is finished drifts will be run for a dozen feet or so on either side. Then sinking will be resumed. A double skip track is being put in the shaft.

**ST. MARY'S COPPER MINING COMPANY.**—A dividend in liquidation of 40c a share has been declared payable April 15th to stockholders of March 25th.

## IRON—GOGEBIC RANGE.

**PENOKE & GEOEGIC DEVELOPMENT COMPANY.**—The company, it is said, has made contracts for the delivery of 600,000 tons of ore this season, 300,000 of which will be taken from the hill overlooking Bessemer.

## IRON—MENOMINEE RANGE.

**CHAPIN.**—Some 75 men, employed chiefly in getting out timber have been discharged. About 200,000 tons of ore are in stock and the production is being restricted somewhat. A little hoisting is done at "A" and "Al," nothing at "B,"

but little at "C," and from 1,700 to 1,800 tons per day at "D" on the extreme west end of the mine.

## GOLD.

**ALAVIESKA MINING COMPANY.**—The directors of this company held a meeting Monday afternoon in the company's office at Red Jacket, at which time it was decided to call an assessment of 15 cents per share of the company's stock, which is composed of 130,000 shares. The present shaft is to be sunk 100 ft. deeper, thus bringing it to a depth of 425 ft. and a stamp mill will also be built as soon as possible.

**FIRE CENTER GOLD MINING COMPANY.**—The Michigan Land and Iron Company, which owns the land on which the Fire Center Gold Mining Company is operating, has notified that company that the royalty of 10% of the gross yield of gold and silver heretofore claimed by it by the terms of the lease, has been reduced to 5%.

## MINNESOTA.

## IRON—MESABA RANGE.

The following companies have been incorporated to work properties on the Mesaba range; Tawanda Iron Company, capital stock, \$3,000,000; Dayton Iron Company, capital stock, \$1,000,000; Washington Iron Company, capital stock, \$3,000,000; Hale Iron Company, capital stock, \$3,000,000.

**MESABA CENTRAL LAND AND EXPLORATION COMPANY.**—This company, which does not mine but acquires mining lands and leases them, declared a dividend of 50c a share at a recent meeting. The company has made several extensive purchases recently.

## MISSOURI.

## JASPER COUNTY.

(From our Special Correspondent.)

JOPLIN, April 4.

Saturday evening closed a prosperous week in the mining industry throughout the entire lead and zinc belt. There were some heavy sales of ore at Carthage, Oronogo and Webb City of accumulated stocks. The average price paid was a trifle under \$21 per ton for zinc ore. Lead ore advanced to \$23.75 per thousand, and there was a large output at Joplin and Galena.

Following are the sales from the different camps:

Joplin mines, 1,387,730 lbs. zinc ore and 306,390 lbs. lead; value, \$21,847.95.

Webb City mines, 1,078,340 lbs. zinc ore and 40,580 lbs. lead; value, \$12,266.05.

Carterville mines, 1,733,640 lbs. zinc ore and 75,500 lbs. lead; value, \$19,969.65.

Zincite mines, 167,920 lbs. zinc ore and 3,740 lbs. lead; value, \$1,994.60.

Lehigh mines, 6,700 lbs. zinc ore; value, \$77.

Oronogo mines, 245,800 lbs. zinc ore and 61,710 lbs. lead; value, \$3,636.65.

Carthage mines, 813,230 lbs. zinc ore; value, \$8,053.

Wentworth mines, 83,000 lbs. zinc ore; value, \$871.50.

Galena, Kans., mines, 900,660 lbs. zinc ore and 312,280 lbs. lead; value, \$16,185.

Districts, value, \$84,901.40.

Aurora, Lawrence County, mines, 168,000 lbs. zinc ore, 655,320 lbs. silicate and 300,000 lbs. lead; value, \$12,436.

Lead and zinc belts, total value, \$97,337.40.

E. C. Hart & Company, operating a mine on the Empire Zinc Company's land, have opened a wonderful deposit of ore, and last week mined and cleaned up 64,500 lbs. of zinc ore. Mr. Hart is personally superintending the operating of the mine, and was the first in this district to apply electric power to mining operations. He is using two small motors, one of which drives the pump and the hoister, and the other the crusher and rolls.

Mr. W. C. Wetherill, general manager of the Empire Zinc Company's mines and smelter here, has just returned from a trip to the company's offices at New York and Philadelphia, and will soon make a shipment of 50 tons of spelter from its smelter here direct to Europe.

## MONTANA.

**BOSTON & MONTANA CONSOLIDATED COPPER AND SILVER MINING COMPANY.**—The production of this company for March was 2,350,000 lbs. of fine copper, or 15,000 lbs. more than in February and 225,000 lbs. less than in January.

## BEAVER HEAD COUNTY.

**POLARIS MINING COMPANY.**—This company is making regular shipments of rich ore, and the owners, it is said, are contemplating the erection of a 20-stamp mill.

## DEER LODGE COUNTY.

**BI-METALLIC EXTENSION.**—Two veins have been cut by the diamond drill in this mine. The first strike was made by the drill in the north crosscut on the 450 ft. level. When in a distance of about 60 ft. from the face of this north crosscut the diamond drill encountered the vein which it is ascertained positively is over 14 ft. in width. While running through the ore matter the drill encountered a small streak of granite, and for a time it was thought the ore body would hardly exceed five ft. in width, but after running about a foot further ore was again cut. The drill was kept working and after passing through this body, at a distance of about 90 ft. from where the boring commenced, another vein was discovered. The width of the last vein is given as eight ft.

JEFFERSON COUNTY.

**ELKHORN MINING COMPANY, LIMITED.**—According to the manager's report for February, the main stope in the 550-ft. level south is yielding ore assaying 42 oz. A new stope has been started in the footwall, at a point 100-ft. south of the shaft. The ore is 18 ins. wide and assays 90 oz. These places produce milling ore only. In the 650-ft. level north the Diamond drill stope is yielding shipping ore averaging 70 oz and 8% lead; the pay streak is 20 ins. wide. South of the shaft the footwall stopes are all in good ore, and both kinds are being broken. The dry or milling ore is from 13 ins. to 2 ft. wide, and assays 45 oz. The lead ore is of the same thickness, but it assays from 75 to 85 oz. silver, and 10% lead. In the 750-ft. level south, No. 1 cross-cut, lead ore is being broken, assaying 95 oz. silver and 12% lead. While in the No. 2 cross-cut the lead ore has been replaced by silicious mill ore, assaying 35 oz. Referring to the South drift, the manager states, "The general average of the smelting ore broken from the stope above this level is higher this month than last. The average net return per ton is a little over \$100. The ore varies from 2 ft. to 4 ft. in width, and above it next the hanging-wall there is from 6 to 8 ft. of dry silicious ore, assaying 70 oz., which is sent to the mill. The development in this place continues to be very satisfactory. Prospecting work has been carried on during the month. The main shaft, previously reported 172 ft. was sunk in February 3 ft. The levels have been started and run at a point 148 ft. below the 1,250-ft. level, as measured on the inclination of the vein. The timbering of the station, cutting out of the tanks and arrangement for the pumps have all been completed, and everything will be ready to resume sinking when the drifts are run. Preparations have been made for the removal of the pump now at the 750 ft. station to the 1,150 ft. level. The 10-in. column pipe is on the way, and will be put in immediately. This will give two independent lines, either of which is capable of handling all the water, at any season of the year, from the 1,150-ft. level to surface." The report from the milling department gives the estimated value of bullion shipped as \$31,660, and the actual returns from about 278 tons of ore shipped were \$17,962.60, making a total of \$59,622.60. The current expenses, including salaries, labor, supplies, etc., were \$24,725.48, leaving a balance of profit of \$34,897.12. Suit has been brought by William Reed, C. P. Van Wart *et al* against this company and L. G. Phelps to determine the title of the Keene claim, adjoining the Holter mine, belonging to this company. This claim had been sold pursuant to a judgment in favor of the Second National Bank of Helena to L. G. Phelps for \$13,000, he acting, it is claimed, as trustee for the Elkhorn Company. The plaintiffs claim that the assessment work was not done, and that they duly located the mine on February 18th, 1892. The Elkhorn Company is now extracting ore from the claim.

**MOUNTAIN KEY MINING COMPANY.**—It is reported that the new tunnel has encountered the vein, which is found to carry the same class of ore found in the upper workings.

LEWIS AND CLARKE COUNTY.

**MONTANA COMPANY, LIMITED.**—The directors have issued their report for the half year ending December 31st, 1891. The revenue account shows that the whole of the charges for the half year, including an expenditure of £2,990 15s. 6d. for machinery, properly chargeable to capital account, have been met out of revenue. On reference to the balance sheet, it is seen that the £4,000 held in suspense at last half year has been written off, out of the reserve fund, which now stands at £10,000. A balance of \$3,556 19s. 7d. is carried to the credit of the current half year ending June 30th. Up to December 31st, 1891, the mine returned a total profit of £688,624 16s. 11d. This has been appropriated as follows: (1) Dividends paid, £537,057 7s. 10d. (2) Loss at 31st December, 1884, written off out of profits, £23,765 18s. 9d. (3) Reserve fund invested in stores, etc., £10,000. (4) Depreciation, £9,657 9s. 3d. (5) Adjoining locations, machinery, and other purposes chargeable against capital, £102,567 1s. 6d. (6) Balance on December 31st, 1891, carried forward, £3,556 19s. 7d.; total, £688,624 16s. 11d. In addition to the above total profit there has been spent out of revenue upon exploratory works alone since 1884 the sum of £145,652 2s. 2d. During the six months ending December 31st, 1891, the mills crushed 41,566 tons, producing a yield in bullion bars and concentrates on assay of \$308,936.23, equivalent to \$7.43 per ton, in addition to which 7,300 tons of dam tailings were treated in the pans of the 50-stamp mill from August to December, yielding, on assay, \$35,053.14, making the total production \$343,989.37. The actual realized value, however, of the bullion and concentrates amounted to only \$309,638.11, the difference being \$34,351.26, or 10%.

The comparative results for the past four years are as follows:

Year	Work done. Feet driven.	Ore crushed. Tons.	Yield.	Dividends.
1888.....	6,499	83,745	\$1,024,593	17½%
1889.....	8,584	77,749	1,297,699	17½%
1890.....	10,698	81,835	1,097,343	10%
1891.....	5,815	80,271	789,754	5%

**SAPPHIRE AND RUBY COMPANY OF MONTANA, LIMITED.**—The bond of this company has expired,

and work has been begun by the Helena owners of the property. A cut to drain the property is being made, and a rim rock tunnel will be run for 75 ft.

**WHITLATCH-UNION-McINTYRE.**—The incline shaft has been opened to the depth of over 40 ft. This shaft follows a compact streak of pay ore 3 to 4 ft. in width. Rapid progress will be made in cleaning out and retimbering this incline and everything will be in readiness for the placing of the steam hoist and pump already purchased, and by the time the mill is built it is expected there will be an abundance of ore on the dump.

MEAGHER COUNTY.

**DIAMOND R. MINING COMPANY.**—On the 300-ft. level of the Moulton mine belonging to this company, a three-ft. vein is reported to have been uncovered, 18 inches of which runs 180 oz. silver per ton.

**TOP HAND.**—This mine, at Barker, is said to be looking well. The tunnel is in 500 ft. on the vein, which varies from 10 ft. to 16 ft. in width. Of the tunnel 400 ft. is in pay ore, 250 ft. of which is carbonate ore assaying 40% lead and 61 oz. silver; 150 ft. is in gray carbonate assaying 33% lead and 70 oz. silver. The vein, which is in a contact of lime and porphyry, has a pitch of 45%. Since December 1st the company has shipped 1,000 tons of ore and has 500 more on the dump; \$150,000 is estimated to be in sight.

SILVER BOW COUNTY.

**ALICE GOLD AND SILVER MINING COMPANY.**—The following is President Joseph R. Walker's statement to the stockholders for 1891: "The mines and mills of the company were run steadily, with slight exceptions, during the year. The bullion yield was \$970,073.05, including gold and silver; the gold was figured at \$20.67 per fine ounce, the silver at \$1.29, per fine ounce, the old standard value. The discount on silver was \$239,611.45. The bullion product in net gold dollars was \$730,461.60. The price of fine silver was very low on the average through the entire year—also less than the previous year. The company paid, during the year, \$75,000 in dividends. There was also paid the sum of \$37,262.57, balance due on the arrangement for the purchase of the Rising Star, Blue Wing, Midnight, Walkerville and an undivided one-half interest of the Pay Master lode mining claims, set forth in the annual statement of 1890, by which, briefly stated, the company was to mill and mine all ores taken out of these properties and receive \$23 per ton for the same, all above this figure contained in the ores to be paid to the owners on account of the purchase. There was paid during the year 1890 the sum of \$105,421.51 derived from these properties from all sources after allowing the Alice company \$23 per ton for all ores worked, making the total sum of \$142,684.08 in full settlement for the same. The titles to the property have been passed to the Alice company.

"The Blue Wing at the present time is the only one of these mines now worked. It is producing a good share of the ores sent to the mills of the company. The Rising Star is idle. At the last working of it the stopes looked well.

"It will be noted by reading the superintendent's report, that the machinery at the Alice shaft is in fine condition for working the same, a large new air compressor having been purchased, and now running for the deeper developments. A large amount of work was done on the Alice, notably the sinking of the main shaft from the 1,300-ft. level down to the 1,500-ft. level, cross-cuts being run from the shaft on the 1,400 and 1,500-ft. levels. This work was necessary for the permanent working of the mines. No work has yet been done toward connecting the 1,400-ft. level with the 1,300-ft. level. A raise will be started immediately from the 1,400-ft. level to connect with the winze which was started on the 1,300-ft. level north vein east of the cross-cut. The vein appears to have been disturbed in the lower workings. Nothing can be determined except by actual work, which will be prosecuted as fast as possible."

The report of the secretary, Louis H. Farnsworth, shows the total receipts of the year to have been \$1,018,184.66. The sum of \$49,342.46 was expended for permanent improvements; \$62,560.05 for prospecting and dead work; \$233,219.84 for ore extraction; \$250,677.98 for ore reduction; \$42,892.84, expense account and taxes; \$239,611.45, discount on silver; \$7,451.24, expressage on bullion; \$4,373.28, bullion reclamations; \$10,414.15, general supplies; \$37,262.57, purchase of property; \$75,000, dividends; \$5,378.80, net cash on hand.

RECAPITULATION.		
Average chlorinations.....		92.17
Average amalgamations.....		88.53
Average value per ton saved of gold.....	\$1.84	
Average value per ton saved of silver.....	22.70	
Total.....		\$24.54
Total number of tons crushed....		39,584½
Total product for the year in gold..	\$61,955.68	
Total product for the year in silver.	883,037.84	

Grand total.....	\$941,993.52
Average loss in tailings in ounces in both mills, 2.26.	
Total number days stopped, 23 days, 5 hours.	
Grand total bullion.....	\$970,073.05
Difference in favor bullion.....	\$25,079.53
Total number of tons crushed according to product, 39,584.27.	

The 80 stamps have been "hung up" during the year over 23 days, by reason of the breaking of the main line shaft and the erection of the new buildings and changing the machinery, steam and other piping incident to the taking down of the old and the erection of new buildings; also including the 10 days taken from the year which were added to the previous year. With the exceptions above enumerated, the 80 stamps have been in constant operation. The loss of quicksilver per ton of ore milled is about the same as in the previous year, being a fraction over three-quarters of a pound to the ton of ore milled.

**ANACONDA MINING COMPANY.**—It has been stated that President Oakes, of the Northern Pacific, has said that his road has made satisfactory arrangements for the transportation of the Anaconda matte to Three Forks, where a large refinery is to be built.

**BLUE BIRD MINING COMPANY, LIMITED.**—Much of the property of this company has been disposed of at sheriff's sale, including bullion, quicksilver and miscellaneous goods. The mine is filled with water to the 400 ft. level.

**BUTTE & BOSTON MINING COMPANY.**—This company, which had shut down its silver mill, has resumed operations again on ore from the Silver Bow mine as well as custom ore.

A strike has been made in the Anderson mine, lying between the I J C and the Ground Squirrel on the Parrot addition.

**COLUSA-PARROT.**—The hoisting works on this property, owned by W. A. Clark, were completely destroyed by fire April 3d; loss about \$30,000.

**EVALINE.**—A strike has been made in the Evaline, according to reports. The ore was encountered on the 140 ft. level west and is 16 in. in thickness. The ore is rich in both gold and silver. The lessees of the mine are Messrs. William Smalley and Reese Wampler.

**I. J. C.**—This property, on the Kemper addition to Butte, is being worked by the Anaconda Company. The shaft is now 200 ft. deep, and there are already 2,000 tons of high grade copper-silver ore in the bins.

**KITTY MORRIS.**—The bond on this mine for \$30,000 has been taken up by L. P. Olds and associates, of Bozeman.

NEVADA.

CHURCHILL COUNTY.

**NATIONAL NICKEL COMPANY.**—We learn at the office of this company, which owns mines near Lovelocks, that it is developing its property in a small way, with the view, if results are satisfactory, of eventually placing its stock upon the market. Ore is being extracted, some of it running as high as 40% nickel, but the greater portion much below that grade. This ore is placed upon the dump and is not offered for sale. The building of reduction work is not immediately contemplated. The officers of the company profess to be satisfied with the results obtained so far, and say they think they have a good mine.

ELKO COUNTY.

**DELMONTE MINING COMPANY.**—Raise 4, second level from North slope, has been extended 30 ft., showing seams of good ore. Hoisted during week ending March 28th: 14 cars of second class ore, assaying \$51 per ton.

**NEVADA QUEEN MINING COMPANY.**—Production for week ending March 26th was 8 tons, assaying \$309 per ton, and 100 cars of second class ore.

**NORTH COMMONWEALTH MINING COMPANY.**—Foot wall second level raise from north drift has been put up 15 ft. in good ore, last week produced 14 cars of second class ore, assaying \$49 a ton.

ESMERALDA COUNTY.

(From our Special Correspondent.)

It is, by private advices, reported that the Miner's Union at Candelaria has disbanded, and that the men formerly employed in the Diablo, Holmes and other mines are anxious to go to work for \$3 per day. The mining companies offered to establish a sliding scale of wages, but the proposition was refused last November by the Miner's Union, which demanded a uniform rate of \$3.50 per day.

HUMBOLDT COUNTY.

A large body of sulphur has been struck, it is reported, in Wise's mines west of Humboldt House. Men have been at work all winter and a large quantity of crude ore is ready for the refinery when it starts, as it will do soon.

LANDER COUNTY.

**BIG CREEK ANTIMONY MINING COMPANY, LIMITED.**—This company has just sold in London 32 tons of ore assaying 67.7% antimony.

NEW MEXICO.

SANTA FE COUNTY.

**SANTA FE COPPER COMPANY.**—For the past year the operations of this company resulted approximately as follows: Gross receipts, \$140,000; operating costs, \$116,000; net receipts, \$24,000, all of which was applied to wipe out back taxes and debts. The management has before it the subject of enlarging the productive capacity of the works. It is now able to treat 30 to 40 tons of ore per day, and has earned \$2,000 net per month on that output. It is recommended that the product be

greatly enlarged. Superintendent McLaughlin says he can furnish 200 tons of ore per day, but to do this he must have new machinery.

#### STORREY COUNTY—COMSTOCK LODE.

**BELCHER MINING COMPANY.**—The north drift on the 300 level is out a total distance of 191 feet from No. 2 raise. For the past 25 feet it has followed a streak of good ore, varying in width from 10 in. to 3 ft. The streak is still in sight in the face of the drift near the bottom, where it is 10 in. wide. The remainder of the face is in porphyry.

**KENTUCK CONSOLIDATED MINING COMPANY.**—The east cross-cut from the north lateral drift on the 160-ft. level advanced 33 ft. last week, and is now out 55 ft. It has crossed a streak of ore about one foot in width, giving fair assays, and on which it is the intention to sink.

**OVERMAN MINING COMPANY.**—The report for the week ending March 26th says that 126 tons of ore were extracted from between the 1,000 and 1,100 levels, of an average assay value of \$35.27.

(From our Special Correspondent.)

April 1.

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

Mine.	Tons extracted.	Tons milled.	Assay Value.	Mar. 26.	Mar. 19.
Con. Cal. & Va....	1,025	980	\$21.99	\$20.75	
Hale & Norcross..	293	380	.....	.....	
Savage.....	729	575	19.54	17.85	
Overman.....	126	.....	.....	.....	
Yellow Jacket....	345	.....	.....	.....	

\*Cars. †Car sample assay. \$35.27. Has discontinued shipping to Brunswick Mill. ‡Shipped to the Brunswick Mill.

**HALE & NORCROSS SILVER MINING COMPANY.**—After very lengthy arguments from counsel on both sides the court now has the suit of Fox vs. this company under consideration, but a judgment will not be handed down, in all probability, for some weeks.

Attorney Waters, for the defense, occupied nearly two days in argument, and was followed by Attorney Wood, who consumed no less than six days. The burden of these arguments was that if anything wrong had been done Levy (who is safe outside the court's jurisdiction) was the guilty party, and Hayward and Hohart had acted in good faith and within legal bounds. The matter of the three pan annex consumed a great deal of time. Attorney Woods admitted that the mill company had no right to work the slime in the annex, but said that as the value of the slimes worked only amounted to about \$16 per month, for that amount only could it be held. The balance—7,197 tons of slime—is still at the mill, and has an assay value of \$16 per ton. The concentrates worked at the Nevada and Mexican mills during the time at issue made a total of \$29,450, received from the sale of concentrates bullion, or, in other words, they saved only 2,700 tons of concentrates from 93,000 tons of ore worked. This would make a yield of about 55%, or \$21,276, allowing discount on silver, and this just about sustained the position taken by Evan Williams.

Arguments for the defense concluded with the claim that not only was there no fraud on the part of any of the defendants to the suit, but even Levy was justified in taking a bonus if he so chose without being charged with dereliction of duty, much less fraud, as alleged.

Ex-Judge McKissick opened the concluding argument for the plaintiff. The statements and figures made by the counsel for the defense were critically examined and their fallacies exposed. In tracing some of the unknown bullion deposited in the Carson Mint, Judge McKissick quoted the Carson Mint records of deposits by Peters, the clerk of the Bullion & Exchange Bank on account of agency of Nevada Bank, which showed a total of \$20,953.31. These deposits were made between March 14th, 1889, and June 26th, 1889. The amount received by the Nevada Mill Company between these dates was \$20,000 by check on the agency of the Nevada Bank, and, making allowance for discount, the two amounts correspond.

Another item counsel alluded to was the mint record, showing that \$70,000 had been deposited by the Mexican mill, a similar amount being also credited in Hayward's books as having reached him by way of the Carson Mint, Bullion and Exchange Bank and agency of Nevada Bank. Alluding to Evan Williams, in his position as hanker, counsel charged that he had refused to produce his books and show the court where \$1,000,000 of unknown bullion that had passed through his hands had gone to. By so doing he screened others and suppressed the evidence that would have proven the truth or falsity of the charges made.

The Court, addressing counsel, asked him to furnish an estimate of what he thought the plaintiff entitled to in the way of a judgment. The answer was, using Mr. Mackay's testimony as a basis, that the amount of which the company had been defrauded was \$1,872,426.55.

In concluding his argument Judge McKissick submitted the case by saying: "The defendants have asked for justice at the hands of the Court. The plaintiff joins in that prayer, and would urge upon your Honor that complete justice be done, even though the 'mill ring' be crushed to powder."

The case was then taken under advisement. \*\*

#### NORTH CAROLINA.

##### M'DOWELL COUNTY.

**MARION IMPROVEMENT COMPANY.**—The secretary of this company informs us that the mill erected for it recently by Fraser & Chalmers, of Chicago, is giving excellent results. A 5-ft. Huntington crusher is used, and with it a ton of quartz per hour has been worked. The company is now mining in three veins of free milling quartz, which yielded on a test run of 17 tons \$5.50 per ton in gold. Thus far the ore worked has been free milling, but since water level has been reached refractory ore has been encountered. All three veins have been found to widen and improve in grade with depth. The company is employing from 40 to 60 men, and expects to mill about 4,000 tons of ore this year. If results are satisfactory this plant will then be materially enlarged.

##### OHIO.

##### MUSKINGUM COUNTY

The work of prospecting for coal, near Chandlersville, has been stopped. A depth of 269 ft. was reached, but no coal was found.

##### STARK COUNTY.

A four foot seam of coal has been struck near Massillon, at depth of 250 ft.

##### PENNSYLVANIA.

##### COAL.

The Schuylkill Coal Exchange has issued a report dated Pottsville, March 31st, 1892, which shows the following collieries drawn to return prices of coal sold in the month of March, 1892, to determine the rate of wages to be paid, make returns as follows: (P. & R. C. & I. Co.) Boston Run Colliery, \$2.33; Schuylkill Colliery, \$2.25; West Shenandoah Colliery, \$2.27; Beechwood Colliery, \$2.33; Monitor Colliery, \$2.20; total, \$11.450; the average is \$2.29. The rate of wages to be paid for work for last two weeks of March, 1892, and first two weeks of April, 1892, is seven (7) per cent. below the \$2.50 basis.

Mine Inspector William McMurtrie, of the Seventh Anthracite District, has prepared his annual report, of which the following is the substance: The amount of coal mined during 1891 was 5,321,044.78 tons, an increase of 892,052.58 tons over 1890; average number of days worked, 194, against 166½ in 1890; number of fatal accidents, 56, increase of 17 over 1890; number of non-fatal accidents, 153, against 121 in 1890; average number of tons of coal mined per life lost is 95,018.65 tons, against 115,357 tons in 1890, being a decrease of 20,338.35 tons per life lost. The Philadelphia & Reading Coal and Iron Company employed 8,458 persons, worked an average of 200½ days, mined 2,523,546.20 tons, and had 23 fatal and 6 non-fatal accidents. The Mineral Railroad and Mining Company employed 1,822 persons worked 255½ days, mined 553,597.20 tons, and had 9 fatal and 8 non-fatal accidents. The Summit Branch Railroad Company employed 1,822 persons, worked 285½ days, mined 356,544.12 tons, and had 2 fatal and 17 non-fatal accidents. The Lykens Valley Coal Company employed 1,012 persons, worked 362½ days, mined 266,023.12 tons, had 3 fatal and 10 non-fatal accidents. The Union Coal Company employed 1,664 persons, worked 314½ days, mined 482,918.22 tons, had 7 fatal and 35 non-fatal accidents. L. A. Riley & Co., employed 1,041 persons, worked 197½ days, mined 376,823.14 tons, had 5 fatal and 9 non-fatal accidents. Individual collieries employed 3,296 persons, worked 217½ days, mined 769,591.58 tons, had 7 fatal and 14 non-fatal accidents.

Messrs. Watson, Brockerhoff & Rochester have options on 4,000 acres of coal in the Dixonville field and 5,000 acres on Blacklick and Yellow creeks, says the *Indiana Gazette*. In West Lebanon district they have made two-thirds payments on 3,500 acres, and have made arrangements for paying off the balance. In the vicinity of Plumville they have options on 3,000 acres and on 2,000 acres between Cookport and Hillsdale. Personally, Mr. Watson has 90 days' options on 3,000 acres in the vicinity of Greenville. In all there are controlled by these three men over 20,000 acres of the finest coal in Indiana county.

The law regarding the number of men to be carried in slope or shaft cars is being rigidly enforced. Mine Inspector Stein has lately made application to the Schuylkill County courts for a number of warrants for arrest for disregard for this law.

Messrs. Morgan, Moore & Bain, of Cleveland, O., have bought 237 acres of coal land on the Monongahela River, below Belleverson, from William J. Manown for \$30,000.

**LEHIGH & WILKESBARRE COAL COMPANY.**—The Nottingham mine of this company, having a greater output than any other colliery in the anthracite regions, is flooded, and will probably remain so for many months. The trouble began on the 2d inst., and the water rose so rapidly that on the 31st ult. all the large pumps inside were drowned and stopped. An attempt was made to lower the water by huge bailing buckets, but this was without avail. The lower lifts of the slope are under water, as is also the foot of the shaft. The trouble is supposed to arise from the leaking through of water from the Susquehanna River, which is very high and under which the slope extends.

**MAPLE HILL.**—The Maple Hill Colliery, at which extensive improvements have been made during the nine weeks of idleness, has resumed work. New seams of good coal are said to have been opened.

**SALTSBURG COAL COMPANY.**—The United States Court at Pittsburg has been petitioned to appoint a receiver for the Saltsburg Coal Company, whose mines are located in the northern part of Lackawanna County.

**WILLIAM PENN.**—The officials of the William Penn Colliery at Shenandoah, operated by E. & G. Brooks, of Birdsboro, deny the report that the colliery has been purchased by the Pennsylvania Railroad Company. The tonnage remains with the Philadelphia & Reading.

##### TENNESSEE.

##### HAMILTON COUNTY.

**WALDEN RIDGE COAL COMPANY.**—This company's coal land situated at Sale Creek, has been purchased for \$42,000 by Chattanooga parties who will develop it at once, it is said.

##### ROANE COUNTY.

**ROANE IRON COMPANY.**—This company, while pushing work on its main coal vein, discovered a new seam of black diamond coal and signs of abandoned workings.

##### TEXAS.

##### MILAN COUNTY.

A new coal mine has been opened in this county, 1½ miles from Rockdale. A 6 ft. seam has been cut at the depth of 30 ft.

##### UTAH.

##### JUAB COUNTY.

**BLACK DRAGON.**—A pocket of ore assaying 6,000 oz. silver per ton is reported to have been uncovered in this mine near Silver City.

**BULLION-BECK & CHAMPION MINING COMPANY.**—It was reported last week, but contradicted, that this Tintic property had been sold to English capitalists for \$3,000,000.

**RETRIBUTION.**—This mine was recently bonded to Oden parties for \$20,000. The bond is to run 18 months.

##### SALT LAKE COUNTY.

**EAGLE BIRD.**—A two-foot vein of rich ore is reported to have been uncovered in this mine situated at Bingham. The strike was made in the new tunnel, which is now over 200 ft. long.

##### SUMMIT COUNTY.

**NORTHLAND-MAYFLOWER.**—The trial of suit between these two mines has entered its second week. Numerous experts have been examined and their testimony is so conflicting that the result is in doubt.

##### VIRGINIA.

##### ALLEGHANY COUNTY.

**CASH.**—It is reported that an English syndicate has purchased and will operate these tin mines, located near Clinton Forge.

##### WYTHE COUNTY.

**WYTHE LEAD AND ZINC MINING COMPANY.**—This mine, of Austinville, is installing a plant for washing iron ores for sale and shipment, adding, also, a pug mill and retort machine to be driven by an electric motor. The electricity will be generated by water power, and will be transmitted 1,200 ft. The company will also have an electric haulage plant to move its lead, zinc and iron ores.

##### WASHINGTON.

##### OKANOGAN COUNTY.

(From our Special Correspondent.)

**WANICUT LAKE MINING AND MILLING COMPANY.**—This company has just been incorporated with a capital stock of \$100,000, divided into 1,000 shares of \$100 each. The officers of the company are Joseph Hanauer, president; Albert Held, vice-president; N. D. Hanauer, secretary; H. W. Holley, Jr., treasurer; Fred W. Wegner, general manager; F. D. Stanley, superintendent. A mill will be erected on its mining property located at Wanicut Lake. A five-stamp mill will be erected and will be so built as to increase to a ten or twenty-stamp as their mines are developed. Work is expected to commence about May 1st. A saw-mill is also contemplated as well as a steamer for the lake.

##### WEST VIRGINIA.

After a decision of the Supreme Court had declared that the "Screen and Anti-Scrip Law," a labor movement, was legal, four-fifths of the coal mines in the Kanawha Valley, W. Va., closed down and the operators say they will remain idle until the act is repealed. About 10,000 men are said to be out of employment. The act in question forbade the payment by scrip not redeemable in lawful money, and that the coal mined should be paid for according to the car weight, unscreened.

##### HARRISON COUNTY.

**GLEN FALLS COAL AND COKE COMPANY.**—This company has been incorporated, with a capital stock of \$30,000, to develop coal lands at Clarksburg.

##### MCDOWELL COUNTY.

**PEERLESS COAL AND COKE COMPANY.**—This company has been organized to develop coal mines, and manufacture coke, at Elkhorn, with a capital stock of \$150,000.

##### MERCER COUNTY.

**LOUISVILLE COAL AND COKE COMPANY.**—This company will erect 25 additional coke ovens. It now has 75.



FOREIGN MINING NEWS.

AUSTRALIA.

NEW SOUTH WALES.

**BROKEN HILL PROPRIETARY COMPANY, LIMITED.**—During the week ending the 24th ult. 5,076 tons of ore were treated, yielding 914 tons of lead, containing 197,964 oz. silver. The shares were quoted at £6 lbs. 6d. in Melbourne on the 24th ult.

CUBA.

Mr. Geo. W. Goetz, of Milwaukee, who has recently returned from Cuba, gives the following information concerning the iron mines on the Sierra Maestra Range, on the southeastern coast, in which American capital has been invested to considerable extent. The leading companies are the Juruago, in which the Bethlehem Iron Company and the Pennsylvania Steel Company are largely interested; the Spanish American Company, controlled by Charles L. Colby and his associates, Cleveland capitalists, and the Sigua Company, belonging to Philadelphia parties. The geological formation is somewhat peculiar, syenite, the underlying rock, being overlaid by coralline lime and stone, marbled where eruptive rocks, such as diorite, have broken through. These eruptive rocks, in Mr. Goetz's estimation, were the sources of the iron. On the lands of the Sigua company the ground was covered with immense boulders of rich ore, averaging over 60% iron and a very low percentage of phosphorus. The Juruago company has its property in full operation and is mining 2,000 tons daily. It shipped some 300,000 tons in 1891. The Spanish American and Sigua companies are merely developing their properties and building a railroad to the coast, some eight miles distant, as well as constructing docks and breakwaters. Labor, which Mr. Goetz says is inferior in quality, brings \$1 a day. A freight rate to the United States of \$1.75 a ton has been made, but there is an import duty of 75c. to be added. Mr. Goetz does not think that these mines are serious competitors with the iron mines east of the Alleghanies.

INDIA.

**MYSORE GOLD MINING COMPANY, LIMITED.**—The directors say in their report for the year ending Dec. 31, 1891, that the sales of gold realized £261,485, and the receipts from other sources amount to £1,856, making together £263,341. The total expenditure was £113,696, leaving a balance of £149,643. Add to this the balance of £61,935 from 1890, and the profit on the sale of Mysore and Champion Reef shares amounting to £1,530—together £64,465, there is a disposable sum of £213,108. This had been dealt with as follows: Balance dividend for 1890, £59,817; dividends on account of 1891, £34,231; written off for depreciation of machinery and plant, £2,005; sinking fund, £5,000; income tax and other items, £3,049; balance carried forward, £58,405. Out of this sum of £58,405 9s. 4d. a balance dividend for 1891 of 5s. per share, absorbing £56,250, was paid on April 10th, leaving a balance in hand of £2,155. The total distributed out of the profits for 1891 is £140,481, or 13s. per share, representing 65% upon the capital of the company.

During the year 40,353 tons of quartz were stamped, yielding 60,685 oz. of bar gold, or an average of 1 oz. 10 dwts. 11 grains per ton, which shows a considerable increase in the grade of the ore crushed over that of the year 1890. There were 20,821 tons of tailings treated, yielding 5,814 oz. of gold, or an average of 5 dwts. 14 grains per ton. The total bar gold amounted to 66,499 oz., and the result in standard gold was 67,112 oz., thus showing that the average quality during the year was higher than the standard. Eighteen additional pans for treating the tailings were set to work in May, but owing to scarcity of water during the last eight months of the year, the working of the tailings machinery was seriously interrupted. Had there been sufficient water it is estimated that a further 2,800 oz. of gold from this source alone would have been obtained. The erection of the additional 30 heads of stamps, with further plant for the treatment of tailings, has been greatly interfered with by drought and outbreaks of cholera, and it is not expected that they will be completed until the rainy season sets in, about May or June.

**NUNDBROOG GOLD MINING COMPANY, LIMITED.**—This company has declared a balance dividend for the year 1892, making a total distribution for the year of 5s. on the fully paid shares, and 1s. 5½d. on the partly paid shares, as compared with 3s. 10d. on the fully paid shares during the year 1890.

MEXICO.

CHIHUAHUA.

**CERRO COLORADO.**—This gold mine, near Batopilas, is reported to be doing nicely. The Australia mill, when there is water for the turbines, crushes 50 tons daily, but on account of the drought is obliged to suspend frequently. A 125-H. P. engine has arrived at Chihuahua and will soon be forwarded.

COAHUILA.

**COAHUILA COAL COMPANY.**—Some alterations are being made in the new coal washer recently erected by this company, and when they are completed it is expected that the plant will be run regularly at its full capacity. The company has a very difficult coal to treat at washing on account of the various impurities in the way of mud, slate and bony coal; some of which material is of specific gravity very little different from that of the

coal. Moreover, the coal cokes with difficulty. The company is shipping coke to Monterey, and also to San Luis Potosi and other points on the Mexican Central Railroad. At Monterey there are three smelters, two of 6 stacks each and one of 3 stacks, which use about one-third Coahuila coke in their fuel charge. Owing to the softness of the coke a greater proportion cannot at present be used, but the company is endeavoring to improve the quality of its coke in this direction, and hopes soon to have the matter under control.

DURANGO.

Concessions have been granted by the general government and supplemented by other concessions by the State government to a party of Americans who, it is reported, will at one begin to work the onyx mines of this State. A company composed of capitalists from St. Louis, Chicago and Philadelphia has been formed for the purpose, and will be ready to begin work in a very short time.

**BOLAÑOS.**—A strike is reported in these famous old mines, belonging to St. Louis parties.

**CANDELARIA.**—According to a Mexican authority the production of this mine, which is in litigation between Daniel Burns, of San Francisco, and Mark Birmingham, of New York, amounted to \$104,000 in December, and about the same sum in January.

**LUSTER MINING COMPANY.**—The annual meeting of this company, the headquarters of which are in Pittsburg, was held in that city April 5th. The following directors were elected: M. K. Salsbury, John H. Mueller, James K. Lanahan, William T. Chaffey, S. H. Murray, H. M. Preston, S. W. Black, Alexander Black and H. D. Gamble. H. D. Gamble, president of the company, stated that at the mine in El Oro, Durango, Mexico, some 65 men were employed and that the output since September last had been \$56,000 in gold. It was also stated that when the reduction works now under way were completed the capital stock would be increased from \$200,000 to \$500,000.

GUERRERO.

**GUADALCAZAR QUICKSILVER MINES, LIMITED.**—Mr. Robert Mackenzie, the resident engineer of this company, reports that the quantity of quicksilver drawn off for the week ending February 25th was 920 lbs.; for the week ending March 3, 950 lbs.

Mr. James Maclear, F. R. S. E., has made the following report to the company: "When I arrived at Guadalucazar on November 17th work had progressed well, and the first furnace was finished and the fire lighted on December 23d. Owing to the great want of skilled labor, much delay occurred in completing the condensers, and it was not until February 4th, 1892, that the furnace with its condensers was actually set to work. All went well from the start, and in a very few hours mercury was running from the condensers. I am thoroughly satisfied with the furnace and the condensers, and the chimney draught will, I think, prove quite sufficient for the condensers of the two furnaces, without the necessity of any "fan" or mechanical draught. Owing to the class of fuel and its only yielding a comparatively short flame, I thought it advisable to alter the furnace and put in four fires, instead of two as originally designed. The result has shown this to be an advantage. The work in the mines has been reduced very much during the erection of the furnaces, etc., owing to the money available being insufficient to do both; but the ores exposed seem ample in the meantime for the present furnace, and for the second one, which will soon be at work.

HIDALGO.

M. P. Boss, of San Francisco, is increasing the capacity of his continuous process custom mill at Pachuca. The stamps in the mill have the peculiarity of being driven by single armed cams at the rate of 130 drops a minute.

**HIDALGO MINING COMPANY.**—The report of this company for 1891 show net profits of \$116,000, Mexican silver. It proposes to increase its milling capacity.

**UNION REDUCTION WORKS.**—The Kroencke barrel amalgamation process is being introduced at these works at Pachuca. The use of salt, sulphate of copper, metallic copper and zinc amalgam is comprised in the process which is in successful operation in various portions of South America.

LOWER CALIFORNIA.

El Boleo Copper Company has asked the government for a concession to build jetties at the port of Santa Rosalia for the better security of the large ships that come to that port from Europe and the United States.

The salt deposit on Carmen Island, Gulf of California, is being developed by a company which recently bought it for \$500,000. The output is about 300 tons daily. Much of it will be sent to Mazatlan, to be used in the mines of Sinaloa for the reduction of refractory ores mined in that district.

**EL BOLEO DE SANTA ROSALIA.**—This French company produced 460 tons of copper in December, 1891, and 475 in January, 1892. The company employs 1,300 men in its 20 mines, of whom 900 are miners and the balance laborers.

**LOWER CALIFORNIA SULPHUR MINING AND MANUFACTURING COMPANY.**—This company has been organized in this city to work sulphur deposits situated in the Cocopah range of mount-

ains, west of the mouth of the Colorado River, in Lower California, in a country which until now has been almost entirely uninhabited on account of its sterility, excessive heat, and scarcity of drinking water. As the ground covered by the concession is said to contain valuable deposits of alum and nitre, as well as sulphur, and as the distance to tidewater is very short, it is thought that a thriving industry will be formed in the until now barren volcanic waste, where even the mail carrier has to take a mule along to carry drinking water for himself and his animals.

CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, April 8.

**Heavy Chemicals.**—With the exception of caustic soda there is no change in the market for heavy chemicals. Stocks are light owing to small shipments, and there has been a fair jobbing demand, which has tended to stiffen the market. The price of caustic soda has been advanced 5 cents, but the other chemicals are quoted as last week.

Quotations are as follows: Caustic soda, 70%, 2.95@3.05c.; 74-76%, 2.97½@3.07½c.; 77%, 3.10c. Carbonated soda ash, 48%, 1.62½c.; 58% (basis 48%), 1.50c. Alkali, 48%, 1.60@1.65c.; 58%, 1.45@1.47½c. Bleaching powder, 2.15@2.20c.; sal soda, English, 1.02½@1.05c.; domestic, 90@1c.

**Acids.**—Manufacturers continue to report a fair business in all the acids especially in sulphuric. Stocks are by no means heavy and we hear of higher prices in some cases. This, however, has not been borne out by our own inquiries. We continue to quote acid per 100 lbs. in New York, in lots of 50 carboys or more: Acetic, \$1.60 @ \$2, according to quality; alum, lump or ground, \$1.55@1.80; muriatic, 18", \$1; 20", \$1.12½@1.25; 22", \$1.25; nitric, 40", \$4; 42", \$4.50@4.75; sulphuric, 90c. @ \$1.10; mixed acids, according to mixture; oxalic, \$7.25@7.75. Blue vitriol is quoted all the way from \$3.25 to \$3.50. Glycerine for dynamite 11½@12½c. according to quality and quantity.

**Brimstone.**—This market is firm but considerably excited owing to the fluctuations in prices. Not much actual business is being done, due probably to the advance. We quote this week on the spot, best unmixed seconds, \$25; best unmixed thirds, \$24.50. To arrive, future shipments, \$24.50 for best unmixed seconds, and \$23.75 for best unmixed thirds.

**Fertilizers.**—There is a better feeling in the market of fertilizing chemicals. A small business has been done in small lots, and stocks of some grades are by no means heavy. Prices show a slight advance as follows: Sulphate of ammonia, \$2.90 for home goods and \$2.90@2.95 for gas liquor. Dried blood, \$1.95@2 per unit for high grade and \$1.85@1.90 for low grade. Acidulated fish scrap, \$11@12 factory. Dried scrap, \$23.50@24. Azotine, \$1.85@1.90. Tankage, \$17.50@21, according to grade. Bone meal, \$22.50@23.50.

**Double Manure Salts.**—Quotations are as follows for lots of from 10 to 50 tons ex-vessel New York: 48-53% \$1.13½@1.23½; 80-85% \$1.81½@1.89; 90-95% \$2.16@2.28½.

**Kainit.**—There has been a fair inquiry from the North. Prices, New York and Philadelphia, are: \$8.75 for invoice weight and \$9 for actual weight.

**Muriate of Potash.**—Arrivals during the week aggregated 500 tons, all of which went into consumption. The demand just now is light. Syndicate prices rule.

**Nitrate of Soda.**—Quotations are \$1.80@1.82½ ex-store. Futures are held at \$1.65@1.67½. We have received the following interesting statistics from Messrs. Mortimer & Wisner, the well-known nitrate brokers in this city:

	1892.	1891.	1890.	1889.
	Bags.	Bags.	Bags.	Bags.
Imported into Atlantic ports from West Coast S. A. from Jan. 1, 1892, to date.....	161,465	121,474	236,365	80,173
Imported into Atlantic ports from Europe.....	.....	2,415	.....	.....
.....	161,465	123,889	236,365	80,173
Stock in store and afloat April 1, 1892, in New York.....	67,333	30,895	76,437	54,174
.....	.....	.....	.....	1,500
.....	.....	.....	.....	1,500
.....	5,000	2,500	3,000	1,500
To arrive, actually sailed.....	254,000	179,500	.....	.....
Visible supply to Aug. 1, 1892.....	326,333	212,895	.....	.....
Additional charters.....	130,000	229,500	486,900	316,700
Total supply, when shipped..	456,333	442,395	566,337	373,874
Stock on hand, Jan. 1, 1892.....	53,585	36,454	22,009	87,043
Deliveries past month.....	72,333	47,918	75,535	11,857
Deliveries since Jan. 1 to date.....	142,717	126,948	178,837	110,042
Total yearly deliveries.....	.....	634,207	673,679	546,589
Prices current Apr. 1, 1892.....	1¾c.	2¼c.	1.70@1.72½c.	2¼c.

Phosphates.—Nominal prices at Charleston are \$5 for best grades of kiln dried rock alongside of buyers' vessels. Some grades which while not inferior do not rank so high are offered at \$4.50, guaranteed 57%. Undried is quoted at from 75c. to \$1 less. Some sales are reported at the reduced prices; more business would have been done if the miners had not supplied the heaviest consumers previous to the reduction in prices.

## NOTES OF THE WEEK.

The first annual general meeting of the United Alkali Company, Limited, was held in Liverpool on the 24th ult. Sir Charles Tennant, Bart., honorary president of the company, presided. The directors of the company, in their report, considered that they had every reason to be satisfied with the results of the first 14 months' working, and with the position and prospects of the company. The profit and loss account on the working of the 14 months, which ended on the 31st of December last, showed a net profit of £536,870 3s. 3d., which the directors proposed should be divided as follows: Interim dividend on preference shares at 7% per annum, for eight months to June 30th, 1891, paid August 28th, 1891, £95,152 0s. 11d.; dividend at 7s. per share, for six months to December 31st, 1891, payable March 26th, 1892, £96,355 3s. 3d.; interim dividend on ordinary shares at 5% per annum, for eight months to June 30, 1891, paid Aug. 28, 1891, £84,652 5s. 7d., dividend at 5s. per share for six months to Dec. 31, 1891, payable March 26, 1892, £70,500 18s. 6d.; amount to be placed to the reserve fund, £190,209 15s.; total, £536,970 3s. 3d. It was stated in the report that during the year 1891 the works at St. Helens of Messrs. J. C. Gamble & Son, and of Mr. D. M'Kechnie had been acquired by the company, the vendors taking practically the whole of the purchase money of their respective works in shares of the company. Colonel Gamble had become a vice-president in place of Sir Edward Sullivan, Bart. (resigned), and Messrs. D. M'Kechnie, J. C. Gamble had joined the board of directors.

## Liverpool. March 33.

(Special Correspondence of Joseph P. Brunner & Co.) Trade is quiet all round in heavy chemicals, although prices are well maintained.

The colliers' strike in the Durham district still continues and is giving trouble to the Tyne chemical manufacturers, although, so far, it has not affected this market.

Soda ash is scarce and manufacturers are declining to quote except for small lots. The spot quotations for commoner qualities are nominally unaltered as follows: Caustic ash, 48% 45 6s. 3d. per ton, 57% 58% 46 7s. 6d. per ton, Carb. ash, 48% 45 9s. 9d. per ton, 58% 46 12s. 9d. per ton; Ammonia ash, 58% 46 7s. 6d. per ton, all net cash. Prime brands are held for a premium on above figures. Soda Crystals are quiet at £3 7s. 6d. to £3 10s. per ton less 5%.

Caustic Soda.—The plant in the Lancashire district is being started again this week in anticipation of the spring demand, which demand, however, is late in setting in, and shows little signs at the moment. At present there is only a hand-to-mouth business passing, but at the same time prices are maintained as follows: 60%, £9 7s. 6d. per ton; 70%, £10 10s. per ton; 74%, £11 10s. per ton; 76%, £12 7s. 6d. to £12 15s. per ton, all net cash. For parcels under 10 tons, 5s. per ton extra is charged.

Bleaching powder inactive but steady, at £7 15s. to £8 per ton net cash in hardwood packages; for all quarters except United States and Canada.

Chlorate of potash in small compass for prompt delivery, and 7d. per lb., less 5%, is nominal price for any delivery up to end of June, although there are some resale parcels to be had at 6½d. For the last six months the syndicate quotes 6½d. per lb., while resellers would probably accept 6¼d. The rush on this article, however, is over, and resellers show more anxiety to get rid of their holdings.

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

Sulphate of ammonia has gone easier, and nearest spot values are about £10 5s. to £10 7s. 6d. per ton for good grey, 24%, and £10 10s. to £10 12s. 6d. for 25%, both in double bags, less 2% f. o. b. here.

March 28.

## (Special Report by Geo. G. Blackwell.)

Minerals.—Manganese: Arrivals this week are practically nil, while a fair amount of business has been done, and stocks are considerably reduced; prices therefore continue firm, with an upward tendency. Borate, 6½d. per lb.; sulphate, £21 10s., oxalate, 1s. 6d. per lb.; chloride, £15; carbonate, £12 10s., steady. Magnesite: Raw lump remains flat; raw ground, \$6 10s. and calcined £12 10s. Bauxite (Irish Hill brand) brisk at full figures; lump, 20s; seconds, 16s. and thirds, 12s. Barytes: Carbonate continues scarce; for all qualities, 90s. to 95s.; nuts, 70s. to 80s.; while finest white sulphate is steady. Emery stone: Best qualities firm, bringing full prices; No. 1 lump, £5 10s. to £6; smalls, £5 to £5 10s. Fullers' earth quiet: best lump, 55s.; fine impalpable ground, 47. Chrome ore of high percentages continues scarce both for spot and forward delivery, bringing full figures. Antimony ore and metal considerably easier. Asbestos firm. Plumbago brisk; Spanish, £5; best Ceylon lump at last quotations; Italian and Bohemian, £4 to £12 per ton; "Founders," £5 to \$6. Ground mica, £45 to £50. China clay steady; com-

mon, 18s. 6d.; good medium, 22s. 6d. to 25s.; best, 30s. to 35s. (at Runcorn).

## MINING STOCKS.

[For complete quotations of shares listed in New York, Boston, San Francisco, Baltimore, Denver, Kansas City, Deadwood, Dak., Pittsburg, St. Louis, London and Paris, see pages 416 and 418.]

NEW YORK, Friday Evening, April 8.

The market for mining stocks is dull; if the majority of brokers are to be believed it is *very* dull. The interest in the silver stocks is next to nothing; in the gold stocks it is not much greater. During the past week prices have declined somewhat and sales have been small.

Trading in the Comstocks has been light and devoid of any features of interest. We note sales of Comstock Tunnel bonds at 13@20c. The stock was dealt in to the extent of 17,500 shares at 12@17c. There was a sale of 100 shares of Consolidated California & Virginia at \$5. An equal number of shares of Best & Belcher was sold at \$2.25. No other sale of Comstock stocks is reported.

Among the Tuzenarora stocks we note sales of 600 shares of Navajo at 15@19c., and 100 shares of North Belle Isle at 30c.

California gold stocks were in very fair demand during the week. There were sales of 200 shares of Bodie Consolidated at 45@50c., and 100 shares of Plymouth at \$1.70. The sales of Standard Consolidated were larger than for many a month, aggregating 3,245 shares at \$1.40@1.75. Brunswick Consolidated shows sales of 15,300 shares. The stock declined steadily during the week from 18c. to 13c.

The Colorado stocks were in but little demand during the week. Lacrosse shows a sale of 500 shares at 5c. Chrysolite was dealt in to the extent of 1,500 shares at 21@23c.

Ever since the price of Leadville Consolidated began its present decline there have been sundry rumors about a stock deal which were not at all complimentary to the directors of the company. No names were mentioned; it was said only that several "insiders" were concerned. Practically the sum and substance of the rumors amounts to this: When a dividend of 3 cents per share was declared last December several directors are said to have stated unofficially that the company's property was in first rate condition, that it was likely to remain so, and that dividends would, in all probability, be declared at regular intervals. It has not been alleged that any official information to this effect was ever given out, but, brokers say, the utterances of certain officials led people to believe that regular dividends would continue.

In consequence of this information the price of Leadville stock advanced until it reached 30 cents per share or thereabouts. The royalties paid by the lessees had been accumulating until there were enough funds in the company's treasury to declare another dividend. About this time the annual meeting was held, but there was not a quorum present, consequently no action could be taken. It is intimated that the absence of a quorum was preconcerted and prearranged by the aforementioned "insiders," in order that a dividend might not be declared, although there was about \$21,000 in the treasury.

Now, say the indignant brokers, the motive for this was that the "insiders" sold heavily at 25c. to 30c., and now wish to buy back the stock at lower figures; and their action in absenting themselves from the meeting was calculated to depress the price of the stock until now it is freely offered at 17c. The brokers who recommended the stock to their customers as an investment now declare that they have been victimized by the insiders.

A representative of the ENGINEERING AND MINING JOURNAL called upon Mr. C. A. Cameron, Secretary of the Leadville Consolidated Mining Company. In answer to the rumors mentioned in the preceding paragraph Mr. Cameron said: "The statement that 'insiders'—by which term I suppose is meant the directors—have sold heavily of late is not true. I can state positively that since the last dividend was declared no large block of the stock has been sold. As to the dividend question, I can only say that the company is not making any money at present, not even clearing expenses, and no one can expect the directors to be so short-sighted as to dispose of all the money now in the treasury and thus leave none for taxes or any emergency. I have had many inquiries, especially from brokers, regarding the condition of the mine. To this I have stated the facts, and this is the reason, I suppose, why I have been accused of bearing the stock."

During the present week the sales of the stock aggregated 1,200 shares at 17@19c.

Phoenix of Arizona shows sales of 600 shares at 45@46c.

In answer to numerous inquiries received by us concerning the suit of the State of New York against the Horn Silver Mining Company of Utah, (see ENGINEERING AND MINING JOURNAL of March 12th, page 306), the amount of the judgment rendered against the company by the Supreme Court of the United States was between \$50,000 and \$60,000.

Boston. April 7.

(From our Special Correspondent.)

The market for copper stocks has relapsed into a state of inactivity, much to the disgust of operators who have been anticipating a lively market with higher prices in sympathy with the advance in ingot copper. There has been no disposition to part with holdings, but at same time no desire is manifested to load up even at the lower prices prevailing, and we see no indications of any improvement at present. To-day being a holiday the Exchange is closed, and there is nothing doing on the street.

Boston & Montana was dealt in only to the extent of 1,200 shares for the week, prices ranging \$42¼ to \$43 with the lower figure as the closing price. Butte & Boston declined to \$15¼ on small sales.

Calumet & Hecla has held fairly firm; a small lot sold at \$265, but later sales were made at \$270. Tamarack was weak, and declined to \$165, but there is no pressure to sell it, and an order to purchase a hundred shares would put it up \$5 very easily.

Franklin has ruled steady at \$15@15¼, and is in good demand, but does not come out very freely. Centennial has been weak and declined to \$10. Oseola declined from \$32 to \$31¼, with small sales. Atlantic was steady at \$12¼@12½.

Santa Fé sold at 40c., and Bonanza at 47½c. Allouez sold at \$1, and Kearsarge was entirely neglected, no sale being reported for the week.

In silver stocks Dunkin declined to 37½c.; Crescent sold at 12½c., and Napa Quicksilver advanced to \$6.

St. Louis. April 7.

(From our Special Correspondent.)

Mining matters have been fairly active this week, though the trading, as last week, was confined to one or two stocks. Prices were, on the whole, weaker and several properties show a decided loss. This is noticeably the case with Granite Mountain. It was confidently expected that the regular dividend would be declared, and when the announcement was made that it had been passed the effect was most depressing on the prices, and even now the stock appears weak at \$13. Opening at \$13.25, 120 shares sold at \$13.50@13 on Saturday, and closed at \$12.75 bid. On Monday 125 shares sold at \$13.75, and Tuesday 75 shares brought \$13, the closing figure.

Central Silver, the only low priced active stock on the market, did a large business at a declining price and from an opening of 2½c. is now quoted at 1½c. On the opening 14,300 shares sold at 2½@3c., and 22,000 shares went the next day at 2@3c. On Saturday 2,600 shares brought 3@3½c. On Monday 14,000 shares brought 2@3c. and 5,000 shares sold on Tuesday at 2c.

Bi-Metallie was very strong all the week and despite the passing of the dividend and low silver quotations appeared very firm. Opening at \$2, 60 shares changed hands, and on Monday 10 shares brought \$22, the market closing at \$21.50 bid and \$22 asked.

Elizabeth opened at 45c. and sold down to 42½c. on a 700 share sale. One thousand seven hundred shares the next day brought 42½c. On Monday a slight boom raised the stock from 43½c. to 47c., but it fell back again to 45c. It is now bid at 42½c.

American & Nettie shows a decline of 11c. this week, and from a 71¼c. opening is now quoted at 60c., but one sale of 100 shares at 70c. was made this week.

Yuma had a sale of 100 shares at 5c., the market opening at 4c. and closing weak at 3c.

Adams dropped from 97¼c. to 95c., and Pat Murphy rose from 2c. to 3½c.

San Francisco. April 2.

(From our Special Correspondent.)

During the week business on Pine street has been discouragingly dull and the combined trading of the brokers has been scarcely sufficient to keep the clerks in one office busy. The dearth of news from the Comstock, the depression of silver and the conclusion of the Hale & Norcross suit have all combined sufficed to bring about the present state of stagnation. Arent the Hale & Norcross situation it is said that arrangements with the Occidental mill are not likely to be consummated, but a lease of the Brunswick mill is reported to be now under consideration.

Albeit trading has been so limited during the week, values have not shrunk as much as might have been expected. To illustrate how entirely the market here is independent of the legitimate means that usually affect values, and how the market has been manipulated for the sole benefit and advantage of the "insiders," it is of interest to note that in 1886, after the last "deal" of any importance, the lowest price at which the Comstocks sold was \$1,235,000. There was then collected in assessments \$640,000, and the Comstocks were put up to \$46,180,000. Since then there have been collected in assessments \$9,389,000, paid in dividends \$2,775,000, and the Comstocks are selling now for \$3,030,000. In December, 1890, the Comstocks sold for \$3,955,000; there was then collected in assessments \$770,000, when the aggregate market price became \$13,260,000. Since that inflation in the middle of last year \$2,168,000 has been collected in assessments, \$216,000 paid out in dividends, and now the stocks are selling at \$3,030,000.

During the past week the North End Comstocks have been heavy, Consolidated California &

Virginia selling to-day for \$5, a shrinkage of 25c. during the week; Ophir for \$2.90; Sierra Nevada, \$1.60; Union Consolidated, \$1.50; Mexican, \$1.55, and Utah 25c.

Of the middle group Chollar was ruling this morning at \$1.15, Hale & Norcross at \$1.55, Potosi at \$1.35, Savage at \$1.50 and Best & Belcher at \$2.25.

The Gold Hill and South End stocks have, for the most part, been steady, and to-day the demand for Alta was active at \$1, an advance of 3c. on the week's trading. Challenge ruled at 85c., Crown Point at 80c., Lady Washington at 20c., Occidental at 35c., Seg. Belcher at 40c. and Silver Hill at 5c.

Scattering sales of outside stocks have been made with Bulwer at 50c., Commonwealth at 15c., Nevada Queen at 45c. and North Belle Isle at 30c. These prices are an advance on those ruling a week ago, but the sales have been light.

SAN FRANCISCO, April 8th. (By telegraph.)—The opening quotations to-day are as follows: Best & Belcher, \$2.45; Bodie, 40c.; Belle Isle, 15c.; Bulwer, 4c.; Chollar, \$1.05; Consolidated California & Virginia, \$4.70; Gould & Curry, \$1.40; Hale & Norcross, \$1.35; Mexican, \$1.75; Mono, 50c.; North Belle Isle, 25c.; Navajo, 15c.; Ophir, \$2.75; Savage, \$1.45; Sierra Nevada, \$1.60; Union Consolidated, \$1.40; Yellow Jacket, \$1.05.

**MEETINGS.**

Bulwer Consolidated Mining Company, at the office of the company, room 33, No. 309 Montgomery street, San Francisco, Cal., April 13th, at 1 P. M.

Champion Mining Company, at the office of the company, room 10, No. 320 Sansome street, San Francisco, Cal., April 12th, at 3 P. M.

Florida Hill Mining Company, at the office of the company, room 20, No. 331 Pine street, San Francisco, Cal., April 15th, at 2 P. M.

Iron Silver Mining Company, at the office of the company, No. 52 Broadway, New York, May 3d, at 12 o'clock noon. Transfer books close April 28th and reopen May 7th.

**DIVIDENDS.**

Standard Mining Company, dividend No. 78 of ten cents per share, aggregating \$10,000, payable April 26th, at the office of the Farmers' Loan and Trust Company, New York City.

**ASSESSMENTS.**

COMPANY.	No.	When levied.	D't'nt' in office.	Day of sale.	Amt. per share
Andes, Nev.	38	Mar. 8	Apr. 11	Apr. 29	.25
Belcher, Nev.	43	Mar. 8	Apr. 12	May 3	.50
Best & Belcher, Nev.	51	Mar. 3	Apr. 7	Apr. 29	.25
Bullion, Nev.	3	Mar. 17	Apr. 21	May 11	.25
Con. New York, Nev.	7	Mar. 10	Apr. 12	May 5	.10
Crown Pt., Nev.	57	Mar. 15	Apr. 19	May 10	.50
Fall River Cons., Cal.	7	Feb. 24	Apr. 2	Apr. 25	.02
Hale & Norcross, Nev.	101	Mar. 24	Apr. 28	May 20	.50
Head Center & Tranquility, Ariz.	4	Mar. 14	Apr. 19	May 12	.03
Kentuck Cons., Nev.	3	Mar. 22	Apr. 26	May 19	.10
Lew Wallace, S. Dak.	3	Feb. 16	Apr. 18	May 7	.001½
Little Pittsburg, Utah	1	Feb. 23	Mar. 28	Apr. 13	.01
Vodoc Chief, Idaho	1	Jan. 28	Mar. 21	Apr. 11	.00½
Montreal, Utah	...	Feb. 17	Mar. 26	Apr. 13	.10½
Norway, Utah	...	Dec. 24	Feb. 1	July 21	.02
Original Keystone, Cal.	12	Mar. 4	Apr. 14	May 7	.10
Peer, Ariz.	9	Feb. 21	Apr. 6	Apr. 28	.10
Pine Hill	1	Feb. 11	Mar. 24	Apr. 15	.04
Siskiyou Co., Cal.	3	Mar. 15	Apr. 22	May 1	.01
Telegraph, Cal.	3	Mar. 8	Apr. 16	May	.01½
Utah, Nev.	14	Mar. 8	Apr. 12	Apr. 29	.25
Weldon Ariz.	5	Feb. 2	Mar. 15	Apr. 14	.05

**PIPE LINE CERTIFICATES.**

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.					
	Opening.	Highest.	Lowest.	Closing.	Sales.
Apr. 2	57¾	57¾	57¾	57¾	3,000
4	57¼	57¾	57½	57¾	25,000
5	57¾	57¾	57¾	57¾	3,000
6	57	7	56½	56½	38,000
7	56½	57	56½	57	6,000
8	56½	57	56½	57	6,000
Total sales in barrels					75,000

**COAL TRADE REVIEW.**

NEW YORK, Friday Evening, April 8th. Statement of shipments of anthracite coal (approximate), for week ending April 2d, 1892, compared with the corresponding period last year:

Regions.	April 2, 1892.		April 4, 1891.		Difference.
	Tons.	Inc.	Tons.	Inc.	
Wyoming Region..	372,541	Inc. 9,311	277,230	Dec. 29,148	
Lehigh Region.	114,908	Dec. 29,148	144,356	Inc. 55,857	
Schuykill Region.	229,089	Inc. 55,857	173,232	Dec. 29,148	
Total.....	716,538	Inc. 121,720	594,818	Dec. 29,148	
Total for year to date.....	9,287,931	Inc. 817,409	8,470,522	Dec. 29,148	

PRODUCTION OF BITUMINOUS COAL for week ending April 2d, and year from January 1st.

EASTERN AND NORTHERN SHIPMENTS.			
	1892.		1891.
	Week.	Year.	Year.
Phila. & Erie R. R.	1,061	24,253	35,725
Cumberland, Md.	87,445	831,254	957,342
Barclay, Pa.	3,421	52,582	40,264
Broad Top, Pa.	15,533	150,550	154,106
Clearfield, Pa.	77,088	924,891	1,075,751
Allegheny, Pa.	19,879	288,064	369,651
Beach Creek, Pa.	42,187	578,120	572,427
Pocahontas Flat Top.	47,961	622,771	555,076
Kanawha, W. Va.	49,072	617,838	521,120
Total .....	343,405	4,090,323	4,251,458
WESTERN SHIPMENTS.			
	1892.		1891.
	Week.	Year.	Year.
Pittsburg, Pa.	27,237	331,777	258,630
Westmoreland, Pa.	33,588	465,507	493,339
Monongahela, Pa.	8,761	114,627	136,910
Total.....	71,586	911,911	889,379
Grand total .....	414,991	5,002,234	5,140,837

PRODUCTION OF COKE on line of Pennsylvania R. R. for the year ending April 2d, 1892, and year from January 1st, in tons of 2,000 lbs.: Week, 105,871 tons; year, 1,562,730 tons; to corresponding date in 1891, 808,112 tons.

**Anthracite.**

The market is quiet; the trade is virtually between seasons. The buyers, although their stocks were well exhausted in the winter, have not commenced their regular spring purchases, though when they do commence they are likely to buy heavily. With the companies stocks are light now and everyone is following restrictive tactics and keeping down to the allotment. Collieries in Pennsylvania, as a rule, are running on short time. All the Reading Coal and Iron Company's collieries shut down on Thursday evening resuming work on the following Monday. The old October circular for the line trade has been changed, although it has never been adhered to, and the following prices named to manufacturers and large consumers at the mine: Egg, \$2.75; lump and steamboat, \$2.65; broken, \$2.25; broken and Highland egg, \$2.35; stove, \$2.40; chestnut, \$2.25; pea, \$1.25.

Governor Abbot has vetoed the "Reading bill," the blow has fallen, but President McLeod has received it apparently with indifference. It would have strengthened the deal somewhat, but the general opinion is that it will get along without the Governor's signature. The action is looked upon with indifference by the coal producers.

The sub-committee of the House of Representatives will report, it is said, in favor of an investigation into the deal pursuant to Congressman Stout's resolution.

**Bituminous.**

The market has a slightly stronger tendency. Some contracts have been made, but others are still pending. This hesitancy or delay on the part of buyers is, perhaps, the only unfavorable feature. The shifting, uneasy feeling of the past few weeks seems to have departed. It is stated that prices will be maintained if not materially advanced; nor is an advance unlikely, as many operators are recognizing the necessity of firmer figures for their product. During the past week the lack of cars on the Baltimore & Ohio has seriously inconvenienced Cumberland operators. There has been a plentiful supply, however, on the Pennsylvania, and as a consequence the Clearfield operators have worked to better advantage.

It is said that the New River operators have, in their eagerness to make new trade, rather overburdened themselves with contracts which they will find difficult to fulfill at the end of the year, and as these operators have been responsible for the greater portion of the unsteadiness during the past few months, the others will be rather disposed to put the screws on them, should they be forced to draw upon the outside fields to make their contracts good.

We are informed by Messrs. Castner & Curran that the statement in our last issue that the White Star contract have been awarded to the Berwind-White Coal Mining Company was an error, as it remains with them for the Pocahontas Coal Company. Stocks at the seaboard are light, and there seems to be an accumulation of cars at the ports. Vessels are plentiful; ocean freights remain unchanged; 70@75c. to Sound ports, and 80c. to Boston or Salem. The tolls on the Pennsylvania, according to current rumor, have been fixed, but have not been made public. It is possible that, as yet they are unsettled, and will be determined at to-day's meeting of the railroad presidents.

**NOTES OF THE WEEK.**

Having completed a traffic agreement with the West Virginia Central, the Baltimore & Ohio, it is stated, will build from Uniontown to Morgantown. The remainder of the connection between Uniontown and its main line will be made by the change of gauge of the already purchased Grafton & Greenbrier Railroad. By the traffic agreement Messrs. Blaine, Elkins and Senator Davis will have a Pittsburg outlet for their products of coal, coke and iron.

One of the probabilities of the new adjustment of coal freight rates is a season of freight rate smashing by the Hocking Valley railroad. The change of rate from 90 to 85 cents per ton, the same as paid by Ohio operators, does not improve conditions sufficiently to suit the Pittsburg operators. They believe the new schedule only requires the Hocking Valley railroad to make a proportional cut of five cents in the market. What

was wanted was a reduction of 20 or 25 cents on the rate to the lakes, which would enable them to compete with the Hocking Valley roads. It is claimed that the Pittsburgh roads could fix a rate of 65 or 70 cents and still make money.

Some of the Cumberland coal companies are having cars built at the South Baltimore Car Works. The Georges Creek Coal and Iron Company is to have one hundred painted bright red with black lettering; Black, Sheridan & Wilson are to have 100 blue ones, and the Consolidation Coal Company one hundred and fifty yellow ones, while the Baltimore & Ohio takes five hundred painted in their usual color.

**Buffalo.**

(From our Special Correspondent.) April 7.

There is nothing special to note in the coal trade at Buffalo. Prices are unchanged. In a few days there will be the usual demand for bituminous for vessel use, as well as for anthracite for shipment West.

Generally speaking, the anthracite coal trade is in excellent condition. Prices of coal to retailers and jobbers have not been advanced and consumers find quotations unchanged. The output of the mines this year to April 1st exceeds that of 1891 by about three-quarters of a million tons.

It is said that the capacity of the vessels wintering here is about 180,000 tons of coal.

Unless charters have been made on private terms, no figures have been made on coal freights thus far this season. Several vessels have taken on loads, but the charges will be at the going rate of day of leaving port.

News was received here yesterday that many of the lake ports were free from ice and that the Straits of Mackinac are all open. Propellers are making passages between Erie and Toledo on Lake Erie, although there is a good deal of ice floating about. Vessel men will be in no hurry to depart for the upper lake ports from Buffalo for the reason that the St. Clair Flats are still frozen over.

Messrs. Bell, Lewis and Yates, of this city, unequivocally deny the report that the Pennsylvania Railroad people are after the Buffalo, Rochester & Pittsburg, and with equal emphasis say that their contract to operate the mines at Walston, Adrian, Du Bois, Beach Tree and Reynoldsville has three more years to run.

By the new contract the city has saved \$3,454 during the month of March in the consumption of gas and electricity.

**Chicago.**

(From our Special Correspondent.) April 7.

Mr. Niven, one of the Eastern representatives of the Philadelphia & Reading Company, is here with Colonel Horton and Mr. Skeele, and it is understood they are about to take formal possession of the property lately purchased by the consolidated companies. This consists of four docks of the Silver Creek & Morris Coal Company, two docks and one yard of the Lehigh Valley Coal Company. There are various other rumors afloat as to meeting of the trio in this city, but we believe the foregoing is the main object in view.

The conditions of the market East will probably have a marked influence on the future price of anthracite in the West. Business in a wholesale way is very light indeed, and governed entirely by the weather conditions. Many of the docks are being rapidly cleaned up, and the close of the season will find stocks very low. The circular price, \$5.25, is rigidly maintained, and we hear of no cutting. There are all sorts of rumors in circulation as to quotations for the coming season, but it is mostly gossip as nothing is known officially. There is, however, a well-defined idea prevailing that price at breaker is to be uniform and to net the companies a trifle over \$2. Retail trade is light, and will gradually grow less with each advancing week of spring.

Bituminous coal is again increasing in supply and unless shipments are stopped there promises to be another heavy glut. Some of the railroads are figuring on ¼ and ½ in. Hocking coal, and there are others which incline to Jackson Hill. This latter of late years has come into considerable prominence for locomotive use and general railroad purposes, and is becoming quite a favorite in the West. The docks here and to the north of us are bare of stock of Eastern soft coal, and with the opening of navigation a large fleet of coal boats is expected to arrive. It is stated that the Straits of Mackinac are pretty well clear of ice, and coal vessels may be expected any day after April 15th. Hocking is quoted at \$2 for straight lump and \$1.90 for ¼ lump at Toledo; Pittsburg is \$2.25 for straight lump and \$2.15 for ¼ lump at Cleveland.

Coke is in light demand and, of course, affected by the blowing out of furnaces. Foundry coke is only in moderate request, and best grades are steady.

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

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

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

**Pittsburg.**

April 7.

(From our Special Correspondent.)

**Coal.**—The market shows very little change. Mines in the pools are generally at work owing to the continued good boating water in the Ohio River. Coal is being forwarded to the lower markets as fast as loaded. The amount of coal in the Pittsburg harbor does not exceed 500,000 bushels; this will be sent South as fast as tow boats arrive with empties, which are forwarded to the ports to be loaded.

The coal mines in the Kanawha Valley, which closed recently on account of the decision of the Supreme Court of the State, declaring the mining law constitutional, have resumed operations. The operators held a consultation in Charleston and decided to start up again under the old rules, paying no attention to the new ones. Judge Snyder in his charge to the grand jury instructed them to bring in no indictments for violation of the new mining law pending its trial for constitutionality in the United States Supreme Court.

The coal road at Hays station, formerly owned by I. D. Risher, is being changed to standard gauge line in order to ship coal direct over three connecting railroads without reloading. The road extends from Hays station to a point two and a half miles from the river and handles the output of the mines along Streets run.

**Connellsville Coke.**—Trade at present is in a rather demoralizing condition. Shipments show a further falling off, last week showing the smallest number of cars shipped for any week during the year, as well as the lowest average in the run of plants. No more ovens have been blown out, but those in blast do not seem to have made such good time as heretofore. Several large operators who have been running steadily six days are now laying off one day; 4½ and 5 days is now the rule in the region. There is comparatively little stock coke in the yards.

Rumor says that certain companies are quoting coke at \$1.05 f. o. b. cars at ovens in order to hold contracts and keep ovens running. Of 17,222 ovens in the region, 13,215 are in blast and 4,007 idle. The time made by the Frick Coke Company at its active plants was reduced to 4½ days. Week's shipments were as follows: To Pittsburg, 1,959 cars; points east of Pittsburg, 1,460; points west of Pittsburg, 3,216; total, 6,635 cars. Tonnage, 124,073.

**METAL MARKET.**

NEW YORK, Friday Evening, April 8, 1892.

Prices of Silver Per Ounce Troy.

April.	Sterling Exch'g.	London, Pence.	N. Y. Cents.	Value of sil. in \$1.	April.	Sterling Exch'g.	London, Pence.	N. Y. Cents.	Value of sil. in \$1.
2	4.87¾	40	87¼	.671	6	4.87¾	39¾	85¾	.664
4	"	40½	87½	.676	7	4.87¾	39¾	85¾	.662
5	"	39¾	87	.672	8	"	39¾	85¾	.664

The advance in silver was checked by free sales and shipments to London. The demand being satisfied, silver receded to 39¾d., and the market closes steady, with some demand, but the future course of the metal is problematical and uncertain.

The United States Assay Office at New York reports the total receipts of silver for the week to be 114,000 oz.

**Platinum.**—The price of sheet and wire platinum is fluctuating considerably. Present quotations may be put at \$10@12 per oz.

**Silver Bullion Certificates.**

	H.	L.	Sales.
April 2.....	87¾	87¾	51,000
April 4.....	87¾	87¼	241,000
April 5.....	87¾	86¾	75,000
April 6.....	86¾	86¾	71,000
April 7.....	85¾	85¾	55,000
April 8.....	85¾	.....	65,000
Total sales.....			561,000

**Coinage of the Mints of the United States.**

The following statement shows the coinage executed at the mints of the United States during March, 1892.

	Pieces.	Value.
Double eagles.....	135,516	\$2,710,320.00
Eagles.....	44,973	449,730.00
Half-eagles.....	179,178	895,890.00
Quarter-eagles.....	23	57.50
Total gold.....	359,690	\$4,055,997.50
Standard dollars.....	350,620	350,620.00
Half-dollars.....	562,620	281,310.00
Quarter-dollars.....	1,148,620	287,155.00
Dimes.....	1,732,316	173,231.60
Total silver.....	3,794,176	\$1,092,316.60
Five cents.....	2,350,817	117,540.85
One cent.....	3,312,507	33,125.07
Total minor.....	5,663,324	\$150,665.92
Total coinage.....	9,817,190	\$5,298,979.12

**Domestic and Foreign Coin.**

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

	Bid.	Asked.
Trade dollars.....	70	75
Mexican dollars.....	68	70
Peruvian soles and Chilian pesos.....	67	70
English silver.....	4.83	.....
Five francs.....	93	95
Victoria sovereigns.....	4.86	4.90
Twenty francs.....	3.86	3.90
Twenty marks.....	4.74	4.76
Spanish doubloons.....	15.69	15.70
Spanish 25 pesetas.....	4.81	4.83
Mexican doubloons.....	15.50	15.70
Mexican 20 pesos.....	19.50	19.60
Ten guilders.....	3.96	4.00
Fine silver bars.....	80¼	87¼

**Copper.**—Lake is scarce and firm at 12c., while casting copper is easier, and dealers complain that they have even lost orders at 11½c. This is about all we have to report this week, the market having been very quiet and the business done rather restricted. Some transactions in Lake took place at 12c., but they were neither numerous nor large, and any desire on the part of producers to market large quantities would mean a not inconsiderable drop in prices; but they are all firm, and pretend to be sold out for weeks and even months to come, and if consumption continues as good as it has been recently, no doubt buyers cannot long stay out of the market. With the commoner sorts it is a different thing. These are all more in harmony with the London market, on which we are dependent to market all our surplus of such, and Europe remaining very flat has, of course, reacted on prices over here.

From Europe we hear by cable that the demand is rather slack and that there are very few consumers' orders in the markets, the closing quotations for G. M. B.'s being \$45 10s. @ \$45 12s. 6d. for spot and \$46 @ \$46 2s. 6d. for three months and for manufactured. We quote: English tough, \$48 10s. @ \$49; best selected, \$49 10s. @ \$50; strong sheets, \$58 10s. @ \$59; India sheets, \$55 @ \$55 10s.; yellow metal, 5¼d.

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

To	Copper.	Lbs.	
To Antwerp.....	190 bbls.	237,500	\$29,688
S. S. Pennland.....	449 pigs.	119,828	14,000
To Liverpool.....	Copper Matte.	Lbs.	
S. S. Aurania.....	500 bags.	56,000	\$4,000
" The Queen.....	230 bbls.	247,810	18,400
" Tauric.....	4,066 bags.	445,500	30,000
To Rotterdam.....	Copper.	Lbs.	
S. S. Obdam.....	285 bbls.	322,545	\$36,500
" .....	792 bars.	109,304	12,977
" .....	180 pigs.	46,868	4,700

**Tin** is gaining in strength almost from day to day. The statistical position is a very good one, and stocks here as well as in London have been concentrated into the hands of a few. Unless all signs fail, it looks to us as if prices would advance. We have to-day to quote for spot 20-10c.; April, 20-05c., and May, 20-05c.

In London prices have advanced about £1 to £90 15s. @ £90 17s. 6d. for spot and £90 17s. 6d. @ £91 for futures.

**Lead.**—The business done has not been large, but prices are fairly well maintained. Offerings from the West are rather small, but an increase in supplies from the Idaho district is now confidently looked for. We have still to quote 4-25 @ 4-25c.

The London market has declined and is closing at £10 12s. 6d. @ £10 15s. for Spanish, and £10 15s. for English lead.

**Chicago Lead Market.**—Mr. H. R. Post telegraphs us as follows: "The only new feature developed during the week has been greater strength in the market. Sales of 600 tons have been made for April-May delivery at \$4.10 @ \$4.15. Producers generally are out of the market at present prices. The consumptive demand is improving."

**St. Louis Lead Market.**—The John Wahl Commission Company telegraph us as follows: "Lead is strong, but the trading is limited. Sellers, generally, have asked from 2½c. to 5c. more for the metal than buyers regard as the proper price. About 500 tons have been sold during the past week at from \$4.02½ to \$4.05 per 100 lbs."

**Spelter** is in very good demand and prices have advanced somewhat. Most of the smelters are sold out for April and May, and we have to raise quotations to 4-625 @ 4-65c., New York.

In London a large business has been done at gradually increasing prices, the last quotations being £22 5s. for April delivery, while for forward delivery not less than £22 can be obtained.

**Antimony** is steady, Cookson's at 15½ @ 16c., L. X. 12¼ @ 13c. and Hallett's, 10½ @ 11c.

**IRON MARKET REVIEW.**

NEW YORK, Friday Evening, April 8.

**Pig Iron.**—Pig iron has moved more freely during the week than for some time past and prices have been well maintained. We have heard rumors of still lower figures which, upon investigation, proved untrue. It would seem that there has been a curtailment in the production, although, of course, it has not been sufficiently great to stiffen prices. The Lehigh Iron Company's failure threw a fair-sized lot of iron upon the market, but it was bought up at auction by some of the creditors and had no appreciable effect upon prices. Prices remain unchanged, as follows: Northern No. 1 X, \$16; No. 2 X, \$15; Southern No. 1 X, \$15.50 @ \$16; No. 2 X, \$14.50 @ \$15.

**Spiegeleisen and Ferro-Manganese.**—Absolutely nothing of interest can be reported of the market for spiegeleisen and ferro-manganese. Quotations are \$61.50 @ \$62 for 80% ferro-manganese, and \$26.50 @ \$27 for 20% spiegeleisen.

**Steel Rails.**—There has been no single large transaction in standard sections of steel rails during the week; some small sales are reported. The market continues as dull and featureless as it has been for a month or two past.

The 1,900 tons which were said to have been sold at low price was, it is reported a lot of 67-lb. rails rolled by the Troy Iron and Steel Company for the Poughkeepsie Bridge, and which had been in the market for nearly a year. A report, to the effect that the Carnegie interests had bought out the Bethlehem Iron Company, was circulated during the week. Mr. Andrew Carnegie stated to a representative of the ENGINEERING AND MINING JOURNAL that there was nothing in the report, and that it was but an April 1st, hoax. Prices remain unchanged at \$30 f. o. b. mill, and \$30.75 tidewater.

**Rail Fastenings.**—We hear of no transactions in this market, which remains as dull as ever. Quotations nominally are as follows: Fish and angle plates, 1-70 @ 1-80c.; spikes, 2-10 @ 2-15c.; bolts and square nuts, 2-70 @ 2-80c.; hexagonal nuts, 2-80 @ 2-85c.

**Merchant Steel.**—Manufacturers report a fair amount of business, but complaints of low prices are numerous. We quote this week: Mushet's special, 48c.; English tool, 15c. net; American tool steel, 7 @ 8c.; special grades, 13 @ 18c.; crucible machinery steel, 4-75c.; crucible spring, 3-75c.; open hearth machinery, 2-25c.; open hearth spring, 2-50c.; tire steel, 2-25c.; toe calks, 2-25 @ 2-50c.; first quality sheet, 10c.; second quality sheet, 8c.

**Tubes and Pipe.**—There is no change to report in this market. The usual amount of business has been done. We quote ruling discounts as follows: Butt, black, 57½%; butt, galvanized, 47%; lap, black, 67%; lap, galvanized, 55%; boiler tubes, under 3 in. and over 6 in., 55%; 3 in. to 6 in., 60%.

**Structural Material.**—Reports from all over the country indicate the resumption of work in building, and it is probable that manufacturers of structural material will soon experience considerable activity. We quote this week: Beams, 2-30 @ 2-50c.; angles, 1-90 @ 2-10c.; sheared plates, 1-85 @ 2c.; tees, 2-40 @ 2-60c.; channels, 2-40 @ 2-50c. Universal plates, 2-10c.; bridge plates, 2-10c. on dock. In some cases lower prices have been obtained, but on the whole the above quotations are fair.

**Old Rails.**—This market is lifeless. No transaction is reported.

**NOTES OF THE WEEK.**

Wm. R. Hart, of Philadelphia, Pa., dealer in steel, iron, iron ore and Bessemer pig iron, trading under the name of William R. Hart & Co., made an assignment on the 5th inst. to William S. Pilling, his business manager and salesman. While the liabilities are not known it is thought that they may affect other houses in the trade. Mr. Hart is said to have handled a larger business in iron and steel than any single individual in Pennsylvania. He made a specialty of high priced foreign iron ores. For many years he was the American agent of Messrs. Naylor, Benzon & Co., of London. Subsequently he became agent for other leading houses, both here and abroad. About ten years ago he formed a co-partnership known as William R. Hart & Co. George T. Barnes was his associate. They dissolved in 1889 and since that Mr. Hart has carried on the business individually.

**Buffalo.**

April 7.

(Special report by Rogers, Brown & Co.)

No change worthy of note has taken place in the dullness which has been characteristic of the market for so long. About the same amount of business is regularly transacted, which is below the average consumption, and largely made up of small orders. Prices continue low and demoralized. We quote on the cash basis f. o. b. cars Buffalo: No. 1 X foundry strong coke iron Lake Superior ore, \$15.75; No. 2 X foundry strong coke iron Lake Superior ore, \$14.75; Ohio strong softener, No. 1, \$15.75; Lake Superior charcoal, \$17.50; Tennessee charcoal, \$18.25; Southern soft, No. 1, \$15; Alabama car wheel, \$19; Hanging Rock charcoal, \$20.50.

**Chicago.**

April 6.

(From our Special Correspondent.)

Probably the most favorable feature in crude iron here is the somewhat better inquiry and demand for small and large lots. There is a manifest feeling on the part of consumers that bottom has been reached, and as a result there is an improved inquiry. But it is useless to disguise the fact that in general the iron business is in an unsatisfactory condition and some agents are of the opinion that no radical improvement will be noticed for 60 to 90 days, and then only in increased sales and steadier prices. In some branches of finished iron improved conditions are noted. Bars, sheets, plates, etc., show more animation. Structural material is in active inquiry and prospects excellent. One large manufacturing concern reports shipments of soft steels for March into this section, nearly double those of March last year, and that was the

heaviest month of last spring's business. Steel rails are in some demand in small lots and one large order was placed last week. Old material and scrap continue quiet.

**Pig Iron.**—There is a moderate amount of activity, though consumers in this district appear to be pretty well supplied with iron. During the latter part of last and early this week there was some inquiry for several large lots of local coke iron, which is accepted by dealers as conclusive evidence that consumers believe prices will go no lower. There is no question but that prices on the local product are steadier. The output is being gradually restricted and, while the results will not be felt for some weeks, it has the effect of imparting a better tone to the market generally. Lake Superior charcoal iron is firm as quoted, as it is not subject to the same general conditions which affect coke iron. Large consumers will soon be in the market for their annual supplies. Southern iron is selling in a small way and a very low price was made on several hundred tons of No. 2 soft; other coke grades are in light inquiry and sales few.

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

**Structural Iron and Steel.**—There is a large amount of inquiry, but that does not strengthen prices. A contract for some 500 tons of iron and steel for a building at an outside point was placed at \$25,790, an average of \$51 a ton, including framed steel beams and everything. The recent storms will necessitate a vast amount of repair work. Regular quotations car lots f. o. b. Chicago are as follows: Angles, \$2@2.10; tees, \$2.20@2.30; universal plates, \$2.05@2.15; sheared plates, \$2.10@2.15; beams and channels, \$2.25@2.50.

**Plates.**—Business is improving from city and country. There is a good deal of work in sight and much will be placed this month. Steel sheets, 10 to 14, \$2.40@2.50; iron sheets, 10 to 14, \$2.20@2.30; tank iron or steel, \$2.10@2.15; shell iron or steel, \$3@3.25; firebox steel, \$4.25@5.50; flange steel, \$2.75@3.25; boiler rivets, \$4.10@4.25; boiler tubes, 2 1/2 in. and smaller, 55%; 7 in. and upward, 65%.

**Merchant Steel.**—There is a good demand for soft steels and the consumption of this material in the Northwestern field was never so large as now. We quote: Tool steel, \$6.50@6.75 and upward; tire steel, \$2.25@2.30; toe calk, \$2.40@2.50; Bessemer machinery, \$2.10@2.20; Bessemer bars, \$1.75@1.90; open hearth machinery, \$2.40@2.60; open hearth carriage spring, \$2.25@2.30; crucible spring, \$3.75@4.

**Galvanized Sheet Iron.**—More activity is noted, with cornice men and manufacturing consumers in the lead; standard grades are fairly steady. Discounts are unchanged at 70% off on Juniata from mill, and 67 1/2% off from warehouse, and 67 1/2 and 5% off on charcoal.

**Black Sheet Iron.**—Roofing sheet steel is in good demand and large orders have been placed at \$2.90 mill. Some inquiry is in market for common black sheets. Mill lots are quoted 2@5c. Chicago, basis No. 27; dealers' price 3@3 1/2c., same gauge from stock.

**Bar Iron.**—Mills in this vicinity have taken large orders from car makers in the southern part of State. Demand is improving somewhat, but prices are irregular. Ordinary quotations are 1@1 1/2c. Chicago, but these are shaded 50c. a ton, according to specification. Warehouse orders are filled at 1 1/2@1 5/8c., as to quality.

**Nails.**—Manufacturers of wire nails east of here have advanced prices 5c. per keg, and now quote \$1.75 from factory. Demand is fair from mill, and improving from jobbers, who quote \$1.95 in small lots, or \$1.90 in mixed carloads. Steel cuts are in good demand from factory, but prices remain unchanged at \$1.60, regular average. Jobbing quotations \$1.70 from stock.

**Steel Rails.**—An order for about 8,000 tons of heavy sections for the Northwest was entered by the local mills last week. Demand generally is fair for small quantities, and the outlook promising for further round lots. Quotation is steady at \$31 and upward, according to quantity. Splice bars and other material are in moderate demand at 180c. for steel or iron bars, spikes at \$2.15@2.20 per 100 lbs. track bolts; hexagonal nuts, \$2.65@2.70.

**Scrap.**—There is some little movement, but prices to dealers are very unsatisfactory. Quotations are no stronger. No. 1 railroad, \$17; No. 1 forge, \$6; No. 1 mill, \$2.50; fish plates, \$18; axles, \$21; horsehoes, \$17; pipes and flues, \$9; cast borings, \$7; wrought turnings, \$9.50; axle turnings, \$10.50; machinery castings, \$10; stove plates, \$8.50; mixed steel, \$11.50; coil steel, \$14; leaf steel, \$15; tires, \$15.50.

**Old Material.**—Last week 500 tons of iron rails sold to consumer at East St. Louis at \$19, and a

smaller quantity here at \$19.75, at which figures railroads don't care to sell any large lots. Steel rails very dull at \$13 for mixed lengths, and \$14.50 has been offered for 200 tons of 6-ft. lengths. Old car wheels are dull at \$15.75@16.

**Louisville.** April 2.  
(Special Report by Hall Brothers & Co.)

Considerable business has been booked during the past week but no large transactions have taken place. Orders have generally ranged for car loads up to 500 tons. On the whole there has been very little change since last report. Prices remain irregular and very weak, we quote:

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

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

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

**Philadelphia.** April 7.  
(From our Special Correspondent.)

**Pig Iron.**—The iron trade remains almost in the same condition as last week. Perhaps a few larger sales of forge iron have been made, but there is still a hesitating policy shown among both large and small buyers. The heavy production explains the hesitancy to cover orders for the summer. The restriction going on is far less than was looked for. Plenty of good No. 1 iron is being offered at \$16.50@17, and some grades are sold at \$16. In No. 2 a fair iron is sold as low as \$15, and \$15.50 is about the outside price paid. In forge irons there is no change. Quotations range from \$14@14.50. Charcoal irons are sold in small lots, as usual. Brokers and representatives of companies are rather disappointed at the inactivity in the market.

**Muck Bars.**—Small sales are made at prices ranging from \$25.25 to \$25.75.

**Steel Billets.**—It is impossible to gather anything new in reference to billets. Manufacturers feel they can do no more, and buyers show no anxiety at all to purchase. So matters hang. Quotations range from \$25.25 to \$25.50. It is probable that a hardening in prices will set in soon.

**Merchant Iron.**—In a retail way a good deal of business has been done during the week, not only in the city but in mills throughout the State, so far as reports have reached us. Buyers continue to purchase in a hand-to-mouth way at 1'60c. @ 1'75c.

**Sheet Iron.**—Quite a satisfactory week's business has been done both in soft steel and refined sheet. Manufacturers are scouring the country for some large orders in galvanized iron, which will steady that branch of the trade when the business is booked.

**Plate Iron.**—Anxiety exists among manufacturers for heavy orders to run through the summer. There is business of this character to be placed, but orders are very trifling. The plate iron market is unsatisfactory, simply from the indifference shown by customers. At the same time every one familiar with the trade knows there is a large amount of business to be placed. Tank plates are 1'90c.; steel shell, 2'15c.; flange, 2 1/2c.

**Structural Iron.**—The same hesitating policy continues in regard to structural iron, and business on the whole is rather disappointing, still there is no shading done or restriction of production at mills, and the output is made to order. Business must be better than it is admitted.

**Steel Rails.**—Apart from two or three transactions by mills in the West we know nothing. Those who speak for Pennsylvania mills have nothing whatever to say. Quotations are \$30.

**Old Rails.**—The brokers who deal in old rails have had no inquiries this week, and have sold very few. Quotations are \$20@21.

**Scrap.**—Buyers are in the market for No. 1 scrap, and want to get it at \$19. Machinery scrap is quoted at \$14.

**Pittsburg.** April 7.  
(From our Special Correspondent.)

There have been scarcely any new features developed in the condition of the iron and steel market since the date of my last report. Consumers, generally, have a fair supply of the raw material on hand and can afford to wait. On the other hand there are others who need stock to keep their works in operation, and are consequently buyers to a moderate extent. Values show no particular change. In pig iron the demand is only of limited proportions and hardly sufficient to absorb current production and prevent any further increase of stocks.

Notwithstanding the much talked of reduction in output there has not been enough blowing out of furnaces to have much effect as yet.

Among the leading producers there continues to be a firm stand taken in regard to concessions on present quoted rates, and the refusal of certain companies to meet the prices offered by the weak furnaces, which are compelled to realize, has had a beneficial effect in strengthening the market.

It appears as if the consumers of pig iron who have confidence in the future, and have been purchasing considerable iron during the past few weeks to meet their requirements until summer, are now fully stocked up for the time being, as the demand has fallen back to orders for immediate consumption. Certain consumers have all along been purchasing pig iron only as they required it, feeling that with heavy stocks and continued large production there would be no difficulty in buying iron during the summer at about present rates.

The Northern furnaces are reducing cost of production in every possible way in order to meet the competition of the Southern furnaces. In the Shenango and Mahoning valleys a reduction of 10% in wages of furnace labor goes into effect the 10th and 15th of this month. Many leading companies, both here and at other points, have refused to make further concessions for business, and this action seems to indicate that prices will go no lower. A lot of 12,000 tons of pig iron was sold at Allentown a few days ago. Grey forge brought \$12, which under the circumstances was considered good a price.

A well-informed Eastern iron merchant says: "It appears therefore that bottom prices must be somewhere near to current quotations, which are as low as have ever been known. Some temporary delay toward improvement may perhaps be caused by the reduction in freights, and until an adjustment is made it is hardly to be expected that any one will take the initiative toward higher figures. The word adjustment should be understood as applying to the cost of iron delivered at various competing points. But, on the whole, the immediate indications are that prices will remain about as they are until an increased demand or a decreased supply will warrant makers in asking more money. The tendency will certainly not be toward an increased supply, so that either of the alternatives named will probably soon begin to develop."

**Coke Smelted Lake and Native Ores.**

4,000 Tons Bessemer, May, June, July.....	\$14.60 cash.
3,000 Tons Bessemer, city furnace.....	14.75 cash.
2,500 Tons Grey Forge, April, May, June.....	12.90 cash.
2,500 Tons Bessemer, April, May, June.....	14.75 cash.
2,000 Tons Grey Forge, April, May.....	13.00 cash.
2,000 Tons Bessemer, June, July, Aug.....	14.60 cash.
1,500 Tons Grey Forge.....	12.90 cash.
1,000 Tons Bessemer.....	14.75 cash.
1,000 Tons Bessemer, May, June, July.....	14.75 cash.
1,000 Tons Grey Forge, prompt delivery.....	13.00 cash.
1,000 Tons Bessemer, Low Phos. next 4 m.....	21.00 cash.
1,000 Tons Bessemer, Low Phos. next 4 m.....	21.00 cash.
200 Tons Mill Iron.....	12.75 cash.
200 Tons No. 3 Foundry.....	13.25 cash.
200 Tons Grey Forge.....	13.00 cash.
100 Tons Silvery, No. 1.....	17.00 cash.
100 Tons No. 1 Foundry.....	15.50 cash.
100 Tons No. 3 Foundry.....	14.50 cash.

**Charcoal.**

75 Tons Warm Blast, No. 2.....	18.50 cash.
50 Tons No. 3 Foundry.....	20.00 cash.
50 Tons No. 1 Foundry.....	22.00 cash.

**Steel Slabs and Billets.**

7,000 Tons Billets, May, June, July, Aug.....	23.40 cash.
3,000 Tons Billets and Slabs, June, July, Aug.....	23.50 cash.
2,000 Tons Billets, May, June, July.....	23.25 cash.
1,000 Tons Billets.....	23.00 cash.
500 Tons Billets.....	23.00 cash.

**Muck Bar.**

1,000 Tons Neutral, April, May.....	25.25 cash.
500 Tons Neutral, May, June, July.....	25.15 cash.
250 Tons Neutral.....	25.25 cash.

**Ferro Manganese.**

100 Tons 80% foreign delivery.....	62.00 cash.
100 Tons 80% domestic at mill.....	63.00 cash.
50 Tons 80% domestic at mill.....	63.00 cash.

**Skelp Iron.**

600 Tons Sheared Iron.....	1.77 1/4 4m.
400 Tons Wide Grooved.....	1.57 1/4 4m.
380 Tons Narrow Grooved.....	1.55 4m.

**Steel Wire Rods.**

1,000 Tons American Fives, at Mill.....	33.00 cash.
500 Tons American Fives at Mill.....	32.60 cash.

**Blooms, Beam, Rail and C Ends.**

780 Tons Bloom and Beam Ends.....	16.00 cash.
450 Tons Bloom and Rail Ends.....	16.50 cash.

**Old Iron and Steel Rails.**

1,000 Tons Old Steel Rails.....	16.00 cash.
1,000 Tons American T's, Valley Delivery.....	21.50 cash.
400 Tons American T's.....	22.00 cash.

**Scrap Material.**

250 Tons Mixed Steel Scrap.....	14.00 cash.
100 Tons Cast Scrap, Ext'd.....	15.00 cash.
100 Tons Coil Springs.....	18.00 cash.
50 Tons Cast Iron Rings.....	9.25 cash.

The following table shows the sales of raw iron and steel for the past three months. The sales for the present year amount to 542,929 tons, being the largest on record, exceeding last year by 192,778 tons. This gives ample evidence that purchasers are making arrangements for a big year's business. Since the first of the year we have reported sales of 5,688,000 tons iron ore.

SALES OF RAW IRON IN PITTSBURG FOR FIRST QUARTER OF YEAR.

Month.	1888.	1889.	1890.	1891.	1892.
	Tons.	Tons.	Tons.	Tons.	Tons.
January.....	11,440	23,970	50,225	21,551	71,900
".....	11,135	15,153	37,890	13,266	41,845
".....	9,360	13,875	32,500	21,415	28,940
February.....	8,355	13,215	26,655	28,830	31,310
".....	11,891	16,850	20,195	28,500	26,040
".....	16,605	20,570	19,455	59,550	32,365
".....	14,935	15,710	25,635	36,720	30,019
March.....	12,000	9,927	17,575	33,595	43,500
".....	11,615	24,505	15,535	41,734	67,775
".....	11,445	33,350	17,935	12,250	58,150
".....	10,870	27,533	27,575	32,240	47,620
".....	8,735	14,150	27,075	20,500	57,375
Total.....	137,495	228,808	318,250	350,151	542,992



DIVIDEND-PAYING MINES.

NON-DIVIDEND PAYING MINES.

Table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES (No., Par), ASSESSMENTS (Total levied, Date and amount of last), DIVIDENDS (Total paid, Date of last).

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Y. Gold, S. Silver, L. Lead, C. Copper. \* Non-assessable. + This company, as the Western, up to December 10th, 1891, paid \$1,400,000. \$ Non-assessable for three years. \$ The Lead wood previously paid \$275,000 in dividends and the Terra \$75,000. Previous to the consolidation in August, 1891, the company paid \$1,325,000 in dividends, and the Colorado Virginia 0,000,000. \*\* Previous to the consolidation of the Copper Queen with the Atlanta, August, 1888, the Copper Queen had paid \$1,350,000 in dividends. + This company paid \$190,000 before reorganization in 1890. \* This company acquired the property of the Raymond & Ely Company which had paid \$3,075,000 in dividends.

STOCK MARKET QUOTATIONS

Aspen, April 4. The closing quotations were as follows: Agnes C., Argonaut Junata, Aspen Deep Shaft, Aspen Contact, Best Friend, Bimetallie, Bushwacker, Carbonate Chief, Deila S., Homer & Alta, Justice, Little Annie, Mollie Gibson, Nolan Creek, Park, Mamie & Queen, Pontiac, Sheep Mountain S. & M. Co., Smuggler, St. Joe & Mineral Farm, Yellow Boy.

Baltimore, Md., April 7. COMPANY. Atlantic Coal, Balt. & N. C., Big Vain Coal, Conrad Hill, Cons. Coal, Diamond Tunnel, George's Creek Coal, Lake Chrome, Maryland & Charlotte, North State, Silver Valley.

Pittsburg, Pa., April 8. Prices highest and lowest for the week ending April 8: Allegheny Gas Co., Bridgewater Gas Co., Chartiers Val. Gas Co., Columbia Oil Co., Consignee Mining Co., Consolidated Gas Co., East End Gas Co., Fisher Oil Co., Forest Oil Co., Hazlewood Oil Co., Hidalgo Mining Co., La Noria Mining Co., Luster Mining Co., Mansfield C. & C. Co., Manufacturers Gas Co., Nat. Gas Co. of W. Va., N. Y. & Clev. Gas Coal Co., Ohio Valley Gas Co., Pennsylvania Gas Co., People's Natural Gas Co., People's N. G. & P. Co., Philadelphia Co., Red Run Gas Co., Pittsburg Gas Co., Ene Klund Mining Co., Silvertown Mining Co., South Side Gas Co., Sterling Silver Mining Co., Tuna Oil Co., Union Gas Co., Washington Oil Co., W. Moreland & Camb., Wheeling Gas Co., W. House of Light, W. House Air Brake Co., W. House Brake Co., Ltd.

St. Louis, April 6. CLOSING PRICES. Bid. Asked. Adams, Colo., American & Nettie, Colo., Bi-Metallic, Mont., Central Silver, Elizabeth, Mont., Granite Mountain, Mont., Hope, Leo, Little Albert, Montrose Placer, Colo., Mickey Brown, Pat Murphy, Colo., Small Hopes, Colo., Silver Age, Silver Bell, Yuma, Ariz., Deadwood, April 2. Bid. Asked. Bullion, Caledonia, Calumet, Cambrian, Carthage, Deadwood Terra, De Smet, Double Standard, Elk Mountain, Emmett, Equitable, Florence, Golden Reward, General Merritt, Harmony, Hester A., Homestake, Hermit, Iron Hill, Isadorah, Maggie, Monitor, Rainbow, Retriever, Ross-Hannibal, Ruby Bell, Ruby Wilkes, Seabury-Calkins, Silver Queen, Stewart, Tornado, Troy, Uncle Sam.

Helena, Mont.

(Special report by SAMUEL K. DAVIS.) Prices highest and lowest for week ending April 2, 1892: Baid Butte (Mont.), Benton Group, Mont., Bi-Metallic, Mont., California (Castle), Mont., Castle Crescent, Champion (Oro Fino), Mont., Combination (Phillipsburg), Mont., Copper Bell (Cataract), Mont., Cornucopia, Mont., Cumberland (Castle), Mont., Elizabeth (Phillipsburg), Mont., Florence (Neihart), Mont., Fourth of July, Wash., Glengary (Butte), Mont., Helena & Victor, Mont., Ingersoll, Mont., Iron Mountain (Missoula), Mont., Iron Mountain Ext., Jersey Blue (Butte), Jumbo (Castle), Mont., Lone Pine Consolidated, Mac (Unionville), Mont., Moulton, Mont., None Such (Unionville), Mont., Poorman (Coeur d'Alene), Idaho, Queen of the Hills (Neihart), Southern Cross (Deer Lodge), Mont., Yellowstone (Castle), Mont.

Trust Stocks.

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

Foreign Quotations.

London, March 26. Highest. Lowest. Alaska Treadwell, Amador, Cal., American Belle, Colo., Appalachian, N. C., Can. Phosphate, Can., Colorado, Colo., Cons. Esmeralda, Nev., De Lamar, Idaho, Dickens Guster, Idaho, Eagle Hawk, East Arevalo, Idaho, Eberhardt, Garfield, Nev., Golden Feather, Golden Gate, Cal., Golden Leaf, Mont., Golden River, Cal., Guston, Jay Hawk, Mont., Idaho, Josephine, Cal., Kohinoor, Colo., La Luz, Mex., La Plata, Colo., La Valera, Mex., Maid of Erin, Colo., Mammoth Gold, Ariz., Mount McClellan, Montana, Mont., Mona Lake Gold, New California, Colo., New Consolidated, New Eberhardt, Nev., New Gold Hill, N. C., New Guston, Colo., New Hoover Hill, N. C., New Russell, N. C., New 'Tols, Idaho, Old Lout, Colo., Parker Gold, N. C., Pittsburg Cons., Nev., Poorman, Plumas Eureka, Richmond Con., Nev., Ruby, Nev., Sam Christian, N. C., Sierra Buttes, Cal., Plumas Eur., Cal., Silver King, United Mexican, Mex., West Argentine, Colo., Yankee Girl, Colo., Paris, March 24. Frances. East Oregon, Ore., Forest Hill Divide, Cal., Gold'n River, Cal., Laurium, Greece, Lexington, Mont., Nickel, New Caledonia, Rio Tinto, Spain, Tharsis, Spain, Vieille-Montagne, Belgium.

CURRENT PRICES.

These quotations are for wholesale lots in New York unless otherwise specified. Acid—Acetic, No. 8, pure, 1,040, Commercial, in bbls. and cys. 0.16, Carbonic, liquefied, Chromic, chem. pure, Hydrobromic, dilute, U. S. P., Hydrofluoric, U. S. P., Iodine—5% gal., Absolute, Ammoniated, Alum—Lump, Ground, Powdered, Lump ton, Liverpool, Aluminum—lb., Aluminum Chloride—Pure, Amalgamating solution, Sulphate, Ammonia—Sul., in bbl. lots, Murate, white, in bbls., Aqua Ammonia—(in cys) 18, Antimony—Oxymur, Regulus, Arsenic—Red, powdered, White, powdered, Yellow, White at Plymouth, Asbestos—Canadian, Italian, Ashes—Pot, 1st sorts, Pearl, Asphaltum—Prime Cuban, Hard Cuban, Trinidad, refined, Egyptian, Californian, at mine, at San Francisco, Barium—Carbonate, pure, Chlorate, crystal, Chloride, commercial, Iodide, pure, Nitrate, powdered, Sniph, Am. prime white, Sulph., foreign, floated, Sulph., off color, Carb., lump, f. o. b. L'pool, No. 1, Casks, Runcorn, No. 2, bags, Runcorn, Bauxite, Bichromate of Potash—Scotch, American, Bichromate of Soda, Borax—Refined, San Francisco, Concentrated, in car lots, Refined, Liverpool, Bromine, Cadmium Nitrate, Cadmium Iodide, Chalk, Precipitated, China Clay—English, Southern, Chlorine Water, Chrome Yellow, Chrome Iron Ore, Chromalum—Pure, Commercial, Cobalt—Oxide, Copper—Sulph., English Wks., Vitriol (blue), ordinary, extra, Nitrate, Copperas—Common, Best, 100 lbs., Liverpool, in casks, Corundum—Powdered, Flour, Cryolite—Powdered, bbl. lots, Emery—Grain, Flour, Epsom Salt, Feldspar—Ground, Crude, Fluorapatite, Powdered, No. 1, French Chalk, Fuller's Earth—Lump, Glauber's Salt—in bbls., Glass—Ground, Gold—Chloride, pure, crystals, oz., s. v., Chloride and sodium, Oxide, Gypsum—Calcined, Land Plaster, Iodine—Resublimed, Iron—Nitrate, 40%, Kaolin—See China Clay, Kieserite, Lead—Red, White, American, in oil, White, English, Acetate, or sugar of, white, Litharge—Powdered, English flake, Magnesite—Crude, kilos, Calcined, Brick, Manganes—Ore, per unit, Oxide, ground, per lb., Mercure Chloride—(Corrosive Sublimate)

Powdered, Marble Dust, Metallic Paint, Mineral Wool, Ordinary rock, Mica, Naphtha, Nitre Cake, Ochre-Rochelle, Washed Nat Oxfrd, Lump, Golden, Domestic, Oils, Mineral, Phosphorus, Plumbago, Potassium, Prussiate, Bromide, domestic, Chlorate, English, Chlorate, powdered, English, Carbonate, Caustic, Iodide, Nitrate, refined, Yellow Prussiate, Red Prussiate, Pumice Stone—Select lumps, Original cks., Powdered, pure, Pyrites—Non-sulphureous, p. units, Quartz—Ground, Rotten Stone—Powdered, Lump, Original cks., Rubbing stone, Sal Ammoniac—Lump, in bbls., Domestic, fine, Common, fine, Turk's Island, Salt Cake, Saltpeter—Crude, Soapstone, Sodium—Prussiate, Phosphate, Stannate, Tungstate, Hyposulphite, Strontium—Nitrate, Sulphur—Roll, Flour, Sylvinit, Talc—Ground French, Terra Alba—French, English, American, No. 1, American, No. 2, Tin—Crystals, in kegs or bbls., feathered or flossed, Muriate, single, Double or strong, 54° B., Oxy. or nitro., Tin Plates, cbarcoal, box, Swansea, best, Vermillion—Imp. English, Am. quicksilver, bulk, Am. quicksilver, bags, Chinese, Trieste, Zinc White—Am., Dry, Antwerp, Red Seal, Paris, Rod Seal, Muriate solution, Sulphate crystals, in bbls.

THE RARER METALS.

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