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RICHARD P. ROTHWILL, C.E., M.E., } Editors.
BOSSITER W. RAYMOND, Ph D., M.E. }

Cable address: "Rothwell," New York.

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

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

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CONTENTS.

| | PAGE. | | PAGE. |
|---|-------|---|-------|
| A Deluge of Lead from Idaho..... | 103 | Chloridizing, Roasting and Lixivation at Yedras Mine, Mexico..... | 106 |
| The Belgian International Exhibition.. | 103 | An Electric Tram Car for Australia.... | 108 |
| The Iron Silver vs. Reynolds Case in the Supreme Court..... | 103 | Coal Gas Production in England..... | 108 |
| Scranton, Pa., as a Seat for the Chemical Manufacture..... | 104 | The Coeur d'Alene Silver-lead Mines.... | 108 |
| Montana Smelting Schemes..... | 104 | Prizes for Small Motors..... | 109 |
| Quicksilver Production and Trade in 1887..... | 105 | Mining and Metallurgical Patents..... | 109 |
| Iron Silver vs. Reynolds Case in the Supreme Court..... | 105 | The Metallurgy of Steel..... | 110 |
| The St. Louis Sampling and Testing Works..... | 106 | Personals..... | 112 |
| | | Furnace, Mill, and Factory..... | 112 |
| | | Contracting Notes..... | 112 |
| | | Labor and Wages..... | 112 |
| MINING NEWS: | | | |
| Alabama..... | 112 | METALS..... | 115 |
| California..... | 113 | CHEMICALS..... | 116 |
| Canada..... | 113 | IRON: New York | 116 |
| Colorado..... | 113 | Louisville..... | 116 |
| Indian Terr..... | 113 | Philadelphia..... | 116 |
| Kansas..... | 113 | Pittsburgh..... | 116 |
| Michigan..... | 113 | FREIGHTS..... | 115 |
| Minnesota..... | 114 | MINING STOCKS: | |
| Nevada..... | 114 | New York..... | 120 |
| Pennsylvania..... | 114 | Boston..... | 120 |
| South America..... | 114 | Advertisers' Index..... | xvii |
| | | MARKETS: | |
| | | COAL: New York..... | 114 |
| | | Boston..... | 115 |
| | | Buffalo..... | 115 |
| | | Pittsburg..... | 115 |
| | | Gogebic..... | (121) |
| | | Pittsburgh..... | (121) |
| | | Baltimore..... | 117 |
| | | Birmingham..... | 117 |
| | | Pittsburgh..... | 117 |
| | | London..... | 117 |
| | | MEETINGS..... | 120 |
| | | DIVIDENDS..... | 120 |
| | | ASSESSMENTS..... | 120 |
| | | PIPE LINE CERT..... | 120 |

A DELUGE OF LEAD FROM IDAHO.

On another page will be found an interesting description of certain Idaho silver-lead mines, by Mr. J. E. CLAYTON, the well-known mining engineer.

It is not our intention to criticise Mr. CLAYTON's assertions concerning the extent and richness of these Idaho ore deposits, for we have no personal knowledge of the mines, and, moreover, Mr. CLAYTON is an experienced miner and geologist; but we can not agree with his estimates of the value of the product.

The total production of lead in the United States in 1886 was 135,629 tons, and in 1887 the output unexpectedly grew to 160,000 tons, without materially depressing the market price, which averaged 4.50 cents a pound in New York in 1887, as against 4.63 cents per pound in 1886. There is every probability of the same sources producing at least as much lead in 1888, and some of them will increase their output, while it may be doubted whether the market will absorb 160,000 tons this year, so that even without any very large addition to production, the prices promise to decline.

It needs no prophet to foresee what the effect would be were the Coeur d'Alene mines to dump on the market an extra amount of lead equal to about half the present total production of the country. Of course this amount

could not be sold at any price, and it would simply become a struggle for existence and the survival of the fittest of our lead producers if this new region should ever realize in richness Mr. CLAYTON's figures. It is certainly satisfactory to know that we possess such enormous stores of lead, abundant for all possible requirements of the future, but it is not at all comforting to those in the business to contemplate Professor CLAYTON's deluge of lead, and the less so because he shows that the ore contains such an amount of silver that it can be worked at a profit even if the lead were "given away." In that event were his figures realized we might even inundate the European markets.

Idaho is evidently going to be a very important factor in the lead market of the future; but let us hope this lead blizzard won't come down all at once on us, but let us become acclimated, as it were, by gentle breezes at first.

THE BELGIAN INTERNATIONAL EXHIBITION.

As already announced in these pages, there is to be an international exhibition in Brussels from May to November of the present year, which offers many inducements for several classes of our manufacturers to take part in it.

Belgians are "the Americans of Europe" in their enterprise and progressiveness, and they are especially qualified to appreciate the ingenuity displayed in American machinery. Among those who may profit by exhibiting are the manufacturers of mathematical and engineering instruments, in many of which we here excel the rest of the world. There is no European instrument made that can compare in efficiency with an American engineer's transit.

In the mining class, drilling appliances for wells or in blasting, ventilating machinery, hoisting and pumping machinery (in which latter Americans excel all European engineers), mechanical preparation of minerals, ore concentrating appliances, quarry machinery and the manufacture of slate and stone products, mine surveying, maps, etc., are some of the departments of interest to our engineers. There are special prizes for monographs on a great many subjects, covering, in fact, about the entire field of mining, mechanical and metallurgical treatment of ores, transportation, etc., etc.

Full particulars can be obtained from Messrs. Armstrong, Knauer & Co., of 822 Broadway, New York, who are the agents of the exhibition for this country. Applications for space should be made at once, as the exhibition opens in May. We believe many of our manufacturers and engineers will find it advantageous to take part in it. We may quote as follows, from a circular just issued by the American Commissioners: "It is now an accepted fact that the effect of such exhibitions has been eminently favorable to exhibitors, and no country has ever tried them that it did not repeat them. These methods of acquiring a standing in foreign markets, of which England, Germany, France, Italy, Russia, Spain and Austria never fail to avail themselves when the opportunity offers, the United States, in these days of intense competition and over-production, can not afford to neglect. It is a fact of no trifling significance to Americans, that England alone has already secured 207,000 square feet of space in this exhibition.

"With our large domestic market, we are prone to lose sight of the important truth that every evidence of American ingenuity and skill which is placed where it attracts the attention of foreign communities, not only enlarges the market for the productions so exhibited, but gives us a national prestige which develops a taste and a fashion for things American."

THE IRON SILVER VS. REYNOLDS' CASE IN THE SUPREME COURT.

This case, between the Iron Silver Mining Company, and Reynolds and Morrissey, has been before the Supreme Court twice. In the first trial below, the company won it, a verdict being ordered in its favor by the court. On appeal, this verdict was set aside by the Supreme Court, and the case remanded for a new trial. This trial resulted in favor of the defendants, and the company appealed, alleging error in certain rulings of Judge HALLETT.

The opinion of the Supreme Court, delivered by Mr. Justice FIELD, will be found in another column. To enable our readers to understand its bearings, we must briefly outline the history of the case, referring those who desire a more extended statement and discussion of it to Dr. RAYMOND's paper on Lode Locations, translations *Am. Inst. Mining Engrs.*, XV., 272, and articles in THE ENGINEERING AND MINING JOURNAL, February 17th and April 21st, 1883; August 2d, 9th, 16th, 23d, 30th, September 20th, 27th, and November 29th, 1884; November 7th and December 25th, 1885; April 3d, 10th, June 26th, July 10th, December 25th, 1886, February 12th, 1887. We shall here give the essential points only.

The case is one of many, in which the Iron Silver Mining Company of Leadville has been involved, in defending its title to the extensive mining property conveyed to it by Mr. W. H. STEVENS. Most of the others were "apex" cases, that is, the company claimed the ground in dispute as on

the dip of veins, the apexes of which were within its patented claims. In this case, on the contrary, the company held a placer-patent, and sought to recover possession and damages against the defendants, who were extracting ore from a lode within the patented boundaries.

The defense was, that the lode was "known to exist" at the time of the application for the placer-patent, and hence, under Section 2333 of the Revised Statutes, the failure to apply for the lode specially at that time must be construed as a conclusive declaration that the claimant of the placer claim had no right of possession to the lode.

On the first trial, Judge MILLER directed a verdict for the company, on the ground that the defendants had shown no right to the vein anyhow, and that the plaintiff's title was good enough as against mere intruders. He also gave a legal interpretation of the term "known to exist," as applied to a lode under such circumstances—namely, that it must be a lode already discovered, claimed and located.

The Supreme Court held (not unanimously) that the plaintiff must recover in such a case upon the strength of his own title, not the weakness of his adversary's; and that if the lode were legally "known to exist" at the time of placer application, then the plaintiff would have no rights, even as against a mere intruder. Hence it remanded the case for a new trial, without defining the critical conditions involved, and without passing any opinion upon Judge MILLER's construction of section 2333, except so far as to say that it was not called for.

On the second trial, the defendants tried to establish the fact that the lode in question was "known to exist" at the time of the placer application. That it had been discovered within the placer-claim was not alleged; but proof was offered that various people, including Mr. STEVENS, reasoning from the general geology of the neighborhood, and from developments in the nearest mines, had the belief that the "contact zone" of Iron Hill (which has been called a lode and no lode, pretty much as courts and juries chose) extended into the ground in question; that Mr. STEVENS acquired the placer-claim, which did not contain any placer-deposit in the popular sense, solely for the purpose of getting possession of the lode he knew must be in it; and that the location of a placer-claim in that particular place was proof circumstantial of such an evil knowledge and intent.

The plaintiff denied the sufficiency of this evidence to prove such knowledge of the lode, on the part of the placer applicant, or of any body else, as could work a disclaimer of title to it. Furthermore, it offered to show affirmatively that, even if the placer-patent did not cover the lode, it was covered by a patented lode-claim outside of the placer-claim, which contained its apex, and which belonged to the company.

Judge HALLETT refused to admit this lode-patent in evidence, thus preventing the plaintiff from establishing any other title than the placer-patent might give. Then he instructed the jury that the location of this placer-claim was a suspicious circumstance in itself, and that if this and other evidence, taken together, should satisfy them that the application for the placer-patent was made with intent to acquire title to a lode which might exist therein, they might conclude that such intent implied a foregoing investigation and a belief amounting to knowledge under the statute.

Both these rulings are reversed by the Supreme Court. With regard to the first, it says, "In this ruling there was plain error. * * * * It is not readily perceived on what ground the ruling of the court rested." And with regard to the second, "This instruction is plainly erroneous. * * * * There may be difficulty in determining whether such knowledge in a given case was had, but between mere belief and knowledge there is a wide difference. The court could not make them synonymous by its charge and thus in effect incorporate new terms into the statute."

So the judgment was reversed, and this veteran case goes back again for a new trial. We doubt whether it will reach the Supreme Court a third time. For this decision, while it does not give us the long-desired definition of "knowledge under the statute," says plainly enough that the kind of knowledge which the defendants sought to prove is not sufficient. We have little expectation that they will be able to allege any other kind; and so disappears the hope we had cherished that this important section of the statutes would receive in this case an authoritative construction.

Judge FIELD even seems to take a cruel delight in enumerating the questions which may arise, but which will only be settled "as they arise." He says it is a question whether the alleged knowledge must be traced to the applicant, or whether a general knowledge on the part of others is sufficient. In the latter case, it becomes necessary to inquire what would constitute such general knowledge. Then he enumerates various ways in which knowledge may be obtained, but declines to say that any of them is sufficient. He does, however, say very plainly that they can not be sufficient if they lead to nothing more than hope or belief.

This is certainly a point gained. Probably Mr. STEVENS and his company are quite satisfied with it. So far as the pending case is concerned, it is a complete victory for them. And we think that, in spite of the guarded language of the opinion, legitimate inferences may be drawn

from it which go far toward sustaining the *obiter dictum* of Judge MILLER.

For if mere belief is not knowledge, then we do not see how knowledge can be had of the existence of a lode within a given area, except by its actual discovery therein. Granted, for instance, that a lode has been traced on its course to the boundary of a claim. Such evidence can not produce more than a strong presumption or belief that it passes beyond the boundary. For all lodes end in their course somewhere, and why may not *this end there*?

But Judge MILLER went further than this, and held that actual discovery would not be sufficient, unless followed by public notice thereof—that is, location. We have elsewhere argued that this is, on the whole, the most tenable and consistent construction of the law. Yet we confess that if in any case the knowledge of an actual lode-discovery could be proved upon a placer applicant (as, for instance, if he had himself found the lode and then, instead of locating it, hurried to make application for a placer-patent) the Supreme Court would probably hold that his knowledge was sufficient to bring the case within section 2333. Such instances are not likely to arise, however; for a placer-applicant actually knowing the locality of a lode within his claim, not located already by another party, would certainly specify it in his application.

When we come to sufficient *general* knowledge, however, it seems likely to us that the Supreme Court will be obliged, some day, to hold that the only adequate proof of it is the formal location. That is a notice to all the world. If the placer applicant is ignorant of it, it is his own fault. He is, in fact, legally presumed to know it, and he can not plead ignorance.

Hence we may conclude that, in its last analysis, the knowledge mentioned by the statute must be, either by actual proof or by legal presumption, brought home to the placer applicant. And it must be real knowledge.

"For this relief, much thanks." We trust the Supreme Court will go on, in its extremely patient way, settling points "as they arise." Certainly we shall not complain, if its opinions continue to be as clear and sensible as this one. But we hope that we shall see the mining law abolished long before the court, at the present rate of progress, has got it completely explained.

One other point deserves notice. It will be seen that the court declares the language of the placer-patent in this case to go unwarrantably beyond the language of the statutes. This is not the only particular in which "Land Office law" has been at fault. The language of the official mining patents might be corrected with advantage, so as to bring that department into harmony with legal decisions.

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.

Scranton, Pa., as a Seat for Chemical Manufacture.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Referring to Dr. Francis Wyatt's paper on the Leblanc Alkali Works, as continued in ENGINEERING AND MINING JOURNAL of February 4th, wherein he speaks of "the quantity of coal employed in the production of soda ash as three times greater than the necessary proportion of salt, and the selection of a site for such works, etc.," I would suggest locations might be found in our city and adjacent to an anthracite culm pile of a million or more tons, a ton of which, when well saturated with water, will make as much steam as a ton of our best lump coal. This has been demonstrated by the large steel mill companies here who have used it for a few years past in making steam, and at a saving of \$50,000 to \$100,000 per annum, instead of the use of lump coals as formerly used. Our location is nearest to the salt mines of Syracuse and Western New York, and why should we not establish pipe lines and bring the brine to the fuel? This plan I brought to the notice of parties interested in alkali works three or four years ago, and now ask the JOURNAL or its readers if such is not feasible.

WILLIAM H. RICHMOND.

SCRANTON, PA.

Montana Smelting Schemes.

"The Helena Herald seems to believe that the stock sharps in New York, having heard that the Helena banks carry on deposit somewhere between fifty and sixty million dollars, are preparing to take Hauser in on a 'sure thing' deal. Those fellows would better leave Governor Hauser alone. If they are not careful he will sell them his stock in the Wickes reduction works or the Bimini Railroad and pocket the cash. It is not safe for any body to fool with Sam Hauser."—Extract from Butte *Intermountain*.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: This extract suggests some remarks that may interest the readers of THE ENGINEERING AND MINING JOURNAL.

Attention has been called of late by various smelting projects brought out to the attractions Montana offers for the establishment of a large silver-lead smelting plant in the vicinity of Helena. (See ENGINEERING AND MINING JOURNAL, January 7th.) Without denying that there is more room for a first-class establishment of the kind in that quarter, still in the interests of legitimate mining it would be well to warn intending investors to examine thoroughly these various schemes.

It is proposed to locate one large plant at "Great Falls" (see ENGINEERING AND MINING JOURNAL, January 7th and 21st), a point which

has quite recently become prominent by being temporarily the Western terminus of the Manitoba Railway.

The fact that the name of Anton Eilers appears among those of the incorporators of this company, coupled with the alleged existence of extensive coal-fields in the neighborhood of Great Falls, and the probability of the enterprise receiving the support of the Manitoba Railroad, warrants one in expecting something from such a combination.

The second enterprise of similar purport is chartered by ex-Governor Hauser, President of the Helena Mining and Reduction Company.

Is this the old Alta Montana cropped up again after masquerading for several years in the guise of the Helena Mining and Reduction Company, alias Wickes Co.?

This property, after its failure in the hands of the old Alta Montana Company, was taken hold of by Helena parties, and some dividends squeezed out of it; but these ceased in July, 1886, and have shown no sign of reappearing, a phenomenon not at all surprising to any one conversant with the way in which the company's business is managed. Several attempts have been made to dispose of this property, but, so far, apparently without avail.

In the spring of 1886 overtures were made to certain Eastern men, offering to guarantee 6 per cent interest on the investment, and even to refund the money if the goods did not suit.

Last spring, just previous to the passing of the Alien act, its familiar old head bobbed up on the London market, but the plan collapsed with many of like ilk upon the passing of that famous (or infamous?) act of Congress.

Is the present scheme for building a new and enormous smelting works in or near Helena simply another ruse of the shrewd manipulators of the former schemes to shuffle off a heavy and unprofitable load on to the shoulders of others? I do not say that it is, but it looks suspiciously like it.

A third smelting scheme is also elbowing its way towards public notice, but this one is at least frank, and does not profess any thing more than the benefit of Helena business men.

The ores of Montana are highly siliceous, lead has to be brought from the distant Coeur d'Alene mines, and if this latter source of supply were diverted, to Portland, for instance, there would not be sufficient lead ores in the local market to make good the loss.

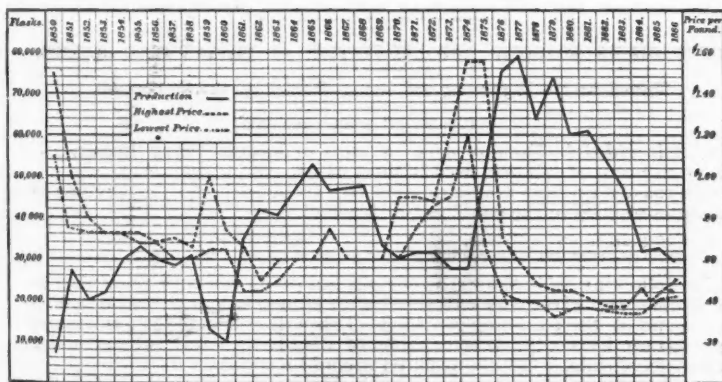
HELENA, MONT., Jan 28, 1888.

TRANSIENT.

QUICKSILVER PRODUCTION AND TRADE IN 1887.

Written for the Engineering and Mining Journal by J. B. Randol.

In our annual review for 1886, published in this journal, January 29th, 1887, pp. 77 and 78, we said: "The renewed activity in gold and silver mining in all parts of the world promises to make an active market for quicksilver in 1887, and better prices than have prevailed for many years." The results for 1887 prove our prediction to have been well founded. In San Francisco the January price of \$38.50 per flask continued until March, when a fall to \$37.50 was followed by a rise to \$40 in April; then the price gradually fell to \$36.50 in August; rose to \$38



Production and Price of Quicksilver Since 1850.

in September; was stationary at \$37 in October and November, and rapidly advanced in December to \$48, which was the closing price. In London the January price of Rothschild was £7 5s. 1d. with slight fluctuations; it fell to £6 10s. in May and gradually rose to £7 15s. October 10th; then it advanced rapidly, £8 November 29th; £9 15s. November 30th; £10 5s. December 1st; £11 5s. December 12th, and closed the year at £11. The California production was 33,760 flasks (20,000 New Almaden and 13,760 for ten other mines), against 29,981 in 1886—an increase of 3779 flasks, of which 2000 are to be credited to New Almaden. The comparative production for all the American quicksilver mines is shown in the following table:

| | 1886. | 1887. | | |
|-------------------|--------|--------|-------|-----------|
| New Almaden..... | 18,000 | 20,000 | 2,000 | Increase. |
| Idaho..... | 3,478 | 2,880 | 598 | Decrease. |
| N. Pa. Con..... | 1,769 | 2,694 | 925 | Increase. |
| Gt. Western..... | 1,949 | 1,448 | 503 | Decrease. |
| Sulphur Bank..... | 1,449 | 1,400 | 41 | Increase. |
| New Idria..... | 1,406 | 1,890 | 484 | Increase. |
| Gt. E. tera..... | 735 | 689 | 46 | Decrease. |
| Redington..... | 409 | 673 | 264 | Increase. |
| Bradbury..... | ..... | 800 | 800 | Increase. |
| Various..... | 786 | 1,198 | 412 | Increase. |
| Total flasks..... | 29,981 | 33,760 | 3,779 | Increase. |

We are still of the opinion that the American mines can not increase their production even with the stimulus of an increased price, and for the year 1888 we look for a falling off in their yield.

Stocks in first hands are unusually small, the demand is good and a

fair price is likely to be maintained, unless quicksilver should be placed on the free list, as has lately been proposed.

In 1886 the Almaden mine, Spain, produced 51,000 flasks, and in 1887, 53,000 flasks—for the two years, 104,000 flasks; against a production of 63,741 flasks by all the American mines for a like period. The estimated stock of quicksilver in London at the end of 1887 was about 40,000 flasks, or some 10,000 flasks less than the stock at the beginning of the year.

The January, 1888, quotations show a fall in London to £8 10s. and a recovery to £9; the San Francisco price also dropping to \$42 to \$45.

The accompanying diagram shows the highest and lowest prices and production of quicksilver from 1850 to 1886, inclusive.

IRON SILVER VS. REYNOLDS CASE IN THE SUPREME COURT.

The decision of the Supreme Court in *The Iron Silver Mining Co. vs. Joseph Reynolds* and John D. Morrissey, heard at the October term has just been published. It was delivered by Judge Field, on January 23d, and the following are its essential portions (the rest, which we omit, consisting in a statement of the case, pleadings, etc.):

When this case was formerly before us, it was held that if a lode or vein of gold or silver was known to exist within a placer claim at the time the application for the patent was made, the patentee could not recover its possession even as against a mere intruder. The patentee having no title to such lode or vein by reason of its exception from his patent under the statute, could not enforce any legal right to it against any one, being bound to rely upon the strength of his own title and not the weakness of his adversary's. The defendants, therefore, on this trial, placed their defense upon this exception, and the question for determination was, whether the lode or vein in question was known to exist at the time the application for a patent was made.

In anticipation of this defense, and to establish title to the demanded premises, if not sufficiently covered by the patent for the placer claim, the plaintiff offered in evidence a patent of the United States for the Rock and Dome lode mining claims, and a deed of them to the plaintiff from the patentees, for the purpose of showing that the lode which, since the issue of the patent of the placer claim, has been ascertained to dip into and extend within the boundaries of that claim, has its apex outcrop within the boundaries of these lode claims; but the court refused to admit the patent and the plaintiff excepted. In thus ruling there was plain error. If the fact thus sought to be established existed, it would force the defendants from their position of intruders without title, and compel them to show prior title in themselves to the premises or to surrender them to the plaintiff.

It is not readily perceived on what ground the ruling of the court rested. The plaintiff did not base its action upon any particular source of title; it simply averred that it was the owner and possessed of certain described mining ground, from a portion of which the defendants had ousted it and wrongfully withheld the possession. The patent was evidence of the grant of the whole of the described premises, if no portion was excepted from its operation either in terms or by force of the statute. But if any portion was excepted for any cause, the duty fell on the plaintiff to furnish title to such excepted portion from some other source, and that the court, by its ruling, refused to permit the plaintiff to do.

The exception in the patent from its grant of any vein or lode of quartz, or other rock in place bearing gold, silver, cinnabar, lead, tin, or other valuable deposit, if "claimed or known to exist," is in terms broader than the language of section 2333 under which the patent was issued. The statute does not except veins or lodes "claimed or known to exist," but only such as are "known to exist," and it fixes the time at which such knowledge is to be had as that of the application for the patent, and not that of the date of the patent, to take the vein or lode out of its grant. Section 2333, as stated by this court when the case was first here, makes provision for three distinct classes of cases:

1. When one applies for a placer plant, 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-claim and twenty-five feet on each side of it at \$5 an acre and \$2.50 an acre for the placer claim, a patent will issue to him covering both claim and lode.

2. When a vein or lode, such as is described in a previous section, is known to exist at the time within the boundaries of the placer claim, the application for a patent therefor, 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.

The question under this section, which must control and limit any conflicting exception expressed in the patent, is, When can it be said that a vein or lode is "known to exist" within the boundaries of a placer claim for which a patent is sought. The language of the statute appears to be sufficiently intelligible in a general sense; and yet it becomes difficult of interpretation when applied to the determination of rights asserted to such veins or lodes from the possession, or absence, of such knowledge at the time application is made for the patent. At the outset, as stated when the case was here before the inquiry must be whether the alleged knowledge must be traced to the applicant, or whether it is sufficient that the existence of the vein or lode was at the time of the application generally known. If general knowledge of such existence should be held sufficient, the inquiry would follow as to what would constitute such general knowledge, so as to create an exception to the grant, notwithstanding the ignorance of the patentee. Such suggestions indicate the difficulties of some of the questions which may arise in the application of the statute.

The court below instructed the jury that it was unnecessary to declare what circumstances might be sufficient to affect a patentee with knowledge as prescribed by the statute, "for, if, in any case, it appear that an application for a patent is made with intent to acquire title to a lode or vein which may exist in the ground beneath the surface of a placer claim, it is believed a patent issued upon such application can not operate to convey such lode or vein;" and further, that "that intention could be formed only upon investigation as to the character of the

ground, and the belief as to the existence of a valuable lode therein, which would amount to knowledge under the statute."

This instruction is plainly erroneous. The statute speaks of acquiring a patent with a knowledge of the existence of a vein or lode within the boundaries of the claim for which a patent is sought, not the effect of the *intent* of the party to acquire a lode which may or may not exist, of which he has no knowledge. Nor does it render belief, after examination, in the existence of a lode, knowledge of the fact.

There may be difficulty in determining whether such knowledge in a given case was had, but between mere belief and knowledge there is a wide difference. The court could not make them synonymous by its charge and thus in effect incorporate new terms into the statute.

Knowledge of the existence of a lode or vein within the boundaries of a placer claim may be obtained from its outcrop within such boundaries; or from the developments of the placer claim previous to the application for a patent; or by the tracing of the vein from another lode; or perhaps from the general condition and developments of mining ground adjoining the placer claim. It may also be obtained from the information of others who have made the necessary explorations to ascertain the fact, and perhaps in other ways. We do not speak of the sufficiency of any of these modes, but mention them merely to show that such knowledge may be had without making hopes and beliefs on the subject its equivalent. As well observed by the court, when the case was here before, it is better that all questions as to what kind of evidence is necessary, and we may add sufficient, to prove the knowledge required by the statute, should be settled as they arise.

For the errors mentioned, the judgment must be reversed and the case remanded for a new trial.

THE ST. LOUIS SAMPLING AND TESTING WORKS.

These new works owe their existence to the enterprise and untiring devotion of Professor W. B. Potter, of Washington University. The objects he had in building them were to secure a complete plant on full working scale, and including most approved machinery and appliances relating to the sampling, milling and concentration of ores, etc., for the benefit of the students in the course of mining and metallurgy at the University, and at the same time to serve as a place where mine owners and investors, mining engineers and metallurgists, can have preliminary trials made of any ores or fuels with plant of full size.

Professor Potter undertook this work with the expectation that the people of St. Louis, and especially those interested in mining, will assist him in supplying the means, and with the intention of deeding the whole establishment, when complete, to Washington University, as a gift from the subscribers, with the understanding that it shall be under the direction and management of the Department of Mining and Metallurgy.

The accompanying drawings and description will show how well the works, as completed, are adapted to carry out these objects. Especial care has been taken in the design and construction of the plant to make it elastic and vary within wide limits the methods and conditions of treatment. With such means at the command of their distinguished originator we may expect some valuable contributions in the way of investigations relating to problems connected with the milling and concentration of ores, etc., many of which problems have remained more or less unsettled for want of such facilities as are here provided.

While the students of the department of mining and metallurgy of Washington University will have every opportunity for a complete practical course in these works, it must be understood that there will be no "student's work" connected with the commercial work taken in. A large corps of skilled and experienced metallurgists will give careful attention to all work, and a mill foreman of large experience and excellent record in Western mills has charge of that department.

Ground was broken in the Fall of 1886, and the works are now complete and ready for operation. There has been no haste in the construction, but every thing has been worked out with patience and deliberation. All the work of setting up machinery, etc., has been done with no other help than the men who are connected with the establishment, and it has been most thoroughly done.

A large part of the machinery was purchased of Fraser & Chalmers, of Chicago, who made liberal reductions in prices, as have also other parties from whom material was obtained, in view of the character of the enterprise.

We heartily congratulate Professor Potter on the great success which has crowned his untiring efforts, and we congratulate Washington University on having Professor Potter in charge of its most important department.

The following description and drawings will give some idea of the completeness of this establishment.

The building, 60 by 139 feet, has a clear span truss roof which leaves the entire floor space free from post or column. The floor of the mill, except near the furnaces, is laid with granatoid flagging, which has a smooth, hard surface, easily kept clean. The water supply is from the city main.

The sampling plant consists of Blake rock breaker 10 by 4 inches; belt driven rolls 10 by 16 inches, and Fraser & Chalmers sample grinder. The gold mill has a Tulloch automatic ore feeder, a three-stamp battery, with 650-pound stamp; electro-plated copper plate, 2 by 8 feet; blanket table, etc. Full size Frue vanner and Evens table for concentrating the tailings.

Reverberatory furnace capable of taking a 900-pound charge of average ore, for roasting ore, chlorine generator and tanks for treatment by chlorination, and two 3-foot iron pans for amalgamation.

THE SILVER MILL

has a challenge automatic ore feeder, a 5-stamp battery, 650 pound stamps, full set of screens of different sizes, settling tanks, two 3-foot iron amalgamation pans, one 6 foot settler, tailing tanks, a reverberatory roasting furnace with dust chambers, an 8 by 8-foot hearth for roasting or chloridizing ores, and a full set of tanks, arranged

with ample fall, giving every facility for working ores by any leaching or wet method.

For crushing by rolls, the works have been equipped with a rock breaker two pair of rolls, 10 inches by 16 inches, elevator and sizing screens; reort and smelting furnaces.

The concentration plant embraces rock-breaker, stamp battery, and two pair of rolls for crushing; a cup elevator, four revolving sizing screens, each 36 inches by 5 feet; three crank-motion, double compartment jigs, each 3 by 6 feet, with trays 20 by 32 inches; three eccentric motion double compartment jigs of same size; 15-foot Richards Coggin hydraulic separator, a spitz-karsten, or pointed box, 15 feet long, with four compartments, for slime classification; Even's revolving table, 15 feet in diameter; Frue vanner, 4 by 12 feet, hand jigs and riddles for smaller tests.

It will be seen that this concentration plant is not a small model, but forms a complete ore-dressing establishment of larger capacity than many of our Western mills.

PLANT FOR TESTING FUELS.

This includes complete machinery for the washing of impure coals and coal slack, viz., two pairs of rolls 10 inches by 16 inches; elevator, four sizing screens, 36 inches by 60 inches; six plunger jigs, with trays 20 inches by 32 inches; classifiers and slime machines.

Also coking oven, 2½ by 4½ by 6 feet provided with side-wall and bottom flues, and so arranged that it can be used as a plain oven of the Welsh type, or on the Belgian system, affording facilities for thoroughly testing the coking properties of coals upon a full working scale; a 54 inches by 16 feet return flue steel boiler, provided with all appliances for making complete fuel trials, including arrangements for taking samples of stack gases for analyses.

The power is furnished by a 10 by 15-inch Buckeye automatic engine. The offices and laboratories are fully equipped for carrying on the business and doing all kinds of assaying and analytical work, as well as making elaborate chemical investigations.

The fullest provision is made for the thoroughly reliable sampling of ores and all classes of mineral substances and metallurgical products; for the practical testing and treatment of ores by any process except smelting; for mechanical preparation and concentration of ores and coals; and for practically testing fuels, a department thus far neglected in nearly all our testing works.

Considering the great variety of ores of the precious metals, and how much the method of treatment in any case depends upon the individual peculiarities of the ore in connection with local conditions, it is easy to understand the immense value of a preliminary practical trial in an inexpensive way before attempting to establish large and costly works in out of the way mining districts. The history of mining is crowded with the record of failures resulting from lack of wisdom in the adoption of processes and undue haste in the installation of works.

The St. Louis Testing-Works will provide an inexpensive means of acquiring this necessary preliminary knowledge, and no doubt will be largely patronized. The officers of works are: W. B. Potter, E.M., Manager; H. A. Hunicke, E.M., Chemist; P. T. Newitt, Foreman; H. S. Wheeler, E.M., specialty, concentration; Arthur Thacher, specialty, milling; R. D'O. Johnson, E.M.

CHLORIDIZING ROASTING AND LIXIVIATION AT YEDRAS MINE, MEXICO.

Written for the Engineering and Mining Journal by Geo. J. Rockwell.

(Continued from page 86.)

b. Salt added in Furnace after a more or less Oxidizing Roasting.—Seven per cent of salt was used in most cases.

The roasted ore was comparatively free from balls, but impervious to solutions and therefore could not be leached.

20 charges, about 70 tons, = 50.6 per cent chloridized.
360 tons reverberatory ore during same period = 79.8 "

The following table shows the curious but easily explained fact that in some cases less silver was extracted after adding salt than was obtained at the end of the oxidizing roasting. This will prove to Mr. Hofmann that sodium hyposulphite is capable of dissolving other salts of silver than the chloride, which he declared it could not do.

Mr. C. A. Stetefeldt, in a paper on the Russell process, read before the American Institute of Mining Engineers, May, 1884, gives an account of Mr. E. H. Russell's elaborate investigations on the solvent power of sodium hyposulphite for various silver compounds other than the chloride, and the following results corroborate his statements:

BRUCKNER ROASTED ORE, SALT ADDED IN THE FURNACE.

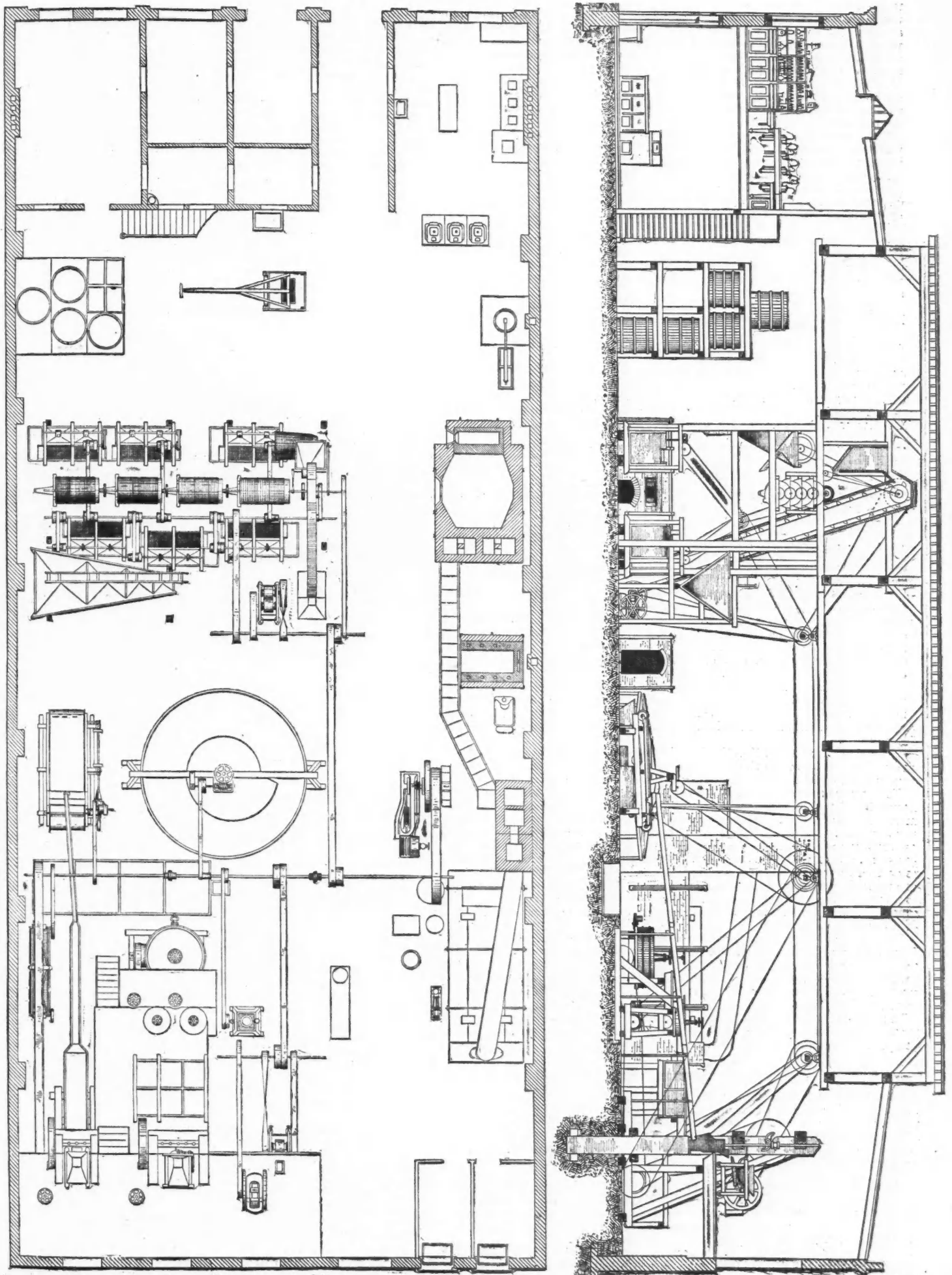
| NO. OF CHARGE. | Percentage extracted with sodium hyposulphite. | |
|----------------|--|---|
| | Before adding salt end of oxidizing roasting. | After adding salt and just before cropping. |
| 108..... | 43.8 | 39.5 |
| 109..... | 43.3 | 40.2 |
| 115..... | 42.8 | 32.5 |
| 116..... | 53.1 | 37.7 |
| 117..... | 44.2 | 20.0 |
| 123..... | 64.3 | 63.7 |
| 125..... | 54.5 | 30.0 |

Average decrease in percentage of soluble silver after adding salt = 11.8 per cent.

I leached the raw ore with sodium hyposulphite, extracting 2.7 per cent, which proves that very little if any silver in the ore exists in the form of chloride.

During the oxidizing roasting, the caustic line derived from the calcination of the carbonate having a strong affinity for the oxidized sulphur unites with it to form calcium sulphate, which remains unchanged during the rest of the operation. Upon adding salt at this stage, not enough sulphuric acid remains to decompose it, and set free sufficient chlorine to chloridize the silver (that a large volume of chlorine is necessary for this purpose is well known), or, in other words the ore has been

SAINT LOUIS SAMPLING AND TESTING WORKS, WASHINGTON UNIVERSITY.



roasted too dead before the addition of salt. Volatilization of the silver goes on under the high heat, and the result is that after the charge has been dropped we find that the percentage of soluble silver is even less than it was at the end of the oxidizing period. I had previously tried the same experiment a number of times in the reverberatories, and always obtained a lower chlorination and higher volatilization than when salt was added earlier. I have heard persons state that the ore could not be roasted too dead, unless excessive heat was used, and that there would still be quite enough sulphates left to decompose the salt. Mr. Hofmann used heat at first to start the sulphur burning, and then withdrawing the fire, let the ore roast itself in its own heat. After the addition of salt the fire was again started and kept up until the end of the operation.

The results prove clearly to my mind that ore can be roasted too dead when caustic lime is present in sufficient quantity to combine with the greater portion of the sulphuric acid formed.

My experience with reverberatories has been that by adding salt after a more or less perfect oxidizing roasting, I not only obtained lower chlorination and greater loss, but found that much delay was occasioned by cooling down the furnace, which decreased its capacity one half.

IV. Furnace Loss in Brückner Cylinders.—There are two kinds of furnace loss: (a) Mechanical or dust loss, which can only be arrived at by weighing the charges before and after roasting and collecting the flue dust, which would not be at all practicable; and (b) volatilization loss, which can be very easily ascertained by Mr. Hofmann's excellent muffle test, described in this journal.

a. Dust Loss.—Observation indicated a much greater dust loss in the Brückner than in the reverberatories.

b. Volatilization Loss.—Mr. Hofmann claims very much less loss by volatilization in the Brückner than in the reverberatories, but as he bases his calculations upon samples taken from the furnace, which I have shown to be incorrect, I will only give figures covering the time during which we took Brückner vault samples. The following table of comparison is between the Brückner and two reverberatories run by picked men and with extreme care for the purpose of comparing their merits. The time covers a period of eight consecutive days:

| Chlorination. | | | Volatilization loss. | | |
|----------------|----------------|-----------|----------------------|----------------|-----------|
| Reverb. No. 5. | Reverb. No. 6. | Brückner. | Reverb. No. 5. | Reverb. No. 6. | Brückner. |
| 82.7 | 82.7 | 71.3 | 10.1 | 9.3 | 10.6 |

The following table shows that the volatilization loss in the Brückner is some times higher than in the reverberatories:

| | Chlorination. | Volatilization loss. |
|--|---------------|----------------------|
| Jan. 23. Average of all the reverberatories..... | 87.0 | 13.9 |
| Jan. 23. Average of Brückner..... | 78.4 | 18.6 |
| Jan. 26. Average of all the reverberatories..... | 83.3 | 11.4 |
| Jan. 26. Average of Brückner..... | 76.2 | 19.1 |

I do not think, however, that the volatilization loss in the reverberatories can be kept as low as in the Brückners, because it is utterly impossible to run a reverberatory with Mexican poor labor with much degree of regularity, while, on the other hand, the Brückner furnaces have the advantage of mechanical power. Still, I think that, with skilled roasters, conscientious men, and clean flues, the difference in favor of the cylinders would not be great.

Conclusions Derived from Mr. Hofmann's Experiments.—We have shown that when salt is added in the battery, Brückner ore gives a lower chlorination than the reverberatories, and that when salt is added after a partial oxidizing roasting, the difference is very much against the Brückners.

We have also shown that the Brückners may sometimes give a higher volatilization loss than the reverberatory furnaces, and that a comparative run of eight consecutive days did not show any marked difference.

Yedrasore roasted in Brückner furnaces can not be leached, no matter how highly chloridized. The physical condition of the roasted pulp makes no difference, the finer material being as impervious to solutions as the balls. By finely pulverizing the samples in the assay office a high percentage was obtained from ore to which salt had been added in the battery, but it was noticed that the samples filtered more slowly than reverberatory ore, which would indicate that even if it was practicable to recrush the roasted ore the mechanical difficulty in leaching would still remain. Reverberatory ore, on the other hand, leaches freely and quickly, and there is very little difference between the assay office and mill results.

It might be of benefit, if some one would offer an explanation of why Brückner ore will not leach, and perhaps Mr. Hofmann, who roasted several hundred tons, will kindly explain the reason. Chemical analyses would throw much light on the matter; but not having these at command, I simply state the facts, and will not try to offer an explanation which might be erroneous.

I have ventured to publish these notes of experiments, which covered several months and represented many hundred tons of ore, with the hope that they may be of some benefit.

(TO BE CONTINUED.)

An Electric Tramcar for Australia has recently been tested in Brussels. The car is of large size, being designed to carry sixty passengers, and is intended to have a maximum speed of 15 miles per hour. The car was at first fitted with motors of Belgian manufacture, but it proved so unsatisfactory that English-built motors were substituted with the result of practically doubling the efficiency.

Coal Gas Production in England.—The following figures relating to the coal used, gas made, etc., by the English gas works in 1886, both in those owned by public companies and those owned by town authorities, are of interest: Tons of coal carbonized by companies, 5,777,966; by authorities, 2,879,765; gas made (feet) by companies, 59,251,112,000; by authorities, 23,880,425,000; gas sold (feet) by companies, 54,309,760,000; by authorities, 23,370,711,000; gas mains (miles) by companies, 19,156; by authorities, 6287; number of consumers of companies, 1,133,897; of authorities, 996,469; public lamps by companies, 258,072; by authorities, 155,849.

THE CŒUR D'ALENE SILVER-LEAD MINES.

Written for the Engineering and Mining Journal, by Prof. J. E. Clayton.

The South Fork of the Cœur d'Alène River takes its rise near Mullens Pass in the Bitter Root range of mountains and runs in a general westerly course to its confluence with the North Fork near the town of Kingston, thence westerly to the south end of Cœur d'Alène Lake.

Milo Creek Canyon is a deep mountain gorge, with very steep sides rising to a height of 1000 to 1500 feet above the bed of the creek opposite the point where it crosses the Bunker Hill lode. The first discoveries made here were the Bunker Hill lode claim on the west side of the creek, and the Sullivan lode claim on the east side. The outcrop of the lode in the Sullivan claim on the east side of the creek is nearly E. and W. magnetic, on the west side nearly N. W., S. E.

The lode has not been found west of the summit of the ridge, nor has it been found east of the Sullivan claim on the east side of the canyon. The lode has a southwesterly "dip" at angles varying from 40 to 60 degrees below the horizontal plane. The geological formations are in most part quartzite and magnesian shale and schists, the quartzite in most places largely predominating. The shales occur as thin seams between heavy beds, or reefs of quartzite. These quartzite and shale beds have been folded up into sharp anticlinal and synclinal curves by lateral pressure from north and south directions. This folding of the beds must have occurred at some remote period, long prior to the upheaval of the Rocky Mountain system of N. and S. ranges. The central axis of one of these anticlinal folds crosses Milo Creek about one mile north of the Bunker Hill lode. From this axis line the beds of country-rock dip in opposite directions.

The Bunker Hill lode is situated in the south flank of this great anticlinal or upward folding of the bedded structure of the country-rock, where the quartzites and shale have an easterly and westerly trend and a southerly dip, the angles of dip varying from 40 degrees to nearly vertical positions.

The general facts above cited will apply to the whole South Fork region of country, including some 30 miles long from west to east, by 15 to 20 miles wide, making an area of over 500 square miles. This block of country on the west flank of the Bitter Root range and drained by the South Fork of the Cœur d'Alène River, is the great silver-lead district of northern Idaho.

While the general outline of the anticlinal and synclinal folding of the bedded formations in this silver-lead district are clearly recognizable, there are many deviations in course or strike of the beds due to faulting and buckling by vast dynamic forces exerted from east and west directions during the development of the Rocky Mountain system of approximately parallel ranges.

At a few points, eruptive rocks have disturbed the original position of the folded shales and quartzites for considerable distances. A notable example of deflected beds may be seen on "Canyon" and "Nine Mile" creeks, about 5 miles north of Wallace, and extending up to, and beyond the town of Burke, where the famous Tiger and Poorman mines are situated. Here the strike of the beds are nearly N. W. S. E., and dip at a high angle toward the N. E. The vein fissure, however, retains its east and west course, cutting obliquely through the upturned beds of quartzite and shale.

These facts seem to indicate that the bedded formations of this region of country were originally folded up into anticlinal ridges and corresponding depressions by slow and persistent forces exerted laterally from north and south; that at a later period in the geological history of the continent, the lateral forces were exerted from east and west directions, and finally culminated in the uplift of the Rocky Mountain ranges with northerly and southerly trend.

I have not been able to find any conclusive evidence of mineralization, or the development of any "mineral vein system" during the remote geological age in which the first folding of the beds occurred. From a careful study of the facts, the evidences are abundant to show that the vein system and mineralization of this country was produced during the great continental uplift that culminated in forming the Rocky Mountain ranges.

The structure and physical characteristics of the Bunker Hill lode are very striking and unusual.

It has the well marked character of a true fissure vein "along its foot-wall contact," and of a "brecciated impregnated mineralized zone" of country-rock along and in the hanging-wall country. The foot-wall country-rock (quartzite with shaly seams) is unconformable to the strike of the lode, while the hanging-wall country is conformable, in most part, to the dip and strike of the lode or ore-zone.

The hanging wall ore-zone is brecciated and crushed in places, while in other parts it retains distinct traces of its bedded structure. The strike of the beds in the foot-wall country is nearly E. W. magnetic, and nearly vertical dip, while the hanging-wall mineralized zone of country-rock has a strike nearly N. W. S. E. and dip S. W. of 40 to 60 degrees below the horizon.

These facts show that the lode is in a line of true fissuring (and profound geological faulting) obliquely across the bedded formations of quartzite and shale country-rock, and that the crushing and buckling of the beds out of their true course was confined to the hanging-wall side of the fissure, while the country-rock on the foot-wall side was but slightly disturbed.

Where the hanging-wall country-rock is most extensively crushed and fissured, the mineralization is broader and more complete than it is where the local disturbance is only slight.

The largest and most valuable deposits of silver-lead ore are found in and near the foot-wall fissure. In portions of this mineralized zone of crushed country-rock, there are a series of nearly parallel fissures all carrying ore of the same character, and all connected by small ore seams and subordinate fissures that ramify and interlace the whole zone into one broad ore-channel.

The Bunker Hill lode and ore zone has not been traced with certainty beyond the Sullivan claim at the southeast end and the summit of the ridge in the Tyler ground at the northwest end, a total distance of about 4500 feet along the line of outcrop.

The mineralized zone is broader and the subordinate vein fissures more

numerous in the central portions than they are at either end of the ore-belt, as above defined. The zone of ore-bearing ground in the northwest portion of the Bunker Hill and in the "Stemwinder" claim, and in the Emma and Last Chance ground, is not less than 200 feet wide, measured at right angles to the strike of the foot-wall fissure.

True crystalline quartz gangue-stone is met with in small quantities only here and there, in the larger ore-bodies, but as a rule the waste stuff found mixed with the ore is brecciated quartzite and earthy infiltrations mainly derived from the crushed and abraded material from the walls of the fissures within the lode, or "mineralized zone" of country-rock.

The workable portions of this broad zone are confined to the larger fissures, that trend irregularly through the broken mass of country-rock in lines approximately parallel with the foot-wall, or principal line of fissure. While the foot-wall vein is continuous as far as the lode has been traced, it is variable in width of ore. In places it will be found "pinched" down to a thin seam of ore, only a few inches thick; then it will gradually enlarge or widen into ore-bodies of great size, called chutes, chimneys or bonanzas.

In the Bunker Hill and Sullivan mines some of the ore-bodies are more than 20 feet wide. In the Stemwinder claim, at the point where the cross-cut tunnel cuts the main foot-wall vein, it is 12 to 15 feet wide. In the Last Chance cross-cut the principal ore seam is 5 feet wide, and other small seams of galena near by are 3 to 10 inches thick. In the Tyler mine further west, the dimensions are about the same in general character as seen in the Last Chance ground.

These dimensions refer to the vein of compact ore along the main line of fissure at or near the foot-wall. In the broken hanging-wall country-rock there are numerous subordinate veins carrying ore in workable quantities. There are also large masses of brecciated quartzite that is mixed all through with seams and bunches of galena in quantity sufficient to pay a good profit for mining and concentration.

Some of these crushed and impregnated masses are known to be of great width, 20 to 60 feet or more, but they are not sufficiently explored to enable one to make reliable estimates of their availability at the present time.

POSSIBLE OUTPUT.

It is difficult to make any close estimate of the possible daily output of the different mining locations on this great lode, until more extensive and complete explorations are made.

The Bunker Hill and Sullivan are extracting about 125 tons of crude ore per day, which yields in the concentrating mill about 30 tons of clean shipping ore that assays about 32 ounces per ton in silver and 65 per cent in lead—say a gross value of silver and lead of \$60 per ton. With fair rates of transportation and reduction the net profit on the dressed ore ought to be about \$30 per ton—say \$25 per ton net. This would make the Bunker Hill and Sullivan output worth \$750 per day net. This output, judging from what I know of the mine, is about one half of its capacity; at any rate I think its daily output could be easily doubled within one year from this date, say 60 tons of clean shipping ore per day.

If the Stemwinder mine continues as large as it now shows in the cross-cut tunnel and in the surface workings it will be able to furnish about 30 tons of clean ore per day. The Last Chance and Emma can probably produce, when opened and equipped, about 20 tons of dressed ore per day, and the Tyler mine may be rated at about the same quantity, making a total output of 130 tons of clean shipping ore per day. Assuming that it will take, on an average, five tons of crude ore to make one ton of concentrates, we have an output of 650 tons of crude ore per day from the whole length of the lode now known to be productive, divided as follows:

| | |
|------------------------|---|
| Sullivan & Bunker Hill | Crude ore, 300 tons; Dressed, 60 tons. |
| Stemwinder | " " 150 " " 30 " |
| Emma & Last Chance | " " 100 " " 20 " |
| Tyler | " " 100 " " 20 " |
| Total | Crude ore, 650 tons; Dressed, 130 tons. |

To those who are familiar with this great lode the above estimates will appear small or extremely conservative. While I am free to confess that its possibilities are much larger than the estimates, I do not think that the present developments will warrant a larger one. In order to realize the output that I have estimated, the Bunker Hill and Sullivan must double the capacity of their concentration mill; the Stemwinder and Tyler mill must have its capacity doubled, and the Emma and Last Chance must build a mill of one hundred tons capacity, all of which takes time and a large outlay of money before my estimates can be realized in actual daily output.

The only owner mine in the neighborhood of Wardner that is sufficiently explored to insure a regular output of ore is the Sierra Nevada, about one mile west of the town in a direct line, and two miles by the road grade. This mine is well opened by four tunnels, and connecting raises and cross-cuts, with a full equipment of a tramway and concentration mill. An output of 15 tons of dressed ore per day can be made easily. This ore will give an average assay of 40 ounces silver, and 60 per cent lead—say a gross value of \$65@-\$75 per ton. This, added to the Bunker Hill series of mines (with some other small additions), will bring the output up to about 150 tons per day, or, say, 45,000 tons a year, from the neighborhood of Wardner alone.

This represents only one group of mining claims, covering an area of about two miles long by less than one mile wide.

I can state as a matter of personal judgment that the group of mines near Wardner, above described, does not represent more than one fourth of the productive capacity of the Cœur d'Alène silver-lead mines.

OTHER GROUPS OF MINES.

The mines now being opened on Canyon Creek 20 miles E. N. E. of Wardner, near Burke, and along down the canyon three miles to Davenport, are far more numerous than in the Wardner District, and when they are properly opened and equipped can furnish an output of 200 tons of shipping ore per day. The Tiger and Poorman mines alone can furnish over one half that amount now.

The mines on Nine Mile Creek, and on the divide between it and Canyon Creek give promise of being large producers. Also the large lodes further north in and near Sunset Peak Mountain, near the heads of Nine Mile and Canyon creeks, will undoubtedly be large ore-pro-

ducers. These three groups of mines all have substantially the same outlet at Wallace Station on the railroad, main line.

As soon as the mining companies can erect three or four good concentration mills to dress the second-class ores in these three groups of mines, they can give an output of more than 250 tons of shipping ore per day, for say nine months in the year,—making an annual output of say 60,000 tons of ore, having a gross value in market of \$3,500,000.

There is also an extensive group of mines near the town of Mullen, about six miles east of Canyon Creek that can be made large producers. The Hunter, Yolande, Morning, Evening, and half a dozen others are strong veins of good promise, and can be made to give an output of at least 60 tons of shipping ore per day.

Outside of the five groups of mines above mentioned,—as the principal sources of output,—there are many promising locations interspersed between the large groups that will make important additions to the estimates above made. There are dozens of promising discoveries made in this great silver-lead region, that have not been opened or prospected enough to enter into the list of available resources. Many of them are no doubt worthless, but out of the whole lot of outside claims that are not opened by exploratory work, there will be many good productive mines developed, which will make up for possible overestimate, in some cases, and add materially to the aggregate output of the Cœur d'Alène silver-lead region.

SUMMARY OF AVAILABLE ORE SUPPLY.

| | Tons. |
|---|-------|
| 1. The Wardner group, per day | 150 |
| 2. Canyon, Nine Mile, and Sunset groups | 250 |
| 3. Mullen group | 60 |
| 4. Miscellaneous claims | 40 |
| Average daily capacity | 500 |

Counting nine months only for steady output, it gives us 135,000 tons of shipping ore, worth in the market (at present prices for silver and lead) \$60 per ton, or a total gross value of \$8,100,000. Out of this must be deducted all costs of mining, milling, transportation, and reduction charges. The balance remaining is the mine owner's profit.

Where water-power is used for driving the mills, I estimate the actual running time at nine months in the year. Where steam is used eleven months can be relied on as actual running time.

In order to bring the output up to an average of 500 tons per day for nine months in the year, or a total of 135,000 tons of merchantable ore, or say 85,000 tons of lead, per annum, it will require two years of active development, and the erection of six or eight more good concentrating-mills, and very largely increased facilities for shipping ore.

PORTLAND, Ore., Jan. 15, 1888.

Prizes for Small Motors.—The English Society of Arts will award prizes in May or June for the best small power motors for electric lighting, provided at least ten are entered for competition. Any steam, gas, water, air, or hydrocarbon motor, of 20 h. p. or less, may be entered; and the prizes will be awarded after a careful examination of the uniformity and automatic regulation of speed, the noise, the first cost, and the cost of running and maintaining. Further information may be had from Mr. H. Trueman Wood, Secretary of the Society of Arts, Adelphi, London, England.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

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

PATENTS GRANTED FEBRUARY 7TH, 1888.

- 377,518. Magnetic Separator. Thomas A. Edison, Llewellyn Park, N. J.
- 377,551. Apparatus for Recovering Soda. Rufus H. Emerson, Jackson, Mich.
- 377,564. Process of Manufacturing Water-Gas. Frederick C. Kniese, Baltimore, Md.
- 377,578. Valve Gear for Ore-Stamps. Edwin Reynolds, Milwaukee, Wis.
- 377,590. Amalgamator. Jules Weirich, Béziers, Hérault, France.
- 377,594. Lubricator. George W. Amos, Chicago, Ill.
- 377,595. Stone Sawing Machine. Valentine G. Barney, Charles City, Iowa, and R. Lester Barney, Swanton, Vt.
- 377,599. Piston-Valve. Thomas H. Bourke, Cleveland, Ohio. Assignor of one half to William H. Teare, Thomas R. Teare, and John T. Bourke, all of same place.
- 377,601. Steam-Engine Indicator. Walter F. Brown, Providence, R. I.
- 377,609. Manufacture of Steel and Ingot-Iron. Percy C. Gilchrist, Westminster, County of Middlesex, England.
- 377,622. Electric Motor Car. Walter H. Knight, New York, N. Y.
- 377,623. Gas-Engine. Ernst Körting, Hanover, Prussia, Germany.
- 377,641. Water Meter. William A. G. Schönheyder, Shepherd's Bush, County of Middlesex, England.
- 377,660. Stone-Sawing Machine. Valentine G. Barney, Charles City, Iowa.
- 377,694. Apparatus for the Manufacture of Gas. Thomas B. Stillman, Hoboken, N. J. Assignor of three fourths to Charles B. Harris, New York, N. Y.
- 377,695. Process of Manufacturing Water-Gas. Thomas B. Stillman, Hoboken, N. J. Assignor of three fourths to Charles B. Harris, New York, N. Y.
- 377,402. Landing-Catch for Mining-Cages. Jonas L. Mitchell, Logan, Ohio.
- 377,423. Steam-Actuated Valve. Henry W. Bulkley, East Orange, N. J.
- 377,424. Dumping-Car. Fred. Cote, Minneapolis, Minn.
- 377,430. Detector-Rail. Charles R. Johnson, Allegheny, and Henry Johnson, Pittsburgh, Pa.
- 377,438. Car-Brake. Abraham Reese, Pittsburg, Pa. Assignor to the Reese Safety Brake Company (Limited) same place.
- 377,442. Piston Packing. Henry L. St. James, Marshall, Tex.
- 377,452. Wire-Scrw-Nail. Hayward A. Harvey, Orange, N. J.
- 377,459. Ore-Crusher. Charles Kaestner, Chicago, Ill.
- 377,460. Steam-Boiler. Mirabeau N. Lynn, Rising Sun, Ind., Assignor to the Lynn Engine Company, Dayton, Ohio.
- 377,462. Steam Engine. Mirabeau N. Lynn and Elmore P. Lynn, Rising Sun, Ind. Assignors to the Lynn Engine Company, Dayton, Ohio.
- 377,463. Steam Engine. Mirabeau N. Lynn and Elmore P. Lynn, Rising Sun, Ind. Assignors to the Lynn Engine Company, Dayton, Ohio.
- 377,481. Regulator for Air-Compressors. George R. Cullingworth, New York, N. Y.
- 377,487. Process of Electrolyzing Copper. Edward S. Hayden, Waterbury, Conn.
- 377,488. System of Electrical Distribution. John W. Howell, New Brunswick, N. J.
- 377,506. Coupling for Boilers, Tanks, etc. James J. White, Brooklyn, N. Y.
- 377,507. Pipe Expander. Herrmann Wozau, Brooklyn, N. Y.
- 377,511. Brick Kilo. Jacob Rührer, Constance, Baden Germany. Assignor of one half to Frank B. Van de Velde, Henry J. Van de Velde, and Bernard F. Van de Velde, all of Cleveland, Ohio.
- 377,701. Process of Obtaining Salts of Cerium, etc. Carl Auer von Welsbach, Vienna, Austria-Hungary, Assignor to the Welsbach Incandescent Gas Light Company.
- 377,719. Dust-Collector. Orville M. Morse, Jackson, Mich., Assignor to the Knickerbocker Company, same place.
- 377,722. Die for Cutting and Pointing Wire Nails. Harley A. Stone, Worcester, Mass.
- 377,729. Pile for the Manufacture of Sheets of Iron. Robert A. Carter, Pittsburg, Pa. Assignor of one half to Phillips, Nimick & Co., same place.

THE METALLURGY OF STEEL.*

By Henry M. Howe.

(Continued from page 93.)

We may now consider in more detail the specific effects of exposure to hydrogen, as given in Table 61.

The *tensile strength and modulus of elasticity* are not in general seriously affected, unless the cross section of the piece is diminished by actual corrosion, as in numbers 9, 10 and 11. The only exception to this is number 20 A, and here the conditions are complicated by the fact that the wire before immersion was hardened and tempered. On exposure its tensile strength falls to 80·8% of the original, but rises again to 98·9% on reheating, which suggests that the iron had not become corroded.

In the six experiments, numbers 3, 4, 5, 6, 8 and 13 (comprising 92 individual tests for each property) in which unexposed iron is compared with that which had been exposed to hydrogen but which had been at least partially protected from corrosion by contact with zinc, the average loss of tensile strength is but 0·017% of the original, while there is a gain of 1·05% in modulus elasticity.

The *elongation* is, on the whole, affected somewhat more than the tensile strength, the average loss in these six experiments being 10·62% (14·5% if we omit one abnormal result). The elongation ratios are very high in numbers 19 B, 19 C, 20 B, 25 and 26, perhaps because here the elongation of the wire unexposed to hydrogen had been depressed by the stresses induced by previous hard-drawing or hardening. It may be that these stresses are released by the subsequent heating which expels the hydrogen, and that their release brings the elongation of the wire exposed to hydrogen and reheated above that of the wire before exposure to hydrogen. (Cf. § 51, C, § 53, 2, A, pp. 29-31). Indeed, the high elongation ratio of number 19 A, which is hard-drawn wire exposed to hydrogen without subsequent heating, suggests that the hydrogen has in some way released these stresses. But the effects of exposure to hydrogen and of subsequent rest and heating on the elongation are so often extremely anomalous that it is not improbable that this property is influenced by some important factor which has escaped detection.

The *flexibility*, however, is the property which appears to be most affected, usually falling more, and often very much more than the other properties tested. In average of the six cases in which the iron was in contact with zinc the flexibility falls by 34·42%.

The *transverse strength* of spring steel and the carrying power of steel springs are also greatly diminished by exposure to hydrogen, falling by from 14·6 to 47·6%.

The *hardness* is affected if at all to a degree which usually escapes observation. According to Stroh it is not affected in the least.* But, by sufficient exposure to hydrogen, as when iron is electrolytically deposited, glass-hardness is acquired.

In numbers 2, 3, 6 and 7 the effects of exposure to hydrogen, unobscured by heating, rest, or visible corrosion, are especially striking, the tensile strength and modulus being practically unaffected, on an average falling by only 1·5% and 0·87% respectively, while the elongation falls by

7·8% (13·62% omitting one abnormal result) and the flexibility by 66·27%.

Contact with Zinc.—In experiments 2 and 3 the conditions are alike, except that in the latter the iron was in contact with zinc, and was exposed to hydrogen for a much shorter time: the same is true of experiments 12 and 13. In the first pair the loss of elongation is greater (if we except one abnormal result), and that of flexibility very much greater per day of exposure when zinc is present. Indeed, the total loss of flexibility is greater in the short exposure with zinc than in the long one without it. In the second pair also the presence of zinc increases the loss of flexibility per diem.

In the former pair of experiments the zinc appears to have slightly diminished, in the latter pair to have slightly protected the tensile strength and modulus of elasticity. But an examination of the details of the experiments leaves little doubt that the changes in the tensile strength and modulus of elasticity are apparent only, and are due to those slight differences in the properties of different portions of the same piece which are to be expected.

It might be inferred that the contact of electro-negative substances, such as iron scale, would lessen just as that of zinc intensifies the effect of exposure to nascent hydrogen. To test this as well as Ledebur's inference that coating with zinc like other contact with that metal should intensify these effects, I cut a single coil of wire into many pieces, some of which were galvanized, some Bower-Barffed, and some employed without protective coating. As the important question is whether these coatings influence the degree of brittleness caused by exposure to the weather, several of each set are now under exposure: the results will appear in an appendix. In order to obtain immediate indications others were immersed in dilute acid (number 21·5, Table 61), the results do not support Ledebur's inference, but they tend to show that Barffing does lessen the effects of exposure to nascent hydrogen.

Heating, even if brief, removes the effects of exposure to hydrogen (the loss of elongation sometimes excepted), nearly and sometimes quite completely. Johnson states that the metal regains its original toughness in twelve hours at 200° C., and that no bubbles can then be seen on moistening its fracture: Hughes that its flexibility is completely restored by heating to cherry redness for a few seconds in a spirit lamp: while Lebebur (3 and 5, Table 61) finds that in 15 minutes at cherry redness in a stream of producer gas made from charcoal, the elongation usually rises, while the flexibility, which exposure to hydrogen had depressed to 39% of the original, rises on heating to 90·1% of the original. In 17 b and c heating restores to a spring much of the carrying power which it had lost by exposure to hydrogen.

In six out of Johnson's nine experiments heating raises, and twice it more than triples the elongation which had been diminished by hydrogen: yet in the remaining three cases, collectively representing the results of fifteen pairs of comparative tests, heating the wire after exposure to hydrogen lowers the elongation.

These surprising results may be regarded as additional illustrations of the wide difference between the effects of hydrogen on elongation and on flexibility: for Johnson states unreservedly that heating restores the original toughness: and his remarks leave little doubt that he uses toughness as nearly identical with flexibility, as something to be gauged by the bending power, and as

* Copyright by the Scientific Publishing Company; 1887.

* Journ. Teleg. Engrs., IX., p. 172, 1880.

having little connection with ductility as measured by elongation.^a

Influence of Rest.—The flexibility and perhaps the elongation are restored more or less completely by simple rest. In experiments 3 and 4 the conditions are alike, except that in 4 the wire is allowed to rest before testing it: so with experiments 6 and 8. In both cases there is a surprising restoration of flexibility: the elongation, however, falls. In experiments 6 and 8, which are closely comparable, the elongation is less after than before the four weeks rest in five out of the eight cases. Johnson found that wire "regained its original toughness" (*i. e.* flexibility?) after resting three days at about 16° C. (61° F.), and Dittmar states that the brittleness due to pickling is so far removed by simple rest that the wire can be drawn with complete satisfaction.^b Yet Hughes states that the effects of exposure to hydrogen do not disappear at ordinary temperatures. Ledebur's results are so harmonious that it is probable that Hughes did not thoroughly examine the effect of rest on flexibility. In all of the eight cases in which similar wires were tested after and before rest, and in five out of the eight in which dissimilar wires were tested, Ledebur found a very marked, and in a sixth a decided restoration of flexibility.

Cold working, according to Brustlein, expels the hydrogen from wire rendered brittle by immersion in acid: but Ledebur found that the carrying power of steel U springs thus immersed was not restored by hammering. (17 b, Table 61).

Proportion of Hydrogen Absorbed.—If these effects are really due to the absorption of hydrogen it might be anticipated that heating and rest, which remove the effects, would also expel the hydrogen, though they might simply transfer it from a noxious to a relatively harmless state without expelling it. Johnson found indications that the gas whose gradual escape from iron was shown by the protracted frothing accelerated by heating, was hydrogen; and Roberts, Ledebur, and Fox have extracted from iron which had been immersed in acid the following quantities of hydrogen.

| Observer. | Method. | Hydrogen, volumes. | Hydrogen %. |
|-----------------|------------------------------|--------------------|---------------|
| W. C. Roberts a | Heating in vacuo | 10.0 | 0.0109 |
| F. Fox, Jr. b | Combustion in dry oxygen | 9.5 | 0.0108 |
| Ledebur c | Heating in steam of nitrogen | 1.98@4.75 | 0.0021@0.0052 |

^a "By experiment I found that, on heating the steel wires" (after exposure to nascent hydrogen) "in vacuo, it is possible to remove from them at least ten times their volume of hydrogen, the latter being quite pure and not contaminated with hydrocarbon, provided care is taken to extract any natural gas occluded by the wire during the metallurgical process involved in the manufacture." "The amount of natural gas varies from three to ten volumes." Roberts, Journ. Teleg. Engrs., IX., pp. 168-9, 1880. It is not absolutely clear whether ten volumes is the total quantity of gas which he extracts from hydrogenized wire, or whether he extracted a larger quantity, and after making allowance for natural gas regards ten volumes as the quantity due to exposure to hydrogen.

^b Loc. cit.
^c Loc. cit. He reasonably objects to the method of heating in vacuo that, as we cannot first warm the iron for fear of expelling the absorbed hydrogen, we cannot be sure that it is free from moisture: that this moisture on heating in vacuo is liable to be decomposed by the iron with the liberation of hydrogen, thus exaggerating the apparent proportion of this gas evolved by the metal. Employing a rapid stream of nitrogen we remove the moisture rapidly, and thus diminish its opportunity of being decomposed by the metal. This method, applied to wire which had not been exposed to nascent hydrogen, extracted no trace of this gas.

The quantity of hydrogen thus extracted is so minute as to suggest^d that its absorption has merely accompanied not caused the intense effects described. If, however, the influence of an element on iron depends not on the weight but number of equivalents present,^e our 0.002% of hydro-

^d "No exact and easily applied test has yet been devised by which we can obtain with precision a numerical result expressing the relative toughness of any of two samples—this difficulty is fortunately not met with in the examination of the change in elasticity and tensile strength; for the breaking weight and maximum elongation—can be pretty easily ascertained." Op. cit., p. 175.

^e Ledebur, loc. cit., from Zeit. Vereins Deutsch. Ingen., 1887, p. 331.

^f Stahl und Eisen, III., p. 252, 1882.

^g Abel, Journ. Teleg. Eng., ante, cit.

^h Ledebur, loc. cit.

gen might indeed affect iron as intensely as $0.002 \times 31 \div 1 = .062\%$ of phosphorus. Indeed, that one part of hydrogen should so greatly effect the properties of fifty thousand of iron would hardly surprise him who already knew how greatly one of phosphorus affects five thousand of iron, as much as this latter fact would surprise one who was ignorant of the influence of small quantities of impurities on the metals in general.

If the hydrogen absorbed be the direct cause of these effects, its influence is clearly far out of proportion to that of the much larger quantities of this gas in the irons of Table 60, which suggests that hydrogen may exist in two or more conditions in iron. It is conceivable that the hydrogen absorbed when nascent exists in iron in a state resembling that of adhesion, whose possible effects have been conjectured in § 170.

§ 180. DEOXIDATION BY HYDROGEN.—Bell's experiments indicate that hydrogen and carbonic oxide begin to reduce iron oxide at about the same temperature, the reduction of Cleveland ore by hydrogen beginning at between 199° and 227° C. (390° and 440° F.), and by carbonic oxide at 199° C., the latter gas reducing precipitated ferric oxide at 141° C. (285° F.). But, as might be inferred from its power to reduce not only carbonic acid but carbonic oxide, hydrogen reduces iron oxide far more energetically than carbonic oxide does, as is indicated by the following

RESULTS OF BELL'S EXPERIMENTS ON CALCINED CLEVELAND ORE. TABLE 62.

| No. | Composition of reducing gas by volume. | | | Temperature. | Hours exposed. | Oxygen removed per 100 of initial oxygen. | |
|-------|--|------|-------------------|------------------------|----------------|---|--------|
| | H. | CO. | CO ₂ . | | | Per hour. | Total. |
| 1f... | 10.7 | 0 | 89.3 | 427°@525° C. | 1.5 | 45 | 68 |
| 2f... | 0 | 100 | 0 | 427° C. = 800° F. | 7.0 | 1.34 | 9.4 |
| 3f... | 7.8 | 82.6 | 29.6a | 450° C. ± = 842° F. ±. | 10.5 | 1.11 | 11.7 |
| 4f... | 0 | 76.4 | 23.6 | 427° C. | 10.5 | 0.65 | 6.8 |
| 5f... | 10.7 | 89.3 | 0 | Very bright red. | 1 | 70 | 70 |
| 6h... | 0 | 100 | 0 | Bright red. | 3.75 | 24 | 90 |

a Excluding 46.4% nitrogen.

In No. 1 the rapidity of reduction by the mixture of hydrogen and carbonic oxide exceeds that of reduction by pure carbonic oxide in No. 2 far more than can be accounted for by the difference in temperature. In No. 3, even in presence of a larger proportion of an oxidizing gas, carbonic acid, the addition of hydrogen to carbonic oxide accelerates deoxidation.

The same holds true at higher temperatures: thus in 5 and 6 the addition of 10.7% of hydrogen to carbonic oxide at a red heat hastens reduction.

IRON AND CARBONIC OXIDE.

§ 181. SUMMARY.—Carbonic oxide reduces iron oxide, but never quite completely: indeed at high temperatures it oxidizes metallic iron slightly, especially spongy iron. Carbonic acid oxidizes hot metallic iron energetically. Mixtures of these gases occupy an intermediate position, their reducing power rising with the proportion of carbonic oxide and within limits with falling temperature.

(TO BE CONTINUED.)

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

g Jour. Iron and St. Inst., 1871, I., p. 98.

Idem, p. 108.

f Principles of the Manufacture of Iron and Steel, pp. 310 to 314.

PERSONALS.

Mr. C. P. Perin, manager of the Belmont furnace of the Belmont Mill Company, Wheeling W. Va., has resigned his position.

Mr. Chas. L. Taylor has been appointed general manager of the works of the Hartman Steel Company, Limited, at Beaver Falls, Pa.

Mr. John S. Leng, a well known metal man, died at his home in West New-Brighton, S. I., last week, in the fifty-first year of his age.

Mr. George R. Fisher has been appointed manager of the Robert E. Lee Mining Company, Leadville, Colo., in place of Mr. C. Roudebush, resigned.

Mr. Alton L. Dickerman, mining engineer, is at present in North Carolina on professional business and for the next two weeks can be addressed at Charlotte, N. C.

Mr. Horace C. Cleveland, of the firm of Cleveland, Brown & Co., one of the most widely known iron manufacturers in the West, died in Cleveland, Ohio, on the 4th inst.

Mr. William Floyd, superintendent of the steel department of the Homestead Steel-Works, at Homestead, Pa., has been promoted to assistant-superintendent of the entire works.

Mr. Julien Kennedy, General Superintendent of the Lucy Furnaces at Pittsburg, and the Homestead Steel-Works of Carnegie, Phipps & Co., Limited, at Homestead, Pa., has resigned his position.

Mr. B. D. Benson, president of the Tidewater Pipe Line Company, limited, died in this city on the 8th inst., aged fifty-six years. Mr. Benson worked a revolution in the transportation of oil by the construction of the first pipe line.

Mr. Theodore Garretson, one of the pioneer coal operators of the Schuylkill region and a prominent citizen, dropped dead at his home in Pottsville, Pa., of heart disease, on the 6th inst. He was about 60 years of age.

Mr. J. A. Adair, superintendent of the Bessemer department of the Homestead Steel-Works, at Homestead, Pa., has resigned to accept the position of superintendent of the Edge Moor Iron Company's Works, at Edge Moor, Del.

Mr. William H. Tillinghast, president of the Lehigh & Wilkes-Barre Coal Company, has resigned that office, to take effect at the next election, the latter part of this month. Mr. Tillinghast has had the intention of resigning for some time past, and his reason for doing so is a desire for rest.

Mr. William R. Symons, mining engineer, died at his home in Pottsville on the 6th inst., aged 64 years. Mr. Symons was born in Cornwall, England, but came to this country in 1858 and after returning to Cornwall for a few years he took up his permanent residence in Pottsville in 1864 and has since been one of the most prominent mining engineers in the anthracite regions of Pennsylvania. Mr. Symons was one of the engineers who attended the first meeting of the American Institute of Mining Engineers and aided in organizing it.

Mr. William H. Case, who was for many years identified with the development of the Lake Champlain iron district, N. Y., and who is chief engineer of the Cumberland Valley & Unaka Railway Company—now the Nashville & Charleston Railway Company—has formed a partnership with Capt. W. C. Crozer, who has been connected with the Cincinnati Southern Railroad, the improvement of the Tennessee and Cumberland rivers and the development of the Southern mineral industry. Messrs. Case and Crozer have located at Knoxville, Tenn., and are now engaged in general engineering work in the South.

FURNACE, MILL, AND FACTORY.

The Western Mineral Wool Company's works in Cleveland, Ohio, recently almost destroyed by fire, have resumed operations.

The Texas Fire-Brick and Tile Company, of Athens, Texas, which has been organized with a capital stock of \$50,000, is now erecting the necessary works.

The North Chicago Rolling-Mill Company's plant at South Chicago, Ill., resumed operations on the 6th inst., after being closed for more than two months while repairs were being made.

The two large furnaces of the Bessemer Iron Company, at Bessemer, Ala., are about completed. One of them will be blown in about March 1st, and 280 coke-ovens are also nearly ready to go into blast.

The Spang Steel and Iron-Works, of Pittsburg, Pa., shipped last week a consignment of steel boiler plates to Japan, and are about to ship material to France for the construction of steel boilers for the Government.

The Woodward Iron Company, at Wheeling, Ala., has its No. 1 stack in full blast, averaging 120 tons daily. No. 2 stack is being refined. A new plant of 125 coke-ovens is being built by this company at its No. 1 slope.

The Lloyd valve-works, foundry and machine shops, Bethlehem, Pa., which have been idle since the fall of 1885, will resume operations shortly, the Bethlehem foundry and machine shops consolidating with the valve-works.

The plant of the Bay State Iron Company, in South Boston, Mass., was sold at auction on the 2d inst. The property included 19½ acres of land, together with puddle, rail, and other buildings, and all the machinery and tools. The property was purchased by Charles J. Whitmore for John H. Read, William S. Dexter and John Cummings for \$210,000 cash.

A violent explosion occurred at Dupont's powder works at Wapwallopen, twenty miles from Wilkes-Barre, Pa., on the 10th inst., by which four men were instantly killed. The explosion took place in the packing house, where several tons of powder had been stored. Besides the killed over forty persons were injured, fourteen of whom it is said will die.

The works of the Britton Iron and Steel Company, of Cleveland, Ohio, were destroyed by fire on the 4th inst. According to reports the pipe for conducting the oil from the storage tank to the mill was clogged. A machinist attempted to clear the pipe by injecting steam into it. The pressure of the steam opened a valve, and the oil rushed from the pipe into the furnace, where it was ignited.

The members of the Atlantic States Nail Association began a three days' meeting at Philadelphia, Pa., on the 9th inst. All the manufacturers in the Atlantic States were represented. One of the subjects before the meeting was the consideration of the formation of a pool for the restriction of the yearly product. The prices were fixed for the coming year at \$2 by the carload and \$2.10 in smaller lots.

The Supreme Court has entered final judgment in the suit of P. M. Barber & Co. against the Erie City Iron-Works, Pa., which has been pending for the past ten years, having been tried before several juries and three times taken to the Supreme Court. Upon each trial the plaintiffs recovered heavy damages for injury done to the mill by the explosion of a boiler manufactured and sold by the iron-works.

The entire plant of William Washburn & Sons, of St. Louis, Mo., dealers in naval stores, including a large oil warehouse and the entire interest of the Iron Mountain Warehouse and Tank Company, was sold on the 5th inst. to the Waters-Pierce Company, of St. Louis, a branch of the Standard Oil Company. Washburn & Sons ran a tank line into Alabama and Mississippi, and practically controlled the turpentine product of those States. This sale disposes of the last competitor of the Standard Oil Company and gives them control of all tankage in St. Louis and leaves them without any formidable competitor in the turpentine trade in the South.

The Bessemer steel mill of Carnegie, Phipps & Co., at Homestead, Pa., will soon be a centre of attraction. It is at these works that the heaviest armor plates are to be made, the new machinery for the work being very nearly ready. The ingots from which some of the plates are to be made will weigh 30,000 pounds. The ordinary steel ingot weighs from three thousand to six thousand pounds, the latter weight being considered very great, though within the last year ingots have been cast weighing over ten thousand pounds. The 30,000 pound ingots are to be each four feet square. They will be cast in sand molds instead of iron, but are made in the mold pit in such a way that the liquid steel flows from the melting furnace directly into the mold below.

CONTRACTING NOTES.

Contracts open will be found on pages xix and xlii. New contracts this week: No. 757, Pumping Engine; No. 758, Electric Lighting; No. 759, Dredging; No. 760, Draw-Bridge; No. 761, Iron Bridge; No. 762, Engine, Boiler and other Tug-Boat Machinery; No. 763, Lighting by either Gas or Electricity; No. 764, Submerged Pipe; No. 765, Sewers; No. 766, Iron Bridge; No. 767, Water-Works; 768, Pipe.

Mr. E. H. Malory, Greensboro, Md., is in the market for steam machinery for boring wells.

Mr. Homer R. Duddee, Union Springs, Ala., wishes to correspond with manufacturers of traction engines.

The contract for the Cumberland Gap tunnel has been awarded to the Mason Gooch & Hoge Company, of Frankfort, Ky.

The Keystone Lumber and Improvement Company, of Bogie Chitto, Miss., and the Mobile Coal Company, Mobile, Ala., are in the market for iron roofing.

LABOR AND WAGES.

At a mass meeting of miners in Wilkes-Barre, Pa., on the 6th inst., it was unanimously resolved to devote one day's pay each month to the strikers of the Lehigh and Schuylkill regions.

All coal miners at Nanaimo and Wellington who have refused to go to work since the recent explosion, referred to in our issue of January 28th, resumed operations this week, the owners agreeing to discharge all the Chinese workmen.

The officials of the Wheeling Steel-Works, of Wheeling, W. Va., have signed the Knights of Labor scale, and work will be resumed next week. This company supplies steel to the Wheeling, Belmont, and Benwood nail factories, which have been idle for want of material.

The employees of the Bessemer Steel-Works department of the Troy Steel and Iron-Works, Troy, N. Y.,

have agreed to go to work at a reduction of 10 per cent, the terms offered by the company. The employees of the iron works department have not all accepted the reduction. The settlement was effected through the State Board of Arbitration.

The superintendent at the Edgar Thomson Steel-Works, at Pittsburg, Pa., on the 9th inst., asked the workmen to accept a reduction of 8 to 10 per cent. He said the Eastern Steel-Works and North Chicago Rolling Mill Company had obtained the equivalent of a 10 per cent reduction from their men, and that in competing for trade the Edgar Thomson Company were placed at a disadvantage unless the reduction was accepted. The men will consider the proposition.

At a meeting of the Executive Board of the Knights of Labor, of Scranton, Pa., the action of District Assembly No. 16 in demanding an increase of 15 per cent on the present rate of wages was unanimously indorsed. The board has sent out to all the coal operators of the region on the 9th inst., a formal request for an increase of 15 per cent., and it is said that another will be received from every one thus addressed before the meeting of the District Assembly, which takes place on the 20th of this month.

The House Special Committee, Washington, D. C., appointed to investigate the existing labor troubles in Pennsylvania on the 9th inst., have notified two of the prominent railroad strikers and two of the striking miners to appear before the committee there on the 11th inst. President Corbin, of the Philadelphia & Reading road, and some twelve others representing the railroad interests, will be summoned to appear probably on the 13th inst. Early in next week the committee will go to Philadelphia and Reading to continue the investigation.

The interstate convention of coal miners and coal operators was held in Pittsburg, Pa., this week, and the work of arranging a scale of wages to govern all the bituminous coal-fields in the United States was undertaken. The scale committee on the 9th inst presented their report, which was as follows: Resolved, That the base scale for the year beginning May 1st, 1888, and ending May 1st, 1889, shall be as follows: Hocking Valley, 60 cents per ton; Pittsburg district, 69; Reynoldsville, 65; Indiana, block, 80; Indiana, bituminous, 65. The committee disagreed upon the scale of prices to rule the coming year, and after the report was submitted, Colonel Yoeman, of Indiana, moved that the base scale agreed upon be fixed as the paying scale for 1888. As this meant a reduction, the motion started a heated discussion, which lasted the remainder of the session. The Indiana operators contended that they could not compete with the Illinois operators in the Northwestern markets, and pay the advance. The miners claimed that they did not want an advance. All they asked was a continuance of the present rates.

GENERAL MINING NEWS.

A convention of delegates from every Western mining territory met at Helena, Mont., on the 7th inst. to consider the question of railroad proprietorship of mineral lands and to investigate the methods of the Northern Pacific road in acquiring title to this class of property. Only a preliminary organization was effected.

NEW YORK & CLEVELAND GAS-COAL COMPANY.—The annual meeting was held in Pittsburg on the 8th inst. The reports presented were satisfactory and adopted. Officers for the ensuing year were elected, as follows: W. P. De Armit, President; Wm. H. Berger, Vice-President; Frank Semple, Treasurer; C. L. Dixon, Clerk. Directors: J. J. Donnell, J. T. Colvin, J. T. Hamilton, Henry Phipps, Jr., Wm. H. Berger, Frank Semple, J. E. Umbstaetter, H. Kirke Porter and Wm. P. De Armit. The company is now building 200 gondola cars, of 30 tons capacity, to meet the increased demand for business. We are advised that Messrs. Thomas Loomis & Co., of Buffalo, have obtained a judgment in the United States Circuit Court of about \$16,000 and costs in addition against this company. Suit was commenced by attachment nearly one year since for cash advanced by and commissions due to plaintiffs while Northern agents in 1886. It is understood that the defendants made certain offers which were accepted, with the above result.

TENNESSEE COAL, IRON AND RAILROAD COMPANY.—During January there were received directly from the mines, from the Tracy City Division only 19,251 tons of coal and 13,132 tons of coke.

ARIZONA.

Our correspondent sends us the following from Prescott: When the long-awaited and expected locomotive of the Prescott & Arizona Central Railroad, a branch of the Atlantic & Pacific Railroad, arrived in this town January 1st, 1888, I fancy it took the miners by surprise, having for so long a time experienced that "Hope deferred maketh the heart sick." They did not, therefore, have their thousands of tons of rich ore ready for shipment, which the "emigration pamphlets" and such like publications lead you to suppose are lying around loose all over the country. No, they are not lying around loose, but need an expenditure of muscle and powder to get them out; but they are there all the same. The miners gradually began to awake from their slumbers and realized that there was a chance for them to sell their ores, and still further, that the first incoming trains were not loaded with crowds of speculators who were going to buy their "prospect holes" on

sight. They commenced to work developing them, and from what I can see and learn so far, I should say that there has been more "bona fide" work done in that line per man in the last year than had been done in a long time before. The result has been a steady increase, month by month, in the amount of ore shipped, and though the total for the year is only 710 $\frac{1}{2}$ tons, the great bulk of this was sent in the last six months, the sampling-works not having gotten into operation until about July 1st. I do not expect to be able to get at the aggregate value of these ores, but feel safe in saying they averaged \$100 per ton, and think it most likely that it was nearer \$200 per ton than \$100.

The rates of freight and charges were such that \$50 ore left nothing for the mine, but, as the expenses have been from time to time reduced, and a still further reduction of several dollars per ton made in December, it is to be expected that the shipments for 1888 will largely exceed those of the past year. If it does not, the miners and not the mines will alone be to blame.

To come down to detail and show that I do not deal in "glittering generalities" only, I will refer to the Walker or Lynx Creek mining district, the only one I have been able so far to visit.

In July, 1886, the "Amulet" lode was discovered, after having been walked over a few thousand times by prospectors. The owners made their first shipment of ore the same year, which, being of high grade—\$359 in silver and 46 per cent lead—put them in funds, and since then they have sunk the main shaft 100 feet deep, a second 50 feet deep, and have done some drifting at the 100 and 50 foot levels, with a little stoping. It is estimated that they have \$50,000 worth of ore in sight. The high grade or 1st class ore has averaged over \$200 per ton, the 2d class between \$60 and \$70, and the 3d class, which they have to put on the dump, from \$30 to \$40. The ore contains about 40 per cent of lead, several per cent of gray copper, silver and a little gold. Assays run as high as \$1,100 per ton. Had they means of concentrating the 3d class ore, it would add very much to the value of the property. As they are less than a mile from Lynx Creek, and have a good wagon road, this want will in time be remedied.

Another mine, the Morning Star, was opened by prospect holes when I was here before. The value of the ore was such that the owners, industrious and enterprising men, leased a little five-stamp (500 pounds) mill which was near at hand, and the only one in the district. This they used for the purpose of treating the surface or decomposed ore carrying free gold, keeping the high-grade ore, which carried a large value in silver, for shipment. They were not able to get possession of the mill until about the middle of the year, and, as it was badly located on a branch gulch, with a very small supply of water, the amount of ore handled would appear very insignificant. Still, considering all the surroundings, the good it has done the neighborhood has made it a very valuable acquisition.

It is the little mustard seed which may grow to a tree, as it has proved what may be done with proper facilities. The mill had worked spasmodically for a couple of years in totally incompetent hands, and was an object of ridicule until put to work by the present operators. They have only been able to save the free gold, the silver—of about equal value—going away in the tailings, and some concentrations, being caught on blankets. They have sunk two shafts on the mine to the depth of 60 feet, connected then with a drift 60 feet long, and done a little stoping. From these openings they have assayed about 15 tons of shipping ore, the assays of which run from \$100 to \$450 per ton, and the bottom of the shaft has given the highest assays, showing that there is a permanency in the ledge. Besides running their own ore, they have stamped sundry lots for the neighbors, and below you have the figures showing the results.

As nearly all these lots were from different claims, distant from a quarter to one mile from the mill, you will see that there are plenty of veins of good value in the vicinity of probably equal value in depth.

| Lot | Tons | Free gold obtained. | Tailings assay. |
|-------|------|---------------------|-----------------|
| ..... | 20 | \$10.00 per ton. | \$2.00 |
| ..... | 10 | 17.50 " | 1.75 |
| ..... | 10 | 9.25 " | .50 |
| ..... | 10 | 10.00 " | 2.50 |
| ..... | 20 | 10.72 " | .60 |
| ..... | 10 | 10.42 " | 2.00 |
| ..... | 5 | 10.72 " | trace |
| ..... | 38 | 10.04 " | .45 |
| ..... | 13 | 10.59 " | 8.00 |
| ..... | 20 | 9.23 " | 1.25 |
| ..... | 5 | 14.25 " | .75 |

This gives an average of the 161 tons stamped of \$10.65 per ton saved in free gold. The tailings were assayed for gold only, and possibly much of this may have been in the sulphurets. The exception of \$8 per ton was caused by broken screens (60 mesh), which had to be replaced for the time with 40-mesh. This would seem to indicate fine gold, but that does not apply to all the ores, as I saw several pieces of about \$1 each, taken from the battery while treating one of the lots. Sundry assays show the ores to contain about as much silver as gold.

As I have said, the value to the district of the working of this little mill is very great, as it is easy to conclude that a large one situated on the main stream where water could be had for most of the year would be a wonderful stimulus to the miners, who could easily keep it supplied with ore, particularly as a large mill could be more economically handled.

There is still another great value to be attached to the results from the Morning Star mine. The veins of the district had been largely worked at the surface some years ago, the ores having been treated in arrastras. Seldom were they followed down more than

10 to 15 feet—perhaps in some cases 20 feet where the rock was much decomposed. The prospectors would all say when trying to sell them, "You will get rich ore when you go down," but they did not prove "their faith by their works," and so they have lain idle for years. They have ventured down on the Morning Star and the result is such as to invite them to push on still further down, as their vein has steadily increased in size and value of ore.

I could refer to several other claims upon which a good deal of work has been done with good results, some of which have made shipments of high-grade ores, but it is not necessary at present to do so. I have selected the two above mentioned to show the nature of our progress in development and to prove that a new era has dawned which will bring the mineral value of our resources to the front at an early day. What is wanted is capital to hasten the matter, otherwise, it must depend solely upon the hard knocks of labor to earn the necessary funds to put up suitable mills for concentration, and where needed, for amalgamation.

CALIFORNIA.

AMADOR COUNTY.

BUNKER HILL MINING COMPANY.—Official advices to us state that the hoisting works and shaft recently destroyed by fire are all rebuilt and now in working order. The tunnel begun two years ago on the Mayflower, adjoining the Bunker Hill on the north, and which is now some 1200 feet long, passed diagonally through the foot-wall, and has now reached the ore, some of which is studded with coarse gold. It is reported to be 5 inches thick. Five feet of main veins have as yet been passed through, but no hanging wall reached. The ore from main veins gives nearly \$12 by assay. The whole Mayflower, 1300 feet in length, is virgin ground, and the striking of such ore in about the center of property, by a depth of 300 feet, is of great value, as it proves beyond any doubt the continuance of the Bunker Hill ore-bodies. The present 600-foot lode in Bunker Hill, where these large ore-bodies were struck last summer, is now 450 feet distant from heading of tunnel. This tunnel will be used in the future for the outlet of all the ore for the 40-stamp mill, which stands about 200 feet east of the mouth of tunnel, and hoisting and pumping power will be derived from the Amador canal.

LAKE COUNTY.

LEADVILLE CONSOLIDATED MINING COMPANY.—The company has begun operations at the Hegeman shaft, at which one of the largest and most powerful plants of machinery in Leadville was recently erected, and has been pumping water vigorously. The mine has been drained so far by the combined work of three No. 9 Cameron sinking pumps and two Cameron station pumps. The pumps are now throwing from 400 to 450 gallons of water per minute. It was expected that the main working level of the Hegeman would be drained by the 4th inst., and as soon as possible afterwards energetic prospecting was to be commenced.

MONO COUNTY.

BULWER CONSOLIDATED MINING COMPANY.—Captain John Kelly reports in reference to the dispute between the Bulwer and Standard about the ore development at the boundary line dividing the two mines: "We have come to an agreement with the Standard Company in regard to working the ore on and above the 200-foot level. They will continue to work the streak or spur pitching east as long as the apex is in our ground."

STANDARD CONSOLIDATED MINING COMPANY.—The shipments for the last half of January amounted to about \$15,000, making a total for the month of about \$26,000.

CANADA.

PROVINCE OF ONTARIO.

CAPITAL GAS COMPANY.—This company has ordered machinery for boring for natural gas near Ottawa. Mr. Thomas Wallace is the chief promoter of this company.

LAKE SUPERIOR COPPER COMPANY, LIMITED.—A general meeting of this company was held in London, England, on the 5th inst., for the purpose of submitting a resolution to the effect that, for the purpose of enabling the company to resume mining operations, the directors be authorized to issue the remainder of the unallotted ordinary shares of the company, or such portion of them as they might deem necessary, at a discount of 75 per cent, and upon such terms as they may think fit. The chairman explained, however, that within two days a legal difficulty had arisen which rendered the directors unable to submit the resolution, it having been stated on high legal authority that directors had no power to issue shares at a discount. The activity in the copper market and the rise in the price of copper seemed to afford the company the opportunity for which it had long waited, of beginning their work again on a considerable scale. At the time the work was stopped, the prospects were all in favor of the mine turning out an exceedingly good one. The stuff had improved in quality from the surface to the point they reached. To work it the shareholders would have to make some sacrifice—they would have to take shares with some slight liability in order to be able to get the outside public to come in. The expense of unwatering the mine would be £400 or £500, but they must have two or three months' capital in hand—to work the mine they ought to have £10,000.

Resolutions were passed requesting the directors to take immediate steps for relieving the shareholders from any liability at present attaching, or supposed to be attached, to the shares at present issued, and for obtaining capital for the future working of the mine

in such a manner—either by the sale of the property or otherwise—as may be deemed best.

COLORADO.

It is reported that the Missouri Pacific Railroad Company has secretly acquired about 3000 acres of coal lands within thirty miles of Pueblo.

BENT COUNTY.

Coal has been found about six miles directly south of Caddoa, at a depth of about fifty-six feet from the surface.

CLEAR CREEK COUNTY.

NEATH MINING COMPANY.—The new mill being erected by the company at Empire is nearly completed, and will soon be started up.

HUERFANO COUNTY.

WEST SPANISH PEAK MINING COMPANY.—This company has been organized with a capital stock of \$1,500,000. The incorporators are: H. J. Veerhusen, T. Olson, Charles G. Mayers, Webster M. Pondon, William Veerhusen, Michael Nuyman, Joseph Hausmann and M. J. Haven.

PITKIN COUNTY.

The Leadville and Denver smelting charges for treating ores from Aspen have been increased from \$8 to \$10. Ores carrying 10 per cent of baryta, \$12; over that the price is \$18.

BONNYBEL.—The new strike in this mine is 250 feet south of the old workings. The ore was found near the surface, a large body, no one knows how much. Mr. J. C. Eames, the lessee, is shipping daily 60 tons from this new discovery. The ore is rich. In one stope the ore is 40 feet thick. The manner in which this ore was discovered is said to be thus, says the *Aspen Sun*: It became necessary to have an ore house, and the men at work excavating for the building uncovered the ore. It is one of the richest finds in the camp. Everything is rich ore, and it is thought from now until March 15, the expiration of Mr. Eames's lease, several hundred thousand dollars' worth of ore will be taken out. Mr. George N. Daniels who, on the 4th inst., in the United States Circuit Court, applied for a receiver on the Bonnybel mine, is the man who gave Mr. Bracken the power of attorney for his interest in that property, and which he (Bracken) sold with his own interest. This application for a receiver is in conjunction with the effort to obtain the mine back from the purchasers. One of the pleas which will be advanced is, that in the deed of conveyance the grantee's name was left blank at the time the deed was acknowledged.

POHLE REDUCTION COMPANY.—This company has been organized at Aspen, with a capital stock of \$150,000. The directors named for the first year are: W. M. Kasson, E. C. Pohle, and Fred G. Bulky. The company will treat ores under the process owned by Messrs. Pohle & Kasson, for which a caveat has been filed in the United States patent office. The principal office of the company will be located in Aspen, with a branch office in Denver.

INDIAN TERRITORY.

ATOKA COUNTY.

Oil was struck at Lehigh on the 7th inst., at a depth of 981 feet.

KANSAS.

LYON COUNTY.

Investigations carried on in the southern part of the county have resulted in the finding of a bed of coal at a depth of ninety feet, and also good indications of an oil field. Companies are being formed, and the land in the vicinity is being leased and will be worked at once.

MICHIGAN.

Our special correspondent sends us the following: No new explorations have been undertaken since last fall, but where the land had been explored before the snow fell some work is being done with good results in some cases. Northwest of the Republic three miles good Bessemer magnetite is found; on Section 10, adjoining the Humboldt, thirty feet of ore has been bored with a diamond drill; on Section 21, next the Winthrop, a large body of A. No. 1 hematite, is struck, besides a rather large tract of country which lies between Crystal Falls and Republic, where ore had been found, and which is now being developed.

Matters in the gold field rest *in statu quo*, excepting at the Ropes, where a new shaft is being sunk 500 feet east on the same vein with the old shaft. The rock here is similar in all respects to that in the west shaft. A rather rich seam of galena appears to go down in the contact at the new shaft, but its dimensions are not large as yet.

Fifty new stamps are being added at the Ropes to the twenty-five now in use. For a long time only ten were worked, yet \$115,000 in gold and silver have been extracted. With the new stamp in operation the product of precious metal should be increased 200 per cent.

Nothing is yet done with the Superior gold shaft, where the \$43,000 rock was found last spring, as reported in the *ENGINEERING AND MINING JOURNAL* last year. Parties are now negotiating for an option and lease of this ground, while others are East to secure capital to work it. Should this rich bunch of quartz hold out in depth, a veritable gold fever will set in.

Vast amounts of various fire-extinguishing gases have been forced down the Calumet & Hecla mine to extinguish the fire now raging, but the effect is not satisfactory. The fire still burns, and occasional falls of ground from the surface down serve to show this, beside feeding the fire with fresh air.

The Michigan Mining School building, to cost

\$75,000, will be built this year at Houghton. Dr. M. E. Wadsworth, the director of the school, is an author of repute and a scientist and geologist. The school, which is now carried on in temporary quarters, is very well situated in the midst of a mining country and close to the great copper and iron mines and near stone and slate quarries.

Wages are now being reduced from 5 to 10 per cent in the iron mines, but no trouble is looked for. The cut leaves the wages \$1.50 for surfacemen and \$2 for miners.

IRON MINES.

IRONTON MINING COMPANY.—An informal meeting of this company's shareholders was held in Boston on the 9th inst. to hear a statement of the company's affairs from the secretary and treasurer, Mr. Zerbe. The present embarrassments, to which we referred in our issue of January 28th, and its causes were set forth. The debt of the company was incorrectly stated on January 1st, 1887, when the present parties came into control, owing to the omission of the pay roll due December 25th. The property was badly mismanaged; lake freights were excessive; the soft hematite ore-body of 75 feet width and 75 feet depth, became pinched to a few feet and changed to a small body of hard hematite, which it would not pay to mine. Royalties ran behind, and finally the company found itself in debt some \$43,000. Creditors became clamorous, and to raise the money, a \$100,000 mortgage was created, and the bonds were offered to stockholders at 60 per cent of the par value, the same to bear 8 per cent interest. When the situation dawned upon the management a retrenchment policy was adopted, and the sinking of a temporary winze was begun through the hard hematite, with a view to find a second body of soft hematite which is believed to exist at a lower level. The adjoining Tontine mine found this second body 100 feet below the bottom of the Ironton winze, and the Ironton management authorized the expenditure of \$1000 per month in reaching it. The speaker believed that it could be reached in two months, and had hopes that the bond investment would not only be repaid, but that something might be earned on the stock. The bonds would pay all debts, and leave a surplus of \$15,000. He was free to confess that he would not invest in the property if it was presented to him as a new enterprise, but he would take his proportion of bonds in order to save his former investment. His associates in Cleveland, Wheeling, and Pittsburg would do likewise, and he hoped the Eastern stockholders would join them in the subscription. Major Burt, who placed the stock in the East, was declared a co-sufferer in the misadventure, and his course was remarked as honest.

METROPOLITAN IRON AND LAND COMPANY.—This company has declared a dividend of \$2 per share on its 30,000 shares of stock and it is said has a very large surplus in the treasury with which to conduct operations the coming year, and to make improvements. The Norrie is a part of the property of the company.

PABST MINING COMPANY.—It is stated that the Pabst mine will put out about 100,000 tons of ore this season. The main north vein has been struck.

MINNESOTA.

There is a movement on foot among Eastern capitalists to reopen the Chengwatona copper mines. These mines were opened several years ago by J. Bennet Smith, of Wilkes Barre, Pa., and vigorously pushed for two years. The company acquired a large tract of copper lands, extending from Snake to Kettle rivers, and the outlook was favorable for a rich yield of metal. The recent advance in copper has turned the attention of several capitalists to this point as being a very desirable locality from its geographical situation for mining on an extensive scale.

NEVADA.

ELEO COUNTY.

COMMONWEALTH CONSOLIDATED MINING COMPANY.—At the recent stockholder's meeting the action of the directors in forming two corporations, the North Commonwealth and the Del Monte, shares in which are to be divided share for share among the shareholders of the Commonwealth Consolidated, was unanimously ratified, and notice is given that on the 13th inst., or within sixty (60) days thereafter, the holders of certificates of the capital stock of the Commonwealth Consolidated Mining Company, issued on or prior to February 8th, 1888, can, upon presentation of these certificates, obtain three fourths of a share of the capital stock of the Del Monte Mining Company or North Commonwealth Mining Company, for each share of stock so presented at the price of one (1) cent per share.

STOREY COUNTY—COMSTOCK LODGE.

The bullion product of the Comstock mines during the week ended the 4th inst. reached about \$150,000, divided as follows: Consolidated California & Virginia, \$100,000; Savage, \$16,000; Hale & Norcross, \$14,000; Chollar & Potosi, \$10,000; Yellow Jacket, \$40,000.

BELCHER MINING COMPANY.—At the annual meeting, recently held in San Francisco, the old board of directors were re-elected, and the resolution re-adopted which has been standing over the minute-book since January 30th, 1883, authorizing the President of the company, at his discretion, to sell the 32,620 shares stock which are in the treasury. None of the stock has yet been sold.

UTAH CONSOLIDATED MINING COMPANY.—At the annual meeting held in San Francisco recently, the old board of directors was re-elected, with the ex-

ception of Charles H. Fish, who was superseded by Henry B. Havens.

The superintendent's annual report states that connection has been made between the 472 level and the Sierra Nevada 520 level by the south drift from the west drift in the former mine. This connection gives access to our buildings or mine shaft. It also forms a valuable airway, and has so far almost wholly ventilated the level at all points where work has been done without the use of blowers or fans that require power to drive them. At a point in the main west drift, 400 feet from the shaft, a north drift has been extended a total length of 852 feet. From this drift five west cross-cuts have been extended to the west wall. All of these passed through a vein of porphyry, clay, and quartz, the latter showing some value in each by assay, but does not pay to extract.

PENNSYLVANIA.

AVONDALE STONE AND LIME COMPANY.—The company's mill, office and other machinery used for crushing and grinding limestone, at Avondale, was destroyed by fire on the 7th inst. The company was but recently organized.

PHILADELPHIA & READING RAILROAD COMPANY. The company has abandoned its project to foreclose the Schuylkill Navigation Company, and has decided to abandon that section of the canal between Port Clinton and Schuylkill Haven on account of the cost of keeping it dredged to a proper depth. Coal will be shipped hereafter from Port Clinton.

OIL.

Exports of refined, crude, and naphtha from the following ports, from January 1st to February 4th:

| | 1888. | 1887. |
|-------------------|------------|------------|
| From Boston..... | 176,856 | 519,570 |
| Philadelphia..... | 7,863,446 | 10,632,805 |
| Baltimore..... | 599,309 | 1,162,698 |
| Perth Amboy..... | 1,879,386 | 1,695,465 |
| New York..... | 28,673,346 | 35,391,837 |
| Total exports .. | 39,119,333 | 49,312,375 |

SOUTH AMERICA.

UNITED STATES OF COLOMBIA.

A correspondent writes us that the mines of this State are attracting considerable attention; foreign capital is being invested and new machinery erected. The mining interests are beginning to feel the foreshadowing of a boom that is confidently expected there in about two years.

FRONTERO & BOLIVA COMPANY.—At the mines of this territory, located in Remedios, district of Antioquia, arrangements are making to put in force upon the various properties a modern system of working.

LA PLATA.—This mine is owned by a native company. It is stocked in 500 shares, which are now held at \$2000 each. The mine is rich in silver, but the vein is considered quite narrow. This mine is now being examined by Mr. J. C. F. Randolph, mining engineer, of New York.

VENZUELA.

Five important concessions have been recently granted to European companies to construct railroads. One of the more important ones is that for a railway from the Orinoco River to Guicupata, in the gold region of Guayana. A road from Puerto Cabello to Valencia is now building.

SOUTH CAROLINA.

LANCASTER COUNTY.

HAILE GOLD MINING COMPANY.—Mr. Adolf Thies is erecting a chlorination plant for this company.

TENNESSEE.

CAMPBELL COUNTY.

PIONEER COAL AND COKE COMPANY.—This company is opening extensive coal mines and building 3½ miles railroad, and expects shortly to erect 200 coke-ovens.

KNOX COUNTY.

The first shipment of canal coal from the mines recently opened near Knoxville to New York was made on the 31st ult., and consisted of 14 40-ton cars. About 100 cars per week will be shipped directly to New York, to be used there in the manufacture of gas.

TEXAS.

NAVARRO COUNTY.

A vein of natural gas was struck at Corsicana at a depth of 240 feet while boring an artesian well. The well will be drilled deeper.

UTAH.

SALT LAKE COUNTY.

OLD TELEGRAPH.—This mine at Bingham, which is being worked by a French company, shipped in 1887 some 1300 tons of first-class ore, which sold for about \$25,000. Second-class was shipped to the extent of producing \$10,000 worth of concentrates, while at the old smelter the slag was overhauled, selected and concentrated to produce \$25,000 more, making the total sales of the company aggregate \$80,000 for the year. Around the mouth of the tunnels are large dumps, being worked over at such times and according to the capacity of sufficient water to carry on the work of concentrating on a small scale. At present but little ore is being taken out, but prospecting is going steadily on. The ore shipped last year averaged, first-class about 88 per cent lead, 10½ ounces silver and \$1 in

gold; second-class 10 to 15 per cent lead and 7 to 10 ounces silver. If a satisfactory freight rate can be secured ore will be shipped to the concentrator at West Jordan, if not, a small concentrator will be erected at the mine.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Feb. 10.

Statistics.

Production Anthracite Coal for week ended February 4th, and year from January 1st:

| TONS OF 2240 LBS. | Week. | 1888. | Year. | 1887. |
|--------------------------|-------|-------|-----------|-----------|
| P. & Read. RR. Co..... | | | 30,604 | 678,390 |
| Cent. R. R. of N. J..... | | | 424,146 | " |
| L. V. RR. Co..... | | | 668,049 | 565,682 |
| D. T. & W. RR. Co..... | | | 694,644 | 436,660 |
| D. & H. Canal Co..... | | | 428,918 | 472,126 |
| Penna. RR..... | | | 336,505 | 246,063 |
| Penna. Coal Co..... | | | 147,355 | 91,212 |
| Total..... | | | 2,730,221 | 2,490,142 |

Increase..... 240,079
Decrease..... 6,350

* Included in tonnage of Philadelphia & Reading RR. The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Production for corresponding period:
1883..... 2,774,235 1885..... 2,052,965
1884..... 2,346,008 1886..... 2,665,576

Production Bituminous Coal for week ended February 4th, and year from January 1st:

Tons of 2000 pounds, unless otherwise designated.

EASTERN AND NORTHERN SHIPMENTS.

| | Week. | 1888. | Year. | 1887. |
|---------------------------|-------|-------|---------|-----------|
| Phila. & Erie RR..... | | | 70 | 3,085 |
| *Cumberland, Md..... | | | 49,366 | 298,703 |
| Barclay, Pa..... | | | 16,256 | 114,399 |
| Broad Top, Pa. | | | | |
| H. & Broad Top, RP. | | | 3,633 | 41,514 |
| Clearfield Region, Pa. | | | | |
| Snow Shoe..... | | | 3,128 | 15,191 |
| Karthus (Keating)..... | | | 4,567 | 21,884 |
| Arvone & Clearfield..... | | | 61,010 | 332,75 |
| Tipton..... | | | 1,090 | 3,846 |
| Alleghany Region, Pa. | | | | |
| Gallatin & Mountain..... | | | 12,982 | 85,256 |
| Pocahontas Flat Top Coal. | | | | |
| Norfolk & West. RR..... | | | 32,510 | 155,208 |
| Kanawha Region, W. Va. | | | | |
| Ches. & Ohio RR..... | | | 4 | 127,432 |
| Total..... | | | 171,609 | 1,099,785 |

* Tons of 2240 lbs. † Week ending January 31st. ‡ Report not received.

WESTERN SHIPMENTS.

| | | | | |
|--------------------------|-------|-------|--------|---------|
| Pittsburg Region, Pa. | ..... | ..... | ..... | ..... |
| West Penn RR..... | ..... | ..... | 9,187 | 44,408 |
| Southwest Penn. RR..... | ..... | ..... | 2,225 | 10,784 |
| Pennsylvania RR..... | ..... | ..... | 7,836 | 28,089 |
| Westmoreland Region, Pa. | ..... | ..... | ..... | ..... |
| Pennsylvania RR..... | ..... | ..... | 35,130 | 162,621 |
| Monongahela Region, Pa. | ..... | ..... | ..... | ..... |
| Pennsylvania RR..... | ..... | ..... | 4,592 | 39,495 |
| Total..... | ..... | ..... | 58,970 | 285,397 |

Grand total..... 230,579 1,376,182 1,161,061
Production of Coke on line of Pennsylvania RR. for week ending February 8th, and year from January 1st, in tons of 2,000 pounds: Week, 81,033 tons; year, 420,670 tons; to corresponding date in 1887, 433,077 tons.

Anthracite.

Colder weather has somewhat increased the demand for coal, and prices as quoted last week are still ruling and very firm. Egg and Stove coal are in better demand, and Broken, which was scarce last week, is now more abundant. We may quote free-burning Broken at \$4.25; Egg, \$4.00; Stove, \$4.75; Chestnut, \$5; Pea coal, \$3.25@3.50; and Buckwheat, \$2.50@2.75. Companies' prices are as heretofore, without change. We quote them as follows: For free-burning coals, net prices f.o.b., Broken, \$3.85@4; Egg, \$4.10@4.25; Stove and Chestnut, \$4.75. Lehigh coal sells at \$4.50 for Broken and Egg; \$5 for Stove and Chestnut; \$2.95@2.90 for Buckwheat.

The Wyoming valley miners have made to-day their demand on the companies for an increase of fifteen per cent in wages. There is no probability whatever of any increase being accorded, but whether the men will strike or not is beyond the knowledge of any one, not even excepting the leaders and the men themselves. Undoubtedly the leaders would like to get them out, but the men have no inclination to abandon good pay and comfort for the reward which the Lehigh miners have received.

Our own impression is that the Wyoming miners will not go out, but as already stated, no one can have more than an impression on this subject. There is nothing new in the Reading strike, except the recent riots, in which some men were injured and some probably lost their lives. A report from Philadelphia says that the Reading officials have found that the miners are stronger than they expected. It looks as though the Reading officials were getting their education in just the same school as the older operators of the anthracite region. Whether any proposition to arbitrate will be accepted is not yet known. If the miners wish only to let themselves down easy and get a form of arbitration while conceding the point claimed by the company, it is probable that an arbitration will take place and the men will go in at the old rates, but if the men still insist on an advance in wages, it can scarcely be supposed that Mr. Corbin will accede to it in the face of his recent remarks.

In the meantime, there is no excitement whatever in the market. A good demand with firm prices and a ready sale for coal, without any undue pressure for delivery, seems the situation.

The Lehigh & Wilkes-Barre Coal Company holds its annual meeting on the 23d of this month, and at that time the President, Mr. W. H. Tillinghast, will retire, and the business of the company will thereafter be managed by the officers of the Central Railroad of New Jersey, which owns fully sixty per cent of the Lehigh & Wilkes-Barre stock. Next week we shall make further reference to the Lehigh & Wilkes-Barre and of the retirement of Mr. Tillinghast, and to his long and honorable connection with that company.

Bituminous.

There is nothing worthy of note to record in the bituminous trade, nor can there be until the spring contracts are again under discussion. The snow storms of the past week have again interfered with the car service, and complaints are heard of a lack of transportation. This will probably continue for some time yet, until the weather settles, but it is hoped that before the spring comes the companies will have been able to catch up on their old contracts.

As a rule the tariff question does not create any excitement in the coal trade. It has, of course, no effect upon the anthracite trade, since there is no anthracite to come in, duty or no duty.

The bituminous trade relies upon the better quality of our American coals and the less cost of mining them to protect it from the competition of Nova Scotia. At the very most, it is probable that not more than 250,000 tons of foreign coal would come in, even with the duty removed, and if, in exchange for free coal here, we can secure free coal into Canada, we would be largely the gainer.

Prices remain as heretofore, \$3.50@3.70 alongside in this harbor.

Boston.

Feb. 9.

[From our Special Correspondent.]

If the strike is settled we shall have something to write about from this port, but at present there is but little business because there is no chance for any, that is to say, on new orders. There has been considerable doing on old orders. The mild weather has caused the arrival of a large fleet which has been storm-bound and ice-bound, and Boston is now fairly well supplied. There is a good demand for spot coal, or would be, if any was offering, but there is none to speak of.

There is no disposition to give orders for future delivery and no company seems desirous of taking on orders, though some of them will on basis of prices current at date of shipment. This arrangement, as will be readily seen, offers slight inducement to buyers when there continues to be a detention of from one to two weeks. The general belief here is, as last reported, that the strikers are weakening. The strongest size is broken, which is very firm.

Nominally no new contracts for bituminous coal have been taken, but some of the early birds have got their eyes on the early worms—of the dust—and it is probable that some few "understandings" have been reached. The movement at f.o.b. sales of cargo lots is small. All bituminous jobbers and agents are talking \$2.75 as the minimum f.o.b. price next season. They are now \$2.50@2.60.

There is a nominal freight market only, vessels being scarce at most ports. We quote, exclusive of discharging: New York, \$1.65@1.75; Philadelphia, @—; Baltimore, \$2; Newport News and Norfolk, \$1.75.

Retail movement is not so large as it was, but no one who has any coal has cause to complain. We quote delivered prices: Stove, \$7.75; Egg, \$7.50; Broken, \$7.25; Franklin, \$9; Lehigh Egg, \$7.75; Broken, \$7.50.

Buffalo.

Feb. 9.

[From our Special Correspondent.]

"There is really nothing to report of any consequence in the coal trade," says a leading merchant today, "and I can not help you with ideas or facts; so possess your soul with patience, etc."

Quotations are unchanged. Cars are not plenty, but yet the supply is better than has been the case for some time past in the bituminous trade.

Many of our soft coal dealers are on their way to Canada to look after the Grand Trunk contract. The railroads have decided to fix the rates of freight on coal from the Reynoldsville, Low Grade, and River Divisions at \$1.30 per ton to the International Bridge, at Buffalo, and at \$1.45 to Suspension Bridge. What effect will the unsettled condition of the labor question have on prices is a conundrum for your readers to cogitate upon.

The traffic relations of the Lehigh Valley Railroad company with the New York, Lake Erie & Western Railroad have been a topic of discussion for many years, originating from a renewal of the report that the former had perfected arrangements for constructing a new line from Buffalo to connect with the Geneva, Ithaca & Sayre Railroad. It has been semi-officially announced, however, that a route for such a line has been surveyed, to be called the Buffalo & Geneva Railroad, 98 miles in length, but that it will be an independent organization, and will be run in its own interests unless the Lehigh Valley or the Northern Central see fit to buy it. There will be inducements held out for these two companies to use the line by lease or otherwise when the proper time comes for negotiation.

The investigation ordered by the House of Representatives relative to the Reading troubles and the differences existing between the owners of the mines and miners of the Schuylkill, Lehigh and other coal regions, a few days since, seems to have given much satisfaction to the general public. The questions of

railroad transportation and kindred topics to be also investigated by the special committee will furnish much food for thought and will be anxiously awaited.

The New York, Lake Erie & Western Railroad has placed an order for 1000 coal cars—to be delivered with quick dispatch.

Our city has a local poet! The following verse, under the caption of "Fell'll Dispute Him," appeared in print:

The coal dealer reckoned his pile of gold,
Thwart his features a grim chuckle started
As he thought how untrue was that saying of old—
'Bout the fuel and the money being parted.

TOMMY DOD.

See—fcw'll; fuel; fool!

Our Common Council have granted permission to the Natural Gas Fuel Company to allow their customers to burn the fuel gas for illuminating purposes if they are disposed to do so.

Pittsburg.

Feb. 9.

[From our Special Correspondent.]

Coal.—The rise in the Monongahela was not to say a very valuable one, the heavy ice preventing shipments to any extent, viz: To Cincinnati, 454,000; Louisville, 564,000; total, 1,018,000. The rise will enable boats on the way with empties to reach port. There is yet 3,000,000 bushels in the pools waiting a rise. The rates are:

PRICE OF COAL PER 100 BUSHELS.

First pool..... \$4.75 Fourth pool..... \$3.25
Second pool..... 4.25 Railroad coal..... \$5.00
Third pool..... 3.75

Pittsburg coal declined in Cincinnati to \$4 per ton delivered.

Connellsville Coke.—The market is dull, owing to so many furnaces being blown out or banked. The coke men complain of hard times. Furnace men still complain of the high price of coke and of the high price of railroad freights. The rates are: Blast-furnace, f.o.b., at ovens, \$1.75; to dealers, \$1.85; Foundry, \$2; Crushed, \$2.50.

FREIGHTS.

The latest actual charters to February 9th, per ton of 2240 pounds:

From Philadelphia:—No shipments on account of the strike of the employees of the Philadelphia & Reading Coal and Iron Company.

From Baltimore to:—Bangor, 1.75; Bath, 1.75; Boston, 1.75; Bridgeport, Conn., 1.30@1.40; Charleston, 1.00; Fall River, 1.50; Galveston, 3.10@3.25; New Bedford, 1.50; New Haven, 1.50; Newburyport, 1.90@2.00; New London, 1.50; Portland, 1.75; Portsmouth, N. H., 1.85; Providence, 1.50; Savannah, 1.25; Wilmington, 1.15.

From New York to:—Bath, Me., 1.50*; Beverly, 1.50*; Boston, 1.50@1.75*; Bridgeport, Conn., .65@.75; Cambridgeport, Mass., 1.50*3c.; Chelsea, 1.50*; Com. Pt., Mass., 1.50*; E. Boston, 1.50*; Fall River, 1.00; New Bedford, 1.05; New Haven, .65@.75; New London, .90; Norwich, 1.00; Portsmouth, N. H., 1.60*; Providence, 1.00; Salem, 1.00*.

* And discharging. † And discharging and towing. 3c. per bridge extra. ‡ Alongside. † And towing up and down. ‡ And towing. †† Pilotage. ** Below bridge * Old B. L.

MARKETS.

NEW YORK, Friday Evening, Feb. 10.

Prices of Silver per ounce troy.

| Feb. | Sterling exchange | London Pence. | N. Y. Cents. | Feb. | Sterling exchange | London Pence. | N. Y. Cts. |
|------|-------------------|---------------|--------------|------|-------------------|---------------|------------|
| 4 | 4.85 | 44 3-16 | 96 | 8 | 4.85 | 44 1/2 | 95 3/4 |
| 6 | 4.85 | 44 3-16 | 96 | 9 | 4.85 1/2 | 44 1-16 | 95 3/8 |
| 7 | 4.85 | 44 3-16 | 96 | 10 | 4.85 1/2 | 44 1-16 | 95 3/8 |

The applications for council bills on Wednesday much exceeded last week's tenders, so that the council could only allot a much smaller percentage of each person's requirements.

Foreign Bank Statements.—The governors of the Bank of England at their weekly meeting made no change in its rate for discount, and it remains 3 per cent. During the week, the bank gained £211,000, but the proportion of its reserve to its liabilities was reduced from 45.53 to 44.90 per cent, against an advance from 47.70 to 50.07 per cent in the same week of last year, when its rate for discount was 4 per cent. Thursday, the bank gained £120,000 bullion on balance. The weekly statement of the Bank of France shows an increase of 6,100,000 francs gold and a gain of 2,975,000 francs silver.

Copper.—With only moderate transactions taking place quotations have again eased off a little, but more steadiness is now observable in the market than has been the case for some time past, and it really becomes more and more probable that the trade are preparing themselves to accept present prices. The demand for outside brands is even more marked than previously, and for this class of copper quotations have now to be raised to 15@15 1/2, according to brand. The usual relative value of outside copper to lake copper which existed previous to the recent great rises has thus been again established.

The foreign markets have also been steadier, the lowest prices quoted during the week for Chili Bars being on Monday, when the quotation was £74 12s. 6d., and since then the price has gradually advanced, with moderate fluctuations, up to £76 17s. 6d. @ £77 to-day. Orders for fine copper from abroad are not so plentiful as previously, but, considering the large orders already placed, this is not at all surprising. We quote: Lake copper, spot, 16 3s; March, 16 5s;

April, 16 80; May, 16 75. Casting brands, 15@15 1/2. Electrolytic, 16 1/2.

It is understood that the syndicate now controls the entire Arizona output, except that of the Detroit Company, and that it is all to be exported. It is also understood that the Montana production is also contracted for, the Anaconda, Parrott and Boston-Montana companies having come into the fold.

Mr. Clark has sold to the Boston-Montana parties his Colusa Fraction and the smelting works at \$175,000. The price originally asked was \$300,000, but when the lower price was agreed upon he was allowed to have all the mine and works produced during the month. This amounted, it is said, to about 800,000 pounds of copper, which at present price, and considering the small cost of getting it when no regard had to be paid to the future, may have compensated for the reduction in price.

The greater part of the Montana production is to be retained in this country. The rumors are still current that an arrangement has been effected between the syndicate and the Calumet & Hecla by which it will act in harmony with the syndicate. It appears also that approaches have been made to some of the manufacturers to make contracts for their copper. It is understood that as an inducement to do so they are to be guaranteed a steady price, which shall not exceed a certain figure.

From the information we have received it appears probable that manufacturers will accept some such proposition, the guarantee against fluctuations in price being more important than the comparatively high prices demanded. Those who do not come in will, of course, stand a chance of being punished, though some of the lake companies still retain, and it is said, will continue to retain absolute independence.

Owing to a reduction of wages because the men lost time on account of the fumes from the calcining heaps at the Rio Tinto copper mines, Spain, the employes went on strike on the 3d inst. A riot occurred in which some twenty person were killed, mostly by the military. It is reported that the company has resolved to pay the old wages, and it is expected that there will be no further trouble.

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

| To | Bags. | Lbs. | \$ |
|----------------------------------|--------|-----------|---------|
| Liverpool—Matte— | | | |
| By S. S. Wisconsin..... | 772 | 91,527 | \$4,500 |
| " Gallia..... | 1,137 | 176,045 | 10,000 |
| " The Queen..... | 1,548 | 184,922 | 12,991 |
| " Belgravia..... | 10,160 | 1,204,375 | 60,300 |
| | 2,116 | 254,340 | 13,000 |
| COPPER. | | | |
| Wisconsin—Bars..... | 401 | 113,412 | 17,126 |
| Germanic—Pigs..... | 303 | 112,000 | 16,800 |
| To Havre— | | | |
| By S. S. La Champagne—Casks... 6 | 6,559 | 1,000 | |
| Bars..... | 546 | 193,356 | 30,800 |
| " Marsala—Pigs..... | 880 | 300,314 | 50,000 |
| Bars..... | 304 | 107,344 | 15,600 |
| Casks..... | 1,079 | 1,409,450 | 201,400 |
| To Hamburg—Argentiferous Copper— | | | |
| By S. S. Australia—Bars..... | 376 | 66,300 | 10,500 |
| " Rhaetia—Bars..... | 13 | 796 | 1,600 |

Tin has shown a decided weakness, not so much for spot, which is comparatively firm, at 36 3/4 @ 37, but for future delivery. About 300 tons of tin were sold. The closing prices are: Spot, 37; February, 36 3/4; March, 34 3/4; April, 33 3/4. London cables spot £168, whilst February is being sold at £2 to £3 less, and three months prompt at £145.

Lead.—After the publication of our last report a renewal of speculative buying set in, principally based on some rumors that an influential syndicate has been formed in Europe to manipulate lead in a similar manner as the French syndicate has done in copper, and that arrangements had already been made with the principal producers to establish £16 per ton as the minimum price for Spanish lead in London. These rumors have not, however, been confirmed, and are discredited in some quarters. At all events, until a definite and authoritative announcement that such a combination has been formed (and our information rather leads us to the conclusion that such will not be the case), we would warn our readers against being carried away by the reckless speculation to which this article has been subjected for a considerable time. Early this week London quotations came £15 2s. 6d. for Spanish, but have since given way, closing dull at £14 15s. English lead being quoted £14 17s. 6d. to £15. Our market also closes decidedly quieter, at Spot 4 90, March 4 90, April 4 90. To those who expect a lead syndicate to control the output, we commend a perusal of Mr. Clayton's article.

Messrs. John Wahl & Co., of St. Louis, telegraph to-day as follows: There has been considerable more inquiry for both hard and soft lead, in consequence of which sellers have been asking a little more, but only a moderate amount of business has been transacted. Sales will probably amount to 500 tons, at prices ranging from 4 62 1/2 @ 4 70. Buyers seem to have more confidence in the market, and are looking around more freely, still they touch the metal only lightly.

Messrs. Everett & Post, of Chicago, telegraph to-day as follows:

The market is advancing on account of large purchases by speculators. Consumers, however, are buying sparingly and offerings are very light, stocks in the hands of holders being limited in the West. Nominal quotations, 4 75 @ 4 85c.

Spelter.—Quotations from London are lower: ordinary, £18 15s.; specials, £19; but the market for domestic is well sustained and nothing is offered below 5 1/2 @ 5 3/4c. The prices of foreign spelter have given way slightly to 6 @ 6 1/2c.

Sheet Zinc, 6 1/2 @ 6 3/4c. **Antimony** barely steady. Foreign makers are

not yet in the market as sellers. We quote Hallett's, 11½@11¼; Cookson's, 14@14½c.

Chemicals.—There are very few changes in the chemical market since our last.

Among the heavy chemicals there is little to be noted.

Caustic soda ash, 48 per cent, is in pretty good demand, and \$1.25@1.27½ is asked for small lots ex store; there is little doing in high test.

The spot price on English sal-soda has advanced somewhat; there has been little inquiry for future shipments, however, and the quoted price remains 92@95c.

There is at present no demand for refined alkali, 36 per cent; the nominal price remains at 1.10@1.15c.; 48 per cent alkali is also without much animation.

Caustic soda of all grades continues very dull, with no change in the quotations.

Bleaching powder has been very quiet during the week, though prices have not lowered any; in fact, at present figures, nothing is to be made, and holders are not anxious to force the market.

Fertilizing chemicals continue very active. Muriate of potash is in good demand at the prices quoted last week.

Kainit also has been very lively; in fact, the demand has far exceeded the supply for spot lots, and prices are consequently high. We continue to quote \$10.50@11.00 on the spot, and \$8.75@9.50 for future arrivals, according to quantity and time of arrival.

Nitrate of soda is very stiff and firm, 2·20@2·25c. is demanded for lots ex store, with nothing afloat in port.

Early in the week the brimstone market was very firm and \$25 per ton demanded for lots ex store. The arrival of some 2000 tons has supplied passing deficiencies and eased the market. Lots of 50 tons may now be bought for \$22.50 per ton. February March shipments are quoted at \$20 per ton for best unmixed seconds; thirds are quoted at \$19 for future delivery.

There is no notable change in the acid market, sulphuric acid, 66°, continues in fair demand, in a jobbing way, with no change in prices.

Chamber acid is quite active at former quotations. Acetic acid continues about the same as usual, the very low prices prevailing apparently not tempting.

A break in the manufacturers' pool has resulted in lowering the price in oxalic acid somewhat, but it is likely the difficulty will be adjusted and the prices maintained at the former figures.

Quicksilver continues dull with no change in prices.

S. W. Royse & Company, of Manchester, report, under date January 28th, 1888, as follows on the chemical market:

We regret to have to report that the new year has so far scarcely fulfilled its promise. There has been a fairly active demand for bleaching powder, more particularly on export account, but prices remain unchanged. Caustic soda and soda ash are again weaker. Lead salts, notwithstanding the fall in the metal, maintain well their position. Foreign white sugar of ead has been throughout the month, and is still, in strong demand, and there is at present little brown sugar of lead offering. Nitrate of lead continues steady. Sulphate of copper has not been appreciably affected by the fall in copper, but there is rather more offering from second hands, and some weak holders compete keenly for what orders are being given out. Brown acetate of lime is rather more plentiful, and prices slightly easier, but gray continues scarce. Miscible and solvent wood naphtha are both dearer, the former especially being inquired after. Carbolic acid, crude and crystal, maintains its strong position, though buyers of crystals have no faith in the continuance of present values, and will only cover immediate requirements. The demand for sulphate of ammonia has slackened, but prices remain steady.

MINERALS.—The recent improvement in the iron market had brought forward buyers of ore, but the reaction caused them to hesitate; the position of iron ores, however, is stronger than it was a few weeks ago. Manganese is still plentiful, and the low qualities are almost entirely neglected, the demand being more and more for the higher grades, for which, however, no advance in price can be secured. Arrivals of French chalk are only small, mining and shipping operations having been interfered with by bad weather. Advices from Sicily report brimstone sufficiently plentiful, and it is rather more pressed for sale, prices being a turn easier. China clay continues very dull, supplies being still in excess of demand, and very little business of any importance is being transacted. Phosphate of lime is being pushed for sale and no advance in price can be expected—indeed, producers can hardly expect to maintain old rates—with the increasing quantities of basic slag now upon the market. Sulphate of barytes continues slow of sale.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Feb. 10.

There appears to be no prospect of any immediate settlement of the strikes in the anthracite coal districts. The effect of the strikes is plainly manifest in the restricted production of the blast-furnaces in the Lehigh and Schuylkill regions. It is also shown in the smaller output of many foundries which have not been able to get their usual supplies of coal. The latter has perhaps made a temporary slackening in the demand for foundry pig. But it must be evident to every careful observer that there is sure to be a large demand for foundry irons in the near future. The large volume of the

general business of the country, the demand for locomotives, cars and machinery of all kinds, all make it more than probable that within the next few months there will be a great demand for foundry irons. It is not supposable that prices will be lower, and should the present restriction of production continue even a few weeks longer, it is hard to foresee what can prevent foundry irons from advancing in price, certainly until production has caught up with demand. Forge irons, likewise, show a firmer tendency. The demand for pipe iron is large, and likely to increase. Good brands of forge iron are not pushed, and are firmly held at prices equivalent to \$17.50 at tidewater.

Recent reported sales of pig-iron, except one sale of a large block to a pipe foundry, have been in small lots and at current quotations.

The market for Scotch pig is quiet, and prices are easier here. Cable quotations show a further falling off at Glasgow.

Bessemer pig is very quiet, and quotations are purely nominal.

The business in steel wire rods is chiefly confined to domestic mills, although some lots of cheap foreign rods are said to be in the way, in spite of the German combination.

The sales of steel rails to date will foot up fully 500,000 tons for 1888 delivery. This figure is based on the official figures of the Rail Makers' Association plus other sales known to have been made and not reported up to February 1st. There is an active inquiry and several large orders are on the market. Only three or four mills are now in operation, but there appears to be a very good prospect that all the mills will have ten months of full work.

Scrap iron is more firmly held, and we note a sale of 1000 tons Foreign, at \$21 on cars.

There have also been some sales of Old Tee rails at \$22. Doubles are firmly held at near \$23. We hear of \$22.75 being offered and declined. The Atlantic States Nail Association is now in session at Philadelphia. Another attempt is to be made to restrict production and maintain prices by forming a pool, or as some of the daily papers with characteristic lack of accuracy call it, a "trust." The Bulletin of the American Iron and Steel Association publishes the following table, showing the exports of iron and steel from Great Britain to the United States since 1884.

| Articles—Gross tons | 1884. | 1885. | 1886. | 1887. |
|----------------------------|---------|---------|---------|-----------|
| Pig-iron | 157,010 | 113,499 | 288,121 | 403,559 |
| Old iron for remanufacture | | | | |
| facture | 25,531 | 14,398 | 65,443 | 172,927 |
| Steel unwrought | 14,602 | 14,644 | 105,924 | 215,656 |
| in plates | 211,975 | 223,820 | 263,581 | 268,364 |
| Hoops and sheets | 21,370 | 21,871 | 17,216 | 32,471 |
| Bar, angle, bolt & rod | 4,275 | 2,159 | 3,042 | 4,273 |
| Rails | 17,825 | 5,778 | 59,271 | 182,270 |
| Total | 452,538 | 396,169 | 802,598 | 1,279,520 |

Louisville.

[Reported by Geo. H. HULL & Co.]

Market remains unchanged. For quick delivery a few buyers have been willing to pay slightly advanced figures, but there have been no heavy purchases on this basis. Old wheels have been sold at \$19.75, and old rails on basis of \$21 cars, Louisville. Charcoal irons have been sold during the last month for as low a figure as at any time since 1878. Quotations will be found in our register of prices.

Pittsburg.

[From our Special Correspondent.]

The volume of business in crude iron for the week has been light. The restriction in production of crude iron so far will no doubt be beneficial, and prices ought to be better in the near future on that account. Stocks at certain points have been running down, and consumers and buyers have been unwilling to load up with orders for future delivery, owing to the uncertainty of the labor question.

Several of the furnaces in this vicinity are still banked, and propose to remain in that state until they can make a satisfactory arrangement with their workmen. We have never seen matters so mixed up; just as soon as one trouble is satisfactorily arranged, a discovery is made that "somebody has been left." Matters have to again be adjusted. After wages were made satisfactory, the Amalgamated Association makes a discovery that there is one man in the mill making more money than they think he should. He is ordered to give up part of his work, and if he refuses a strike is ordered, and hundreds of men are ordered to quit work and depend on others for support. As promised in our last, the Solar Mill of Wm. Clark & Co. started up with non-union men, and have been running steadily all week. The firm say that from this time forward they will manage their own business in their own way, let the cost be what it may. They have no use for amalgamated or any other association; that while they will pay union prices, they will reserve the privilege of hiring or discharging who they please. The coke question is not yet settled. Meetings are still being held, with a fair prospect that matters will soon be satisfactorily arranged; in the meantime the coke trade is evidently demoralized. One company has shut down 100 ovens, or one third of their entire number, and have 3000 tons coke stocked in their yards waiting shipment. A final meeting of coke men is ordered for February 20th.

SALES REPORTED SINCE OUR LAST.
Coal and Coke Smelted Lake Ore.

| | |
|-------------------------------------|-------------|
| 500 Tons Bessemer | 17.75 cash. |
| 500 Tons Bessemer | 18.00 cash. |
| 200 Tons Gray Forge | 16.25 cash. |
| 200 Tons Mottled and White Bessemer | 16.25 cash. |
| 250 Tons Gray Forge | 18.75 4 mo. |
| 200 Tons No. 1 Foundry | 18.50 cash. |
| 150 Tons Bessemer Extra | 19.00 4 mo. |
| 100 Tons No. 2 Foundry | 17.50 cash. |
| 500 Tons Gray Mill | 16.50 cash. |
| 500 Tons Low Grade Bessemer | 17.50 cash. |
| 500 Tons Gray Forge | 16.75 4 mo. |

| Coke, Native Ore. | |
|--------------------------------|-------------|
| 250 Tons Gray Forge | 16.25 cash. |
| 200 Tons Gray Forge | 16.25 cash. |
| 100 Tons Gray Forge | 16.75 ca-b. |
| 50 Tons No. 2 Foundry, all ore | 19.60 cash. |

| Charcoal. | |
|-----------------------------|-------------|
| 120 Tons Hot Blast | 23.50 cash. |
| 60 Tons Cold Blast | 28.00 cash. |
| 50 Tons Cold Blast of grade | 24.00 cash. |
| 50 Tons Hot Blast | 24.50 cash. |
| 50 Tons Cold Blast | 16.50 cash. |
| 35 Tons Cold Blast | 26.00 4 mo. |

| Steel Rail Ends. | |
|-----------------------|-------------|
| 500 Tons Rail Ends | 19.00 cash. |
| 400 Tons Steel Blooms | 18.00 cash. |

| Steel Billets. | |
|------------------|-------------|
| 500 Tons Billets | 28.75 cash. |

| Muck Bar. | |
|--------------------|-------------|
| 1000 Tons February | 27.75 cash. |

| Old Iron Rails. | |
|-------------------------|-------------|
| 1200 Tons Imported T's | 24.00 cash. |
| 600 Tons American T's | 24.00 cash. |
| 100 Tons Imported D. H. | 25.50 cash. |

Philadelphia.

Feb. 9.

[From our Special Correspondent.]

The demand to be made to-day for a 15 per cent advance by the Wyoming miners, coupled with the possibility of a strike, adds another ugly feature to the present situation. Otherwise the situation is not materially changed. The banking up of a few more furnaces is seriously considered, yet the furnace interests dislike to take any steps which two or three weeks after would prove to be ill-advised. Sufficient coal is coming, both soft and hard, as well as coke, to keep the industrial establishments in eastern Pennsylvania running along smoothly. Prices have been slightly reduced and a further decline was probable prior to the announcement of the intended demand for an advance. Even now stocks are abundant and there is no certainty of an advance being made, but should the Wyoming region stop the situation will be brought to a crisis. Considerable money is arriving already and quite a number of collectors are hard at work. It is given out to-day that a movement is on foot which will bring about a conference between the Reading miners and the Reading Company. The company has discovered the miners are stronger than they had supposed.

So far as sales of pig-iron are concerned, they have been light, and only for actual requirements. A number of consumers have been counselling with outside producers relative to shipments if iron should become actually scarce. There will be no advance in prices, unless in two or three brands, and that would not last long. The consumers have found out that they can be supplied with outside iron, and they feel easier, and the market is, therefore, dull. Still all who want pig-iron are able to get it, although not always the particular kind they would like. The appended quotations represent the extremes in prices of all kinds.

The muck-bar mills are quite busy, and seem to be picking up orders enough to keep them moving. There are some inquiries for muck-bars, but mill-owners think they are doing very well to fill orders at present prices.

Foreign material is practically neglected, although an occasional inquiry is received, and it is intimated that some large business has been done direct between consumers in the West and importers. This market has heard very little about it. Anthracite blooms are neglected.

Manufactured iron has had a little relapse from some cause, and buyers are simply waiting until they are in greater need of material than now, yet quotations run from 1·80 to 2c. Large consumers will not place large orders at present asking price, nor are they anxious enough for iron to make a square offer. They prefer to buy in a retail way. A few fair sized lots were taken at \$1.90, and some car building buyers will be in next week. Our advices to day, from the interior of the State, show that there is some irregularity of production among the mills, but that there would be an abundance of business if another tenth drop would be made. The manufacturers do not care for business at that sacrifice and claim that the fuel question must be settled before large contracts can be safely entered into. This seems to be the general impression all around; the fuel question underlies the whole iron situation.

There is a little falling off in merchant steel. Western consumers are not buying quite as heavily and those who usually purchase at this time are deferring the placing of contracts. Sheet iron is more active as to inquiry for spring delivery. Current requirements are light. Stocks are moderate. Prices are firm. There is nothing to be gained by shading just now, but if square offers were made for large lots for spring delivery they would be accepted at something off. The iron and steel makers as a whole are undecided as to the best policy to pursue, whether to make the necessary shading to suit buyers for large spring deliveries or to wait until then and take their share of safe business.

The Atlantic States Nail Association met to day at the Continental Hotel and fixed nail quotations at \$2 cargo lots, \$2.10 small lots and arranged the matter of extras which has been a source of contention for some months. They also took steps looking to the restriction of production within the market requirements.

In plate and tank nothing has been developed and while a shading in prices might be accepted if an offer was made, there is not much to report. On the other hand there is a great deal of steel and iron plate going into consumption and all consumers have large contracts in hand which they do not care to fully cover at this time. Nothing can be ascertained as to the rumor about the heavy importation of foreign plates that has been spoken of.

Structural iron is without any change. The mills

WEEKLY REGISTER OF CURRENT QUOTATIONS.

CHEMICALS.

Table of chemical prices including Acetic, Muriatic, Nitric, Sulphuric, and various salts and acids.

Table of Sal. American, Nitrate, Sulphur, and other mineral products.

Table of Building Material including Bricks, Haverstraw, and various stones.

Table of THE RARER METALS including Aluminum, Arsenic, Bismuth, Cadmium, and others.

Table of METALS including Lead, Tin, Zinc, and various alloys.

Table of IRON AND STEEL including American Pig-Iron, Scotch Pig, and various grades.

Table of Gartscherrie, Dalmellington, and other iron products.

Table of Structural Iron and Steel including Bridge Plate, Tees, and Angles.

Table of Cast-Iron Pipe and Wrought Iron Pipe.

Table of Boiler Tubes, Ball Fastenings, and Wrought Scrap.

Table of Louisville Prices including Pig-Iron, So. Coke, and Charcoal.

Table of Pittsburgh Prices including Coke or Bituminous Pig and Charcoal Pig.

Table of London Quotations including Alturas Gold, Arizona Copper, and various metals.

Table of Philadelphia Prices including Foundry No. 1, Bessemer Pig, and various iron products.

Table of STOCK MARKET QUOTATIONS including Baltimore Stock Quotations and Birmingham, Ala., Stock Quot.

Table of Pittsburgh Stock Quotations including Allegheny Gas, Brantwater Gas, and others.

Table of Pittsburgh Stock Quotations (continued) including Nat. Gas Co. of W. Va., N. Y. & C. Gas Coal, and others.

Table of Pittsburgh Stock Quotations (continued) including Wheeling Nat. Gas, Yankee Girl Mg, and others.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

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

G. Gold. S. Silver. L. Lead. C. Copper. * Non-assessable. † This company, as the Western, up to Dec. 10th, 1881, paid \$1,400,000. Non-assessable for three years. ‡ The Deadwood previously paid \$275,000 in eleven dividends, and the Terra \$75,000. Previous to the consolidation in Aug., 1884, the California had paid \$31,320,000 in dividends, and the Con. Virginia \$42,390,000. Previous to the consolidation of the Copper Queen with the Atlanta, Aug., 1885, the Copper Queen had paid \$1,350,000 in dividends.

NEW YORK MINING STOCKS QUOTATIONS.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Main table of New York Mining Stocks Quotations, divided into Dividend-paying and Non-dividend-paying mines. Columns include Name and Location of Company, dates from Feb. 4 to Feb. 10, Sales, and Price per share.

* Debit in at the New York Stock Ex. † Unlisted Securities ‡ Debit in at the Metal E. Dividend shares sold, 42,500. Non-dividend shares sold, 10,297. Total New York, 145,400.

BOSTON MINING STOCKS QUOTATIONS.

Main table of Boston Mining Stocks Quotations. Columns include Name of Company, dates from Feb. 3 to Feb. 9, Sales, and Price per share.

Boston: Dividend shares sold, 36,435. Non-dividend shares sold, 28,895. Total Boston, 63,330.

COAL STOCKS.

Table of Coal Stocks. Columns include Name of Company, dates from Feb. 4 to Feb. 10, Sales, and Price per share.

San Francisco Mining Stock Quotations.

Table of San Francisco Mining Stock Quotations. Columns include Company, dates from Feb. 3 to Feb. 9, and Price per share.

**Of the sales of this stock, 37,983 were in Philadelphia, and 113,580 in New York.

Total sales, 293,358.

continue to pick up small orders and some building requirements will shortly come to hand.

Steel rails are selling in one to 5000 ton lots in a quiet steady way that looks as though a good many of the smaller purchasers were covering. The larger buyers, who make business lively, are, so far as can be ascertained, holding back. One reason for this is said to be that there is practically a combination among the Western railroad managers to depress stocks west of Chicago by maintaining a freight war, so that they can load up at low prices, after which orders for material will be given out. This statement is made for what it is worth, and if it is worth anything it will be proven by the placing of large orders as soon as the freight war is settled. Old rails are dull with a number of concerns, with a decrease which holders do not wish to accept just now. The scrap yards are bare of good material. Quotations will be found in our weekly register of prices.

FINANCIAL.

NEW YORK, Friday Evening, Feb. 10.
Mining Stocks.

The mining market has undergone no special change since our last. The trading has shown no increase and no diminution, for which all should be thankful, inasmuch as affairs in Wall street are reported to be any thing but encouraging, the dullness now prevailing being intense on all the exchanges. Such being the case, there is no cause for complaint in respect to mining shares, of which 20,000 to 50,000 shares are changing hands daily, at prices which on the whole show but little variation.

The Surinam Gold Mining Company, of Dutch Guiana, came out here on the Consolidated Petroleum and Mining Exchange last September, and since then declared several dividends. From information then received we promptly (ENGINEERING AND MINING JOURNAL, October 15th, page 288) warned proposing investors that the company was unworthy of their confidence. Our notice killed the scheme, and no business since then has been done in the stock. We now have received further information which shows that so far as the company brought out here is concerned its claims were wholly unfounded, and any innocent holder of the stock can, undoubtedly, recover from the parties who aided in floating the scheme here.

Thus, again, the services of the ENGINEERING AND MINING JOURNAL to legitimate mining have been shown. No disreputable mining scheme can succeed here when the ENGINEERING AND MINING JOURNAL knows the facts concerning it.

Eureka was among the strong shares on the list. The company has just declared an extra dividend of 25c. per share, or \$12,500. The price, which has steadily advanced since last week, when it was at from \$9.88@10.50, opened this week at \$14.13, and closed to-day at \$15.75.

Navajo this week shows a decline, going from \$2 to \$1.75. Bells Isle was firm at from 80 to 85c. Tornado, which has held the dollar mark for several weeks past, went to 90c. yesterday, at which price it has been selling to-day.

Notwithstanding the good prospects which are reported from the mines of the Consolidated California & Virginia Mining Company, and the payment of regular monthly dividends, the price does not move upward, and little interest is shown in the stock, which this week shows a decline of \$2 per share, going from \$19.50 to \$17.50, at which price the last sale was made. Sierra Nevada was also on the down grade and went from \$5.63 to \$4.95. Chollar from \$6.38 to \$6.25.

Savage shows only one sale at \$7.63, and Gould & Curry are at \$5.63. Hale & Norcross advanced from \$10.13 to \$10.75. Crown Point from \$7.38 to \$8. Alta from \$2.20 to \$2.25. Union Consolidated declined from \$5 to \$4.40. Scorpion from \$2.20 to \$1.05. Mexican advanced from \$5.13 to \$6, but on Wednesday declined again to \$5.63. Exchequer was quiet at from \$1.65 to \$1.70, and Julia from 60c. to 70c. Bullion at from \$2 to \$2.20, and Alta from \$2.20 to \$2.25. Sutro Tunnel again shows the largest business; the price has been at 15@16c.

Martin White is beginning to attract some attention here; prices have ruled at from 75c. to \$1.

We understand to-day that the manipulators of that well known fraud, the "great Tortuuta mine, having failed to appear before the committee of Consolidated Stock and Petroleum Exchange, will shortly be advised that their stock has been placed on the suspended list.

Next to Sutro Tunnel, the largest business is recorded in Proustite, which shows transactions amounting to 19,300 shares at declining prices—from \$2.50 to \$2.25. Castle Creek remains at 10c. and 11c., and Holyoke at from 6c. to 8c.

Messrs. Allen C. Washington and Bache McE. Whitlock, who were elected directors of the Horn-Silver Mining Company last October, and at the time pledged themselves to furnish the stockholders, from time to time, all information which they could obtain respecting the affairs of the company, have just issued a circular from which we take the following:

At the various directors' meetings, which have been held since the election, we have constantly endeavored to insure that the company should hereafter be managed upon a practical business basis, and we are pleased to be able to say that we have in most cases been readily seconded by those of the directors who represented the majority of the stockholders at the late election. It was not until the question of the form of the annual report to the stockholders was raised that any very serious difference showed itself among the directors.

The object of this circular is to explain to those stockholders whom we represented at the late election

our position with reference to the report just issued by the company, extracts of which will be published in the next issue of the ENGINEERING AND MINING JOURNAL.

It need hardly be said that the Secretary's report, and that portion of the financial statement which states in one item the "outstanding amounts due to company," were adopted by the directors against our vote and after our earnest protest. We consider that these statements of the company's affairs were entirely too indefinite, and desired the publication of a full and itemized account of the company's assets, and a particular statement of every thing done by the new board since its election. In this we were overruled. It is, of course, still in our power to make public, by a minority report, all the details which we wished to have inserted in the report adopted by the directors. We do not do so at once, because it was represented to us by the other directors and by the counsel for the company, that our doing so at this time would seriously interfere with and impede an effort now being made to realize on certain securities, given to us to secure a large portion of the "outstanding amounts due to company." It is possible that it would interfere with such effort, and that the other directors were right in deciding on that account not to publish the particulars which we wished to have inserted in the report. We do not believe that it would interfere with such effort, or that any substantial good can come from any further delay in laying before the stockholders the exact condition of the company's affairs. We do believe, however, that the other directors are acting in good faith, and we wish to give them every opportunity for carrying out their ideas on their own lines. We, therefore, and solely on this ground, refrain for the present from making any more particular statement. We beg to inform you that we have not forgotten our pledge to you to give you all the information which we possess, and we shall take pleasure in fulfilling it as soon as we are certain that our doing so will not prejudice the interests of the company.

The stock has been more active, some 3450 shares changing hands at prices ranging from \$1 to 95c., at which sales were made to-day.

Ontario shows a few sales at \$28. Stormont is quoted at 5c.

The copper stocks, which have been booming in Boston, attracted but little attention here, and only the following sales are recorded: Calumet & Hecla at \$224.63, Pewabic at \$2.88, and Winthrop at from 40@50c., and National, which was active and strong, at from \$3.25@3.88.

Father de Smet has shown some life, and advanced from 36 to 46c. Iron Hill was quiet, at 82@83c. Deadwood-Terra, at \$1.85@1.90, and Homestake declined from \$11.88 to \$11.50.

The fire which broke out in the Plymouth Consolidated Company's mine recently, we are advised by the company, is not very serious. Further details have not yet been received. A few sales of the stock were made at from \$19 to \$17.88.

No attention is given to the Quicksilver stocks at present. Preferred records a few sales at from \$33 to \$34.

Standard was neglected, and sold at from \$3@ \$2.95. Bodie was active at from \$2.45@2.50. Bulwer appeared but once at 95c. Mono showed some business at from \$2.05@2.15. Consolidated Pacific at 20@19c.

The "twin brothers," Amador and Middle Bar, continue their little game. The former tries to induce buyer at prices ranging from \$1.50 to \$1.60, and the latter 33 to 36c.

Brunswick holds its own, at \$1.65. Some 1500 shares of Hector changed hands at 35 and 40c.

El Cristo declined from \$1.80@1.50. Mr. Geo. D. Roberts, who recently visited the district where the mine is situated, speaks in glowing terms of the climate!

Phoenix of Arkansas is selling at from 25 to 30c., and it is probable that the price will go still lower.

Silver King after a long absence again appeared on the list and was actively dealt in at prices which in the beginning of the week advanced from \$4.85 to \$5, declining to-day to \$4.75.

Rappabannock was quiet at 20 to 21c.

Iron Silver, which is the best paying Colorado stock on the list, has gradually advanced to \$4, at which price sales were made this week. Robinson Consolidated is resting from its efforts to reach the dollar mark. A few sales are reported at 75 to 80c. Leadville was out of the market altogether, and Little Chief appeared once at 23c. Little Pittsburg at 30c. Small Hopes was active in the beginning of the week at from \$3.10 to \$3.20. Dunkin, which has just declared an extra dividend of 15c. per share, advanced in consequence from \$1.40 to \$1.70. Chrysoite is quoted at 50c. Adams at \$2.75, showing only one sale of 100 shares. Silver Cord was firm at 30c. Security was lower, from \$1.35 to 90c. Monitor showed more activity, and sales were made at 16 to 17c. Lacrosse at 11c. Cashier, which has been dormant for a few weeks, came out at 8 to 10c.

Alice is now selling as low as 40c. Some months ago a boom was predicted in this stock, but it never materialized. Bad management is generally credited with this collapse, and the criticisms of the ENGINEERING AND MINING JOURNAL, made months ago, as usual, have been fully justified.

It is rumored that the stock of the Great Granite Mountain Mining Company of Montana will be listed at the Consolidated Stock and Petroleum Exchange.

The "rennant" of the "famous" Sierra mine, the Silver Mining Company of Lake Valley, receives but

little attention. Only one sale of the stock was made at 20c.

Meetings.

The annual and special meetings of the following companies will be held on the dates given:

Connellsville Gas Coal Company, No. 333 Walnut street, Philadelphia, Pa., February 27th, at twelve o'clock noon.

Cranberry Iron and Coal Company, No. 237 South Third street, Philadelphia, Pa., February 21st, at twelve o'clock noon.

Daly Mining Company, No. 29 1/2 West South street, Salt Lake City, Utah, February 20th, at ten o'clock P.M.

Delphic Iron Company, No. 20 Nassau street, New York City, February 14th, at twelve o'clock noon.

Lehigh & Wilkes-Barre Coal Company, No. 226 South Third street, Philadelphia, Pa., February 23d, at one o'clock P.M.

Midvale Steel Company, Nicetown, Pa., February 27th, at half past three o'clock P.M.

Robinson Consolidated Mining Company, No. 45 Broadway, New York City, March 6th, at twelve o'clock noon.

Dividends.

Consolidated California & Virginia Mining Company, of Nevada, has declared a dividend No. 14, of fifty cents per share, or \$108,000, payable February 10th.

Dunkin Mining Company, of Colorado, has declared an extra dividend, No. 22, of fifteen cents per share, or \$30,000, payable March 1st, at the Farmers' Loan and Trust Company, No. 22 William street, New York City.

Eureka Consolidated Mining Company, of Nevada, has declared an extra dividend of twenty five cents per share, or \$12,500.

Assessments.

| COMPANY. | No | When levied. | D'ing't in office. | Day of sale. | Am't per share. |
|-----------------------|----|--------------|--------------------|--------------|-----------------|
| Alpha Cons. Nev. | 23 | Jan. 9 | Feb. 15 | Mar. 6 | .87 1/2 |
| Alpha M. & M., Nev. | 1 | Jan. 9 | Feb. 15 | Mar. 6 | .25 |
| Anchor, Utah | | Dec. 13 | Jan. 13 | Feb. 13 | .20 |
| Baker Divide, Cal. | 15 | Jan. 7 | Feb. 13 | Feb. 29 | .25 |
| Best & Belcher, Nev. | 39 | Jan. 4 | Feb. 9 | Mar. 2 | .50 |
| Cedar Rapids Dak. | 4 | Dec. 17 | Dec. 12 | Feb. 14 | .10 |
| Climax, Dak. | 2 | Jan. 4 | Feb. 4 | Feb. 27 | .00 |
| Commonwealth, Nev. | 6 | Dec. 29 | Feb. 6 | Feb. 28 | .50 1/2 |
| Cora, Dak. | 1 | Jan. 31 | Mar. 6 | Mar. 23 | .0 1/2 |
| Crown Pt., Nev. | 6 | Jan. 4 | Feb. 8 | Feb. 29 | .50 |
| Eva, Nev. | 1 | Jan. 5 | Feb. 10 | Mar. 5 | .05 |
| Flowery, Nev. | 5 | Jan. 13 | Feb. 17 | Mar. 9 | .20 |
| Found Treasury, Nev. | 2 | Jan. 5 | Mar. 7 | Mar. 28 | .08 |
| Genesee, Nev. | 1 | Jan. 10 | Feb. 14 | Mar. 6 | .03 |
| Gold & Reward, Dak. | 1 | Dec. 31 | Feb. 3 | Feb. 21 | .0 1/4 |
| Kosuth, Nev. | 9 | Nov. 25 | Jan. 5 | Feb. 6 | .10 |
| Mexican, Nev. | 35 | Jan. 17 | Feb. 21 | Mar. 13 | .25 |
| Mayflower, Cal. | 40 | Jan. 19 | Feb. 23 | Mar. 18 | .50 |
| Mono, Cal. | 25 | Dec. 20 | Jan. 24 | Feb. 28 | .50 |
| Morning Star, Nev. | 3 | Jan. 13 | Feb. 15 | Mar. 3 | .0 1/2 |
| Navajo, Nev. | 18 | Jan. 10 | Feb. 14 | Mar. 6 | .30 |
| Nevada Queen, Nev. | 3 | Dec. 16 | Jan. 24 | Feb. 14 | .50 |
| North Bonanza, Nev. | 8 | Jan. 19 | Feb. 15 | Mar. 14 | .15 |
| Paradise Valley, Nev. | 4 | Jan. 28 | Mar. 1 | Mar. 23 | .10 |
| Pioche, Cons., Nev. | 4 | Dec. 30 | Feb. 4 | Mar. 22 | .20 |
| Quartz Mt., Cal. | 20 | Jan. 17 | Feb. 20 | Mar. 15 | .70 |
| Rattler-Gilroy, Dak. | 10 | Jan. 21 | Feb. 24 | Mar. 14 | .0 1/2 |
| Spring Valley, Cal. | 2 | Jan. 11 | Feb. 18 | Mar. 17 | .50 |
| Vuican, Dak. | 1 | Dec. 14 | Jan. 17 | Feb. 17 | .001 |

Pipe Line Certificates.

The Stock Exchange Governing Committee has decided to permit dealings in pipe line certificates, subject to such regulations as may be formulated hereafter.

The following table gives the quotations and sales at the Consolidated Stock and Petroleum Exchange:

| Feb. 4 | 90 1/2c. | Highest. | Lowest. | Closing. | Sales. |
|--------|----------|----------|---------|----------|-----------|
| Feb. 4 | 90 1/2c. | 90 1/2c. | 90c. | 90c. | 140,000 |
| 6 | 89 1/2 | 89 1/2 | 88 1/4 | 89 1/4 | 1,75,000 |
| 7 | 89 1/4 | 89 1/4 | 88 1/4 | 90 | 1,150,000 |
| 8 | 90 | 90 | 89 1/2 | 90 1/2 | 99,000 |
| 9 | 90 1/2 | 90 1/2 | 89 1/4 | 90 1/2 | 1,244,000 |
| 10 | 89 1/2 | 90 1/4 | 89 1/2 | 90 | 465,000 |

Total sales in barrels..... 6,000,000

Boston Mining Stocks. Feb. 9.

[From our Special Correspondent.]

We have had a veritable boom in copper stocks the past week and it looks very much as if it had come to stay. The feeling seems to be very general that the price of ingot copper will be sustained at or about present rates, and if the syndicate have really purchased the output of the Calumet & Hecla, as it is currently reported and generally believed, we have only seen the beginning of the advance which is coming in all the producing mines in the country, and its effect upon the low-priced shares will be to stimulate a good degree of activity and much higher price in them.

The rapid advance in C. & H. from \$210, the closing price at our last report to \$233 on good buying orders would seem to indicate the truth of the rumors regarding the sale of their copper to the syndicate, but it does not assure the fact. No doubt at 16 cents per pound very large dividends can be paid the stockholders, notwithstanding the losses by the fire, and this fact is beginning to be realized, and in some measure accounts for the desire to buy the stock the past few days. The reaction was small—the stock selling at \$230 to-day.

Next in point of interest is the rise in Tamarack from \$151 to \$167 1/2, which is pretty well for a mine that has never yet paid a dividend.

Quincy has been very active with larger sales than for a long while. There were large orders to buy without limit, and it rapidly advanced from \$69 to