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CONTENTS.

	PAGE.		PAGE.
The Proposed Reduction of the Tariff . . .	175	Systems of Mining in Large Bodies of Soft Ore	179
Some Alaskan Mining Bubbles	175	Mineral Production of Canada	181
The Rights of the Public vs. Those of Strikers	176	Elimination of Bismuth in Refining Silver	181
Hydrogen in Steel	179	Mining and Metallurgical Patents	181
Russian Duties on Metals	177	The Metallurgy of Steel	182
Spanish World's Fair	177	Personals	184
Development of the American Chemical Industry	177	Furnace, Mill, and Factory	184
Chloridizing-Roasting and Lixivation at Yed-as Mine, Mex	178	Contracting Notes	184
Cure for the Rabbit Pest in Australia	179	Labor and Wages	184
MINING NEWS:		FREIGHTS	187
Colorado	185	London	189
Michigan	185	MEETINGS	192
Nevada	185	ASSESSMENTS	192
Pennsylvania	185	DIVIDENDS	192
Utah	185	PIPE LINE CERT.	192
MARKETS:		Advertisers' Index	xvii
COAL: New York 185			
Boston	186		
Buffalo	186	MINING STOCKS:	
Pittsburg	186	New York	188
METALS	186	Boston	192
CHEMICALS	187	San Francisco	192
IRON: New York 187		Baltimore	189
Louisville	187	Birmingham	189
Pittsburgh	188	Pittsburgh	189
Philadelphia 188			

THE PROPOSED REDUCTION OF THE TARIFF.

The proposed tariff bill has not created any excitement in the metal or other markets, owing chiefly to two circumstances: first, very few believe that it has much chance of passing in its present shape, and second, it is generally so evenly balanced in its reductions, that even if it were to pass, it would not seriously affect many important industries.

It is generally, in fact universally, admitted that the present tariff is absurdly and injuriously unequal in its provisions, and it is also beyond question that, sooner or later, the income of the government must be reduced by the reduction of duties; but there will always be a question between rival parties as to which shall inaugurate the reduction. The "outs," it may be assumed, will always oppose what the "ins" propose, and so no bill can ever be drawn that will satisfy all. Among the present proposals are some which we think unwise, sufficient care not having

been taken of young industries. Thus, the chemical industry is in its first infancy with us, and it is certainly entitled to such support as will induce the investment of capital to establish it. Some of the provisions of the proposed act would be a serious injury to this very important source of national wealth and greatly retard its development. In some articles the duty should be increased, not reduced.

Quicksilver is produced in Spain as a government monopoly, or it is under the control of a few foreign banking-houses. To put it on the free list would cause a great injury to our American mines, which are already working under the heavy handicap of higher wages and poorer ores than the foreign mines possess. Though as yet we have no native tin industry to be hurt, we are on the point of becoming tin producers, and it is the young and not the old industries the tariff was intended to protect.

There is no change proposed in the iron ore or coal duties, in fact the Canadians do not care for free trade in coal, as they would lose by it while we would gain. As the subject comes up for discussion in Congress we shall refer more particularly to the provisions which affect the great mining, metallurgical, and engineering interests, which the ENGINEERING AND MINING JOURNAL represents, and will be pleased to receive the views of those who are in a position to voice the interests affected.

SOME ALASKAN MINING BUBBLES.

The fame of the great Tredwell mine on Douglas Island, Alaska, which has been declaring large dividends from treating 300 tons a day of a \$6 to \$8 ore, has been utilized by speculators to float companies organized to work all kinds of property in that district.

The distinguishing feature of the Tredwell lode is its enormous size. The ore-body is said to exceed 450 feet in thickness and to have been proved over a length of nearly two miles to carry pay ore whenever opened.

The ore is worked at an open quarry above water level, and as the cost of mining and milling does not exceed \$1.25 per ton, an ore of \$5 or \$6 a ton, in such abundance, would leave a handsome profit after allowing for loss in treatment, company expenses, etc.

It need not be told to any one having the least knowledge of ore deposits that proximity to a good mine is absolutely no indication of value. "The extension" of a vein beyond the pay chute or bonanza is usually barren, though the vein itself may be as large as where it carries rich ore. Still less can any value be placed upon the fact that a vein, though not the continuation of one in bonanza, is in its neighborhood.

In any reliable estimate of the value of a mine its own proven ore-body must necessarily be the principal, and in nearly every case the sole element to be taken account of. Because the Tredwell has a paying ore-body of very unusual length and of great uniformity in value it must not be imagined, much less assumed, that the Tredwell vein is everywhere in pay, or that every vein in its neighborhood will afford the foundation for a paying mine.

It is said on responsible authority that the pay ore of the Tredwell vein extends into the claims adjoining the Tredwell's company's mine, and that what promise to be profitable mines are being opened on these claims; but far beyond these and even on the mainland a great number of locations have been made and several companies have been organized to work them, and the stock of some of these has been quite freely distributed in the East.

Among the most prominent and least valuable of these concerns are some companies which are being floated in the East by a Mr. THOMAS S. NOWELL, whose past history is chiefly remembered for the unsuccessful enterprises he has brought out.

The Boston Alaska Mining Company, which owned the Amazon and Oro claims in Alaska, is one of these apparently worthless enterprises. Examination of the claims by several responsible parties failed to find any thing like pay in the ore of the mines. The worthlessness of this property is now more generally known than that of another of Mr. NOWELL'S schemes, the Alaska Union Company, which is based on the Cleveland & Hendricks claims, and which has built an 80-stamp mill, now complete. This mill it was first promised would start last spring, and, having failed in that, its starting was promised for nearly every month since last August; it is now promised in a few months more.

In the mean time, it is said that \$300,000 or \$400,000 of the stock has been sold, at figures which would give a valuation to the property of from \$500,000 to \$1,000,000. It is said that perhaps \$100,000 has been spent on it and Mr. NOWELL has been raised to affluence before a single ton of the ore has been milled.

We learn from trustworthy authority that the ore-body has been sampled several times by disinterested parties and the result has never shown pay ore, the average being probably less than \$1 a ton.

It is true Mr. THOS. S. NOWELL states that his brother—a practical miner who located some of the claims and is or was interested in the sale of the property—got samples from these claims that assayed \$10 to \$20 per ton; but Mr. NOWELL has no reports to show from disinterested ex-

perts. In fact, he expresses great contempt for experts, who, he says, ruined his Amazon and Oro mines—by finding they contained no gold.

Mr. NOWELL has several other claims in Alaska, on which he has organized or proposes organizing companies, and on which also no pay ore has been proven.

Ten of these claims, including the Cleveland & Hendricks, he purchased for \$10,000 or \$8,000 for the lot, and since, without expending any money on them to prove them, and in fact, before paying for them, he was enabled to sell several hundred thousand dollars of the stock of the Alaska Union Company, it is easy to understand his evident objection to expert examinations, or to starting the mill or to any publicity being given to the affair.

Several highly respectable Boston gentlemen have taken stock in these enterprises, and yet there is no information furnished by the company to show that the property has any value whatever, while we have information from what we consider entirely trustworthy sources that it has not yet been shown to have any paying ore opened. It seems high time that further light should be thrown upon these Alaskan bubbles, and those interested in their stocks should send a competent expert to ascertain the facts regarding them.

In the mean time, the information in our possession, and which it is not necessary to discuss further at present, justifies us in saying that these Nowell schemes are excellent ones to keep out of.

We commend the investigation of this bubble, whose dimensions far exceed those of the Tortilita humbug, to the *New York Herald*. It is said that the Boston promoter is now endeavoring to float some of these properties in London. Perhaps the *London Financial News* will take note.

THE RIGHTS OF THE PUBLIC VS. THOSE OF STRIKERS.

The anthracite strikes are not fairly over, when trouble breaks out in a new quarter. The Brotherhood engineers on the Chicago, Burlington & Quincy Railroad strike suddenly, on a question of classification, attempt to tie up that road, and, failing in that endeavor, are reported to threaten similar action on all connecting roads that receive freight from it. More than this: all over the country the members of this large Brotherhood are holding meetings and passing resolutions, which express a willingness to paralyze the railroad business of the whole country, if necessary, to assist their friends of the Burlington & Quincy.

This is, of course, intolerable. It has been the fashion, hitherto, to praise Mr. ARTHUR at the expense of Mr. POWDERLY, and to extol the trade-unions proper, of which the Brotherhood of Locomotive Engineers is one of the most powerful, in comparison with the Knights of Labor, in which miscellaneous and ill-disciplined body all sorts of incongruous interests are represented. The difference exists. But Mr. ARTHUR is fast making it plain that in some industries, even the right to strike must be restricted for the public good. The relation of railways, as common carriers, and the extent to which the interruption of their regular operation inflicts loss on the whole community, puts them in a separate category. Perhaps coal-mines and gas-works should belong in the same list. Whether any other industries are so vitally necessary to the whole community as to require similar treatment, we will not discuss, but will confine ourselves at present to the railroads.

Assuming the right of wage-workers to strike, and admitting that the exercise of this right has, on the whole, greatly improved their condition—though at frightful cost, we say that the Legislature of a State might with perfect propriety declare it illegal for the employes of a railroad to paralyze its operation by suddenly leaving their work *en masse*. Whatever be the sacredness of the right to strike, it is not more sacred than a great many other "natural rights" which are restrained by law for public convenience or safety.

If Mr. ARTHUR were as wise and prudent as he has been thought to be; if his cause in the present instance were perfectly just, the real question would not be changed. A man or company of men with ever so just a cause ought not to be their own judges and sheriffs, even if they confine their process to their adversaries. But when they deliberately distress the whole community, they commit a greater wrong than any which they seek to remedy.

Unless we are much mistaken, public sentiment is becoming aroused on this subject. Our courts are firmly holding the balance of justice in such cases as come before them. Our politicians ought to begin to see pretty soon that they have fooled too long with the so-called "labor vote." It is understood that in one great party at least, perhaps in both, there are several aspirants for the Presidential nomination. We should like to hear some of them speak out plainly on this question. Ambiguous utterances, calculated to please both sides, will win no support from either. But a bold, clear protest against the usurpation of governmental power and the exercise of reckless violence by irresponsible bodies pretending to represent "labor" would command a hearty assent from thoughtful men; and the statesman who should make it would not suffer, in the long run, by doing so. Important as the tariff issue is, this

issue of the supremacy of law and the protection of peaceful industry is even more fundamental. We might even say that we wish it might be brought up and settled in a great political campaign; but in fact we do not believe it could come to that; because when it is once clearly stated, there can not be two respectable parties among the American people on the two sides of it.

Since the above editorial was written, the ringing words which follow have been uttered by Hon. ABRAM S. HEWITT, the Mayor of New York, at a dinner of Williams College Alumni:

"We have very difficult problems in this age with which to grapple. They are not to be settled by declamation. I trust they will not be settled altogether by empiricism. We have new creative forces, powers which produce wealth beyond the wildest dreams of avarice. How are our problems to be solved, by the sword as in the past or by reason and reflection? Surely reason must prevail. We must discuss what are the rights of man, and what privileges will stand the test of reason.

"The fundamental doctrine, the underlying principle of the best institutions, of the noblest laws, is the right of the individual, not only to control himself, but to manage his own property, the production of his own hand or his own mind, in his own way. This fundamental right is now in danger. It is in danger from the ignorant rich and the ignorant poor; and here lies the mission of the colleges, to train the mind that it may draw the line between right and wrong, to lay down the correct premises and come to just conclusions, to have the patience to investigate every phase of nature and of morals, and so reason out a system under which every class may have its rights and none may be deprived of its rights.

"What is all the tyranny of the past compared with the claim which is deliberately made in this country now, that it shall be in the power of one man—call him Powderly or call him Arthur or call him what you will—to paralyze the entire industry of the United States? Was there ever in the history of man a despot who laid claim to any such power as that? Where, at any time in the history of the race, has it happened that a conclave of ten or twelve delegates should be sitting in a room, as they are to-night, to determine whether the bread and the fuel and the necessities of life should be withheld from those who are ready to work and are working for the support of themselves and their families? Who is to stand up in this crisis and preach the truth? If the men who have been trained in college, in the mathematics, in the humanities, are cowards, and because they want votes are afraid to get up and preach the truth, then God save the republic, for man cannot do it. Hence I want the graduates of the colleges of the country to understand that they have a high mission, a greater one than Peter the Hermit thought he had when he led the hosts of the Crusaders to rescue the Holy Sepulchre. Ah, that is a sacred spot; but there is something more sacred than that. It is the right of men to govern themselves, to be their own masters, and not to be the slaves of irresponsible power sitting in secret and usurping the function of government.

"But I have not lost faith in the common sense of the people who for a hundred years have maintained free government on this continent. Men who were willing to spend six thousand millions of dollars to preserve the form, the fabric and machinery of free government ought to be ready and willing to sacrifice that amount twice over in order to preserve the substance and spirit and conscience of free government."

We are not surprised to read in the newspapers that this utterance of courage and common sense was received with immense and enthusiastic applause. If every man who knows that these brave words are true and wise would be equally outspoken, both the cranks and the demagogues would find themselves in a lonesome minority. We have had noise enough from deluding schemers and deluded dreamers. It is high time that wide-awake patriots should make a little.

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.

Hydrogen in Steel.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I quite agree with Mr. Howe as regards the improbability of iron containing the enormous quantity of hydrogen given in my experiments; and my sole object in publishing my last series of hydrogen determinations in gray pig-iron was, in the first place—to afford others an opportunity of determining the truth or otherwise of my statements, and above all to trace the cause of the continuous evolution of hydrogen, which even up to the present time I have failed to do. Secondly, I deemed it a duty to publish results conducted with care and apparently free from error without regard to probabilities. In my opinion new facts or discoveries must of necessity always clash with preconceived ideas, and the seeker after truth should never be deterred by fear of consequences or by results not in accordance with accepted or probable formulae.

I beg to thank Mr. Howe for the immense trouble he has taken in classifying my experiments, and the very fair and candid criticism thereon, and I may say, once for all, that as regards the improbability "of my hydrogen determination" we are as one; but I must be allowed to say that I do not consider they have been disproved. With the additional knowledge now at our disposal, it would be easy for any good chemist and physicist to repeat and check the work of previous experimenters, and thus, by the only reliable method, *i. e.*, the experimental one, confirm or disprove their results, and I may add that the primary question requiring settlement is the discovery and adoption of a method for collecting the gases evolved from the iron and steel only.

Both the drilling method of Müller, and the ordinary process of heating in vacuo, practiced by Graham and others, are fairly open to the objection that the gases may be derived from sources other than the iron, Müller's method being in my opinion most objectionable and unreliable, for, as far as my experience goes, one can never be assured of the complete absence of dissolved gases in either mercury, water or oil.

I think it probable that Mr. Howe in quoting my researches has not quite caught my meaning. It is generally admitted that hydrogen is a metal existing as a permanent gas at ordinary temperatures, allied to magnesium and the more volatile metals.

Knowing this, I was not surprised to find that iron heated in vacuo

evolves copper, manganese and probably magnesium and calcium in addition to hydrogen.

I have recently thus examined wrought-iron, steel and various pig-irons and find that in addition to hydrogen, copper is invariably evolved, and in most instances, manganese.

If we thus classify hydrogen with the metals it does not seem improbable that *bona fide* alloys of hydrogen and iron may exist, which can only be completely dissociated by the application of an intense, possibly, abnormal temperature.

I need not say more at present as I intend publishing the results of some years' labors in this direction. In my earlier researches I have suggested that the great quantity of hydrogen evolved from gray iron, a part may be in combination with the carbon existing as graphite. I deem this probable inasmuch as since I have found that the purest natural graphite contains hydrogen, and even after intense heating at atmospheric pressure both graphite and coke retain hydrogen, which is evolved on heating in vacuo, and I must confess I have failed to completely eliminate this gas from either coke, graphite, or iron.

Mr. Howe's Answer.

Mr. Parry's views and my own coincide so exactly that comment on my part seems almost superfluous. My examination of his results simply confirmed his own inference that they were improbable, while it could not in the nature of the case disprove them. The propriety of his

THE DEVELOPMENT OF THE AMERICAN CHEMICAL INDUSTRY.*

By Dr. Francis Wyatt.

(Continued from Page 160.)

THE LEBLANC PROCESS (SALT CAKE).

In some other works, notably at Rouen and Lille in France, we have seen the sole and the roof of these furnaces constructed of fire-clay tiles, those for the latter being properly curved and made to fit into each other, while those for the sole are larger, and flat and close-fitting. This has always struck us as a very excellent arrangement, as there must be an economy of fuel from the heat not being compelled to traverse a thick bedding of brick. The only serious drawback to this muffle furnace is caused by the smoke flue, into which the great draught sometimes provokes a leakage of the gas, and as this may be overcome by adopting Deacon's improved form, we have thought it advisable to illustrate in Fig. 10 what is known, and now very much employed in England, as his "plus pressure" furnace. The chief modification to the arrangement we have described is really a very simple one, and merely consists in building the fireplace several feet below the level of the furnace. Simple as it is, however, it achieves the desired object, for it maintains a heated column of air and gas over the fire-bars, and thus dispenses with the necessity for a great draught.

A is the furnace in longitudinal section. B a transverse section of muffle and pan. C a developed longitudinal section through the lower

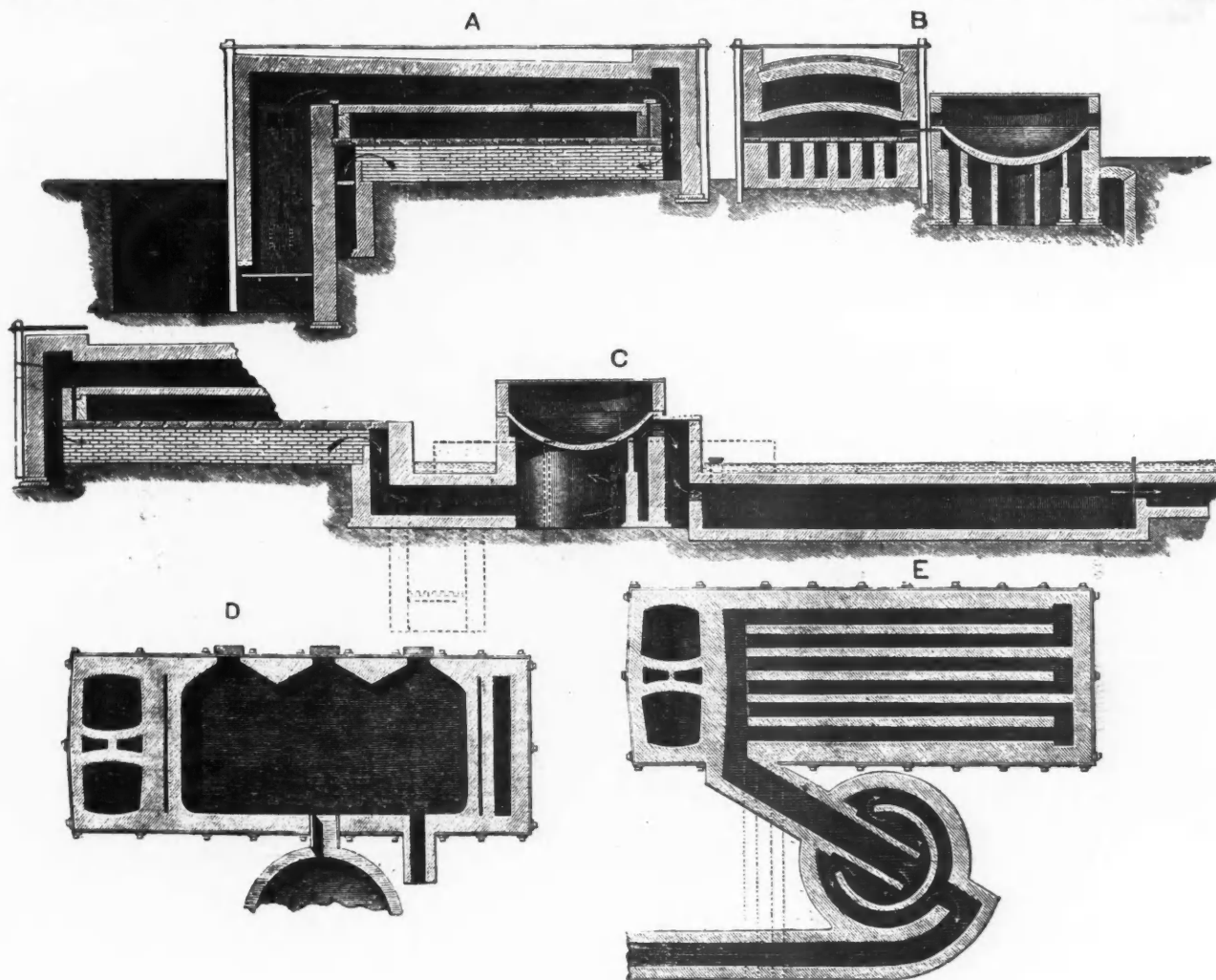


FIG. 10.—THE "PLUS PRESSURE" SULPHATE FURNACE

printing them is obvious. They pointed either to the presence of extraordinary quantities of hydrogen, or to extraordinary sources of error: in either event their teaching was important. That there is much to link hydrogen with certain of the metals is clear: but whether it is a metal or not depends on how we define "metal," a question into which I am not now prepared to enter.

There are possibilities of error in Müller's method, as in most others. His results, however, are so extremely harmonious and the hypothesis that the gases which he obtained actually came chiefly from the iron accords so completely with all the vast array of facts presented, that I see no reasonable ground for doubt. Of this more in due time.

HENRY M. HOWE.

Russian Duties on Metals.—It is reported from St. Petersburg that the Russian customs commission is taking steps for raising the import duties on lead, spelter and copper.

Spanish World's Fair.—Messrs. E. M. Blum & Co., of New York City, agents of the Barcelona Exhibition, have been informed by cable that the time for admitting goods intended for the International Exhibition, to which we referred in our issue of January 28th, has been extended till the last of April.

part of the muffle-pan and smoke-flue. D a sectional plan through the muffle. E a sectional plan through the muffle, smoke-flues, pot-flues, and chimney-flues.

For all practical purposes, no better furnace than this could be desired, and it may unquestionably be said to realize the two most important points—(*i. e.*), a strong and well fired salt cake and a large yield of comparatively strong hydrochloric acid—in a higher degree of perfection than any other that has yet been introduced.

Coming now to the manufacturing process, we cannot refrain from again insisting upon the necessity of its being superintended by a practiced hand, a competent foreman, who has learnt from his experience how easy it is to spoil a batch of salt cake, and to work irreparable damage to his pan, if not, indeed, to his entire plant, by carelessness or inaptitude.

If we lay such special stress upon the foreman it is not that there is much difficulty in training the furnace men to a sufficient degree of competency, in fact in no other stage of the process will this be so easy, but it is because the work of these men, to be properly performed, necessitates enormous strength, great endurance, and the utmost patience, and because, like most mortals, they will always have a tendency to take things easy if not kept up to the mark. Presuming every thing to

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be in admirable working order, the operations are commenced by weighing and transferring to the pan the necessary amount of well dried salt, and running in upon it, as hot as possible, about an equal weight of sulphuric acid of 60° B.

To effect this without loss of time and with little difficulty it is customary to conduct the acid as it flows from the Glover tower into a small lead pan, known as the "batch pan," and set at the outside of the decomposer. It is warmed by the waste heat from the latter, and its capacity so calculated that its contents are made equal to the charge of salt. The number of inches of acid to be used at varying temperatures may be readily determined with the aid of a thermometer, and a properly compiled table and a very few lessons will soon enable an intelligent pan man to manipulate this detail without error and without assistance.

When the two substances have been thus brought together, it will be found useful to throw in a small quantity of some oil, or fat, to prevent them from boiling over, and immediately after this the mixture is well stirred up with a rake, and the door is closed and luted with a handful of dry salt.

The reaction is an extremely lively one—enormous volumes of hydrochloric acid gas are evolved, and in from 20 minutes to half an hour the formation of the liquid sodium bisulphate of the first phase is completed. This is the crucial period of the operation, and the greatest smartness and energy must now be displayed. First of all, the fire is increased; the door of the furnace is then opened, and the liquid in the pan is stirred up unceasingly, until, by the evaporation of its water, the compound assumes the consistency of a thick paste, extremely difficult to work and to prevent from caking. As soon as this paste is sufficiently consistent, the fire is slackened, the damper (if there be one) is raised, and the mass is quickly pushed with a spade, from the pan on to the sole of the furnace or muffle. The pan is now at once recharged exactly as before—a small crust of sulphate left upon the pan after each output will be rather an advantage than otherwise—and the men then devote their whole attention to the sulphate in the roaster.

To be properly and successfully worked, the entire pan mass must be spread out over the surface, and every little lump, be it never so small, must be flattened out with the tool. It will be well to imbue all hands with a due sense of the importance of this pulverization; to make them understand from the beginning that the object of this part of the process is to cause a reaction between the bisulphate of soda and the salt which still remains undecomposed; and to impress upon them that this object would be defeated if any lumps were allowed to remain uncrushed.

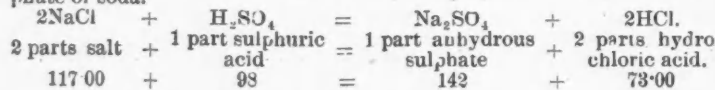
Of course, if there is a good foreman, a little practice will soon make all this a matter of mere routine to the men, but if this functionary be inattentive or incapable, or if he acquire the dangerous habit of trusting to the initiative of entirely ignorant operatives, a great deal of partly undecomposed sulphate will find its way into the finishing bins and will entail the greatest trouble and discredit on all the products of the factory. When the furnace has been sufficiently heated to make the sulphate itself red hot, the latter is either drawn out with rakes into iron wagons and trammed to the storehouse, or is dropped by means of a movable trap in the sole of the furnace into a pit immediately beneath it, where, pending the preparation of a fresh batch, it is allowed to cool.

If properly handled, a well-constructed pan should regularly decompose a charge of about 7 cwt. of salt, and as each operation should occupy a maximum of 90 minutes, there will be no difficulty in working 16 charges in the 24 hours. As to the inconvenience and loss arising from the breakage of the pans, about which so much has been written, it is hardly necessary to say that a great deal depends upon the treatment to which the pans are subjected. For our own part we have known pans to last for nearly two years, and to decompose during that period over 5000 tons of salt. On the other hand, we have been witnesses of accidents brought about by sheer carelessness or want of foresight which have put a *pan hors de combat* at the end of three months.

The great desideratum to our mind is, to use a colloquialism, to "keep the ball continually rolling;" to allow no time to intervene between the charges; to see that there is no hurrying or scamping; and to arrange for the methodical changes of shifts, so that the men who go off should leave immediately after a charge has been made, and thus insure to the men who take their places the necessary time to make all in readiness for a continuation of the work.

A well made sulphate recently cooled should be of a distinctly pale yellow color, with no perceptible shade of brown, green or pink. The latter color, especially, is a sure indication that insufficient sulphuric acid has been employed.

According to theory, as shown by the equation, 100 parts of pure chloride of sodium should produce about 120 parts of anhydrous sulphate of soda.



In practice, however, it is found impossible to exceed an average yield of 110, or a maximum of 115 parts, the composition of the product, according to a long series of our own analyses, being approximately as follows:

Sodium sulphate.....	97.50	Iron and alumina.....	.25
Calcium sulphate.....	.51	Siliceous.....	.40
Magnesium sulphate.....	.35		
Sodium chloride.....	.45		
Free sulphuric acid.....	.55		
			100.00

To insist upon the propriety of keeping down the proportions of both undecomposed salt and free sulphuric acid, would, after all we have said, be superfluous, since it must now be apparent to the meanest capacity that whatever quantity of the latter is allowed to pass, accompanies the product through all the final manipulations to which it is subjected, and entails a weak, inferior soda ash, much detested and complained of by the principal consumers.

Constant and accurate chemical analysis is the only means of insuring uniformity and excellence; and so thoroughly is this recognized in a

well regulated establishments, that it is customary to provide the laboratory with average samples of every batch of sulphate made during the day; that produced during the night being kept separate until the chemist has made his assay of the average sample; deposited at his office by the foreman of the night shift before going off duty.

The complete analysis of salt cake—as carried out by ourselves, for the purposes of control in the factory—is effected in the following manner, and requires:

1. A solution of methyl orange as indicator (1 gram to the liter).
2. A standard solution of caustic soda (40 grams to the liter).
3. A solution of neutral potassium chromate.
4. A $\frac{20}{N}$ solution of pure potassium permanganate (1.582 grams per liter).
5. A $\frac{10}{N}$ solution of argentic nitrate (17.00 grams per liter).

Sodium Chloride.—Four grams of salt cake are dissolved in 100 cc. distilled water, and the solution is neutralized by standard alkali. A small quantity of the potassium chromate (sufficient to give the color) is now added, and the titration is then performed with $\frac{10}{N}$ silver as described in the analysis of salt (each cc. employed represents 0.146 per cent NaCl).

Free Acids.—Another 4 grams of salt cake are dissolved in 100 cc. of distilled water. Methyl orange is added, and the standard alkali run in from a burette with great care, until the color is pale yellow. The total acids being taken as SO_3 , each cc. of the soda solution will represent 1 per cent sulphuric anhydride.

Iron.—Twenty grams are dissolved in 200 cc. distilled water, and 20 cc. of strong sulphuric acid and about 1 gram of pure granulated zinc are added to the solution. The whole is gently warmed until all the zinc has dissolved, when the iron salts, being thus reduced to the ferrous state, are estimated by titration with the $\frac{20}{N}$ potassium permanganate solution, 1 cc. of which = .0028 grams metallic iron, which is reduced to Fe_2O_3 by the factor 1.429.

Alumina.—A solution containing 10 grams of salt cake in distilled water is treated with pure liquid ammonia; the precipitate is filtered, washed, dried, ignited and weighed. As this precipitate contains all the iron and alumina of the original substance, the quantity of Fe_2O_3 found in the preceding test is deducted from the weight, and the remainder is then Al_2O_3 .

Lime.—Twenty grams are dissolved in as little distilled water as possible, and acidulated with pure hydrochloric acid. Ammonia and ammonium chloride are added in reasonable proportions, and, after stirring, oxalate of ammonia solution is poured in until no more precipitate falls. This precipitate is carefully collected on a filter, well washed, dried, ignited and weighed as described in the analysis of salt.

Magnesia.—The filtrate from the lime precipitation is concentrated to about one half its volume by gentle boiling. Ammonium phosphate is then added in excess, the whole is allowed to stand for 12 hours and is then filtered, washed with solution of ammonia (one tenth strength), dried, ignited and weighed. The residue is pyrophosphate of magnesia, and its weight $\times .5604 = \text{MgO}$ in the salt cake.

(TO BE CONTINUED.)

CHLORIDIZING-ROASTING AND LIXIVIATION AT YEDRAS MINE, MEXICO.

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

(Continued from page 159.)

CHEMICAL ACTION IN THE FURNACE.

A study of very many experiments shows that chemical action in the furnace can be divided into three stages, which I have endeavored to calculate as follows:

I. Oxidizing period.	II. Evolution of chlorine (ore dormant).	III. Active chlorination.
3¾ hours.	3 hours.	1¾ hours.
Extraction by ordinary, 50 per cent silver. Ext. action by extra, 75 per cent silver.		Average of 234 tons: Ordinary extracts 74.1 per cent silver. Extra extracts 83.5 per cent silver.

As sodium hyposulphite extracts 50 per cent of the silver from oxidized ore, I assume this to be in the form of sulphate arsenate and antimonate, and that salt has no action until after this percentage has been reached, therefore when we say Yedras ore during the past eleven months chloridized to about 74 per cent we really mean to say that only 24 per cent of the silver has been converted into the form of chloride, and that salt has only affected the ore to the extent of 24 per cent of the silver contained therein. Hence we can represent the composition of the silver in the roasted ore, approximately, as follows:

Principally Ag_2SO_3 and Ag_3AsO_4 and a little $\text{Ag}_2\text{SO}_4 = 50$ per cent soluble in both ordinary and extra solutions.
 $\text{AgCl} = 24$ per cent soluble in both both ordinary and extra solutions.
 Composition not determined, 9 per cent soluble in extra solution.
 17 " " not soluble in solutions.

Table IV. shows that *nine hours roasting are required* to produce the average extraction with both ordinary and extra solutions, and the following table shows that ten hours are required for a high extraction with extra solution.

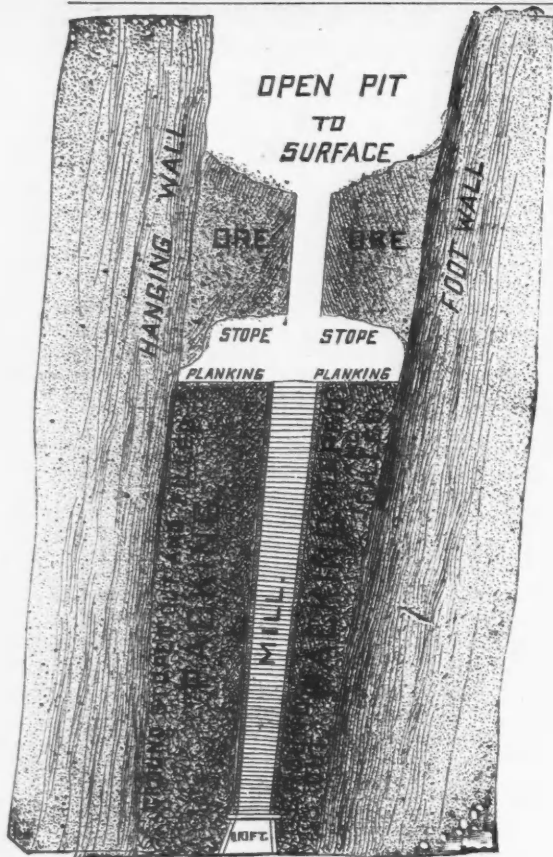
TABLE VI.

SHOWING TIME REQUIRED TO PRODUCE 80 PER CENT AND OVER WITH "EXTRA SOLUTION," Average of seven experiments.

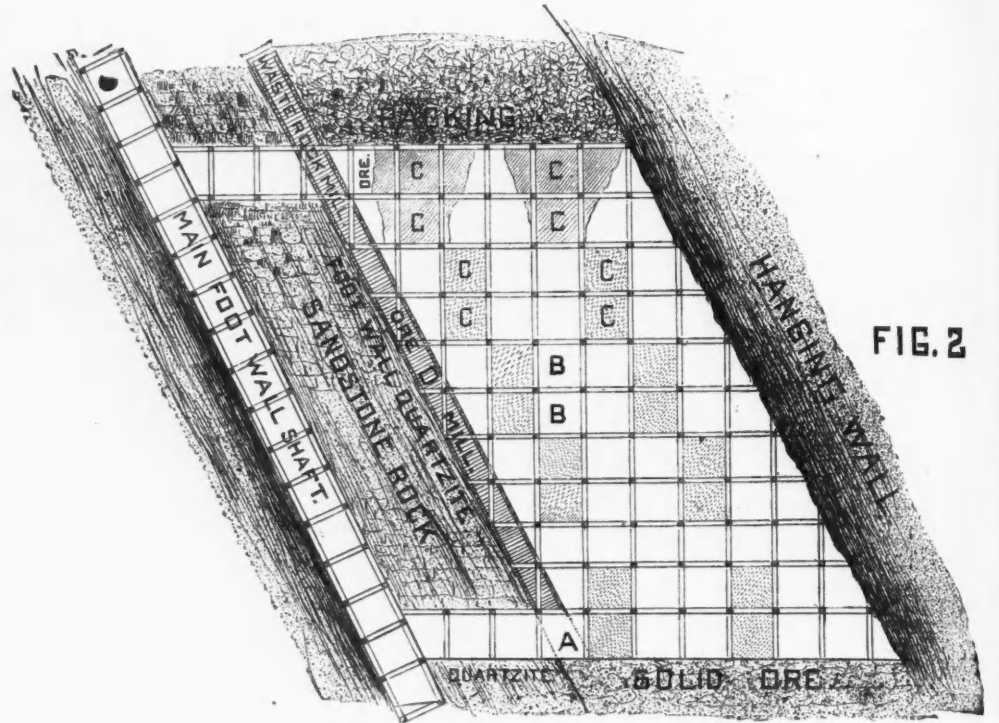
Seven per cent salt added not later than the third hearth.
 Time in furnace, ten hours. Extraction by "extra solution" 82.7

Average of five experiments.
 Seven per cent salt added in the second hearth.
 Time in furnace, ten hours. Extraction by "extra solution" 88.5

Mr. Russell obtains a high extraction by adding salt in the second

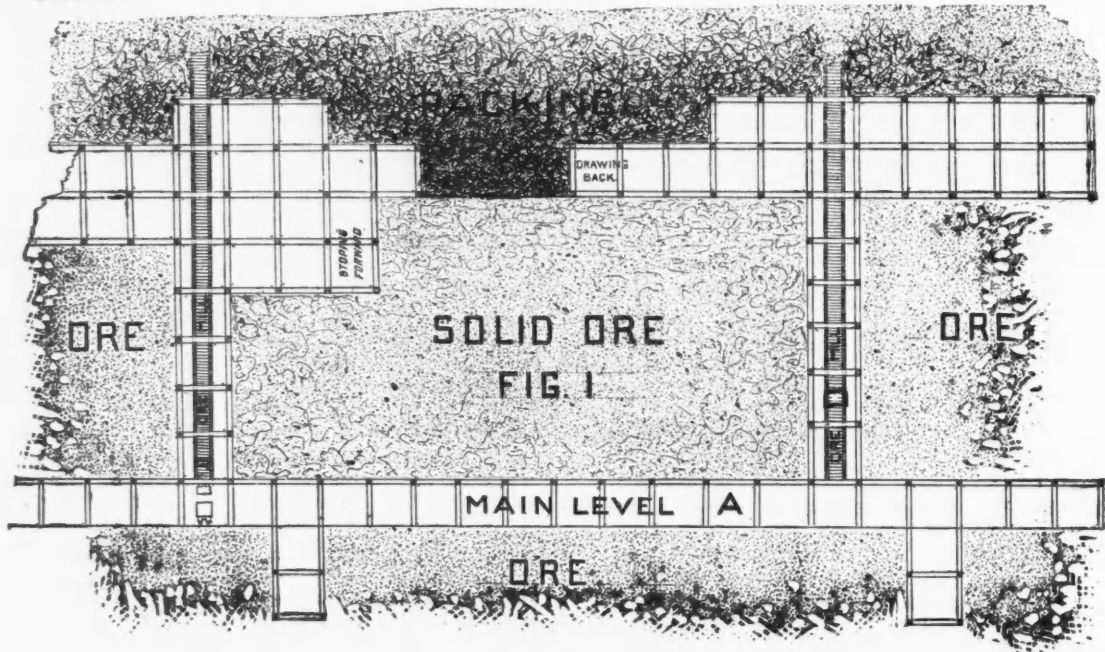


IRON RIVER MINE
SHOWING METHOD OF
STOPPING AND FILLING.

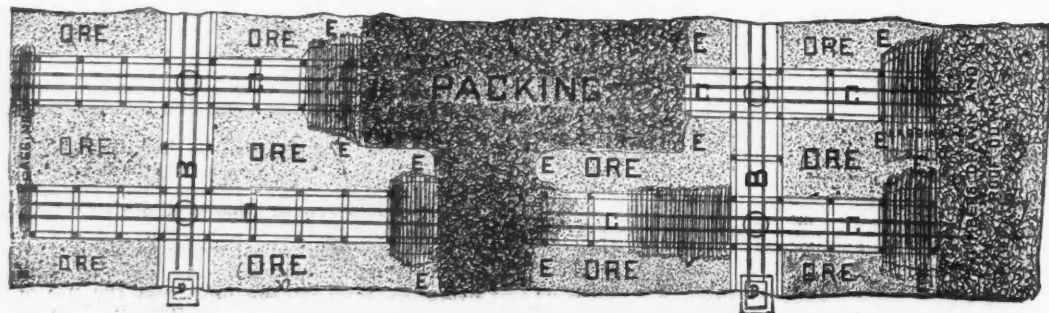


Proposed Method. Vertical Section across Ore-Body.

FIG. 2



Vertical Section lengthwise of Ore-Body.



Horizontal Section through Working Stope.

SYSTEMS OF MINING IN SOFT ORE-BODIES.

conditions were extremely favorable and the filling probably did not replace all the ore extracted, so that the average cost will probably much exceed this figure.

PROPOSED METHOD OF WORKING IN LARGE SOFT ORE BODIES.

I believe it will be found very much more simple, economical and advantageous in every way to work the vein out from the top down, instead of from the bottom up.

The accompanying sketches (Figs. 1, 2, 3) show the suggested method of work so fully that but few words will be necessary to describe it.

Instead of driving the main level and cross-cuts every 50 feet in the foot-wall, as in the Chapin method, I would drive the main levels in the vein A A A, Figs. 1, 2 and 3. (On the foot-wall would generally be the most convenient, though it is not essential.) This is possibly because the ground is undisturbed, and a level the width of an eight-foot set can be kept open no matter how soft the ore may be. This will do away with the dead work, ninety per cent of which at the Chapin mine is in barren ground, and in 1886 amounted to 10,159 feet of drifts and 1938 feet of winzes with an output of 198,000 tons of ore.

At intervals of say 100 feet (which, like other details of the system, will be determined by the hardness of the ore and other local considerations) the vein will be cross-cut B B B, and stoped out the width of one set up from one level to the next above, a distance which will also be regulated by the nature of the ore, but may be counted at from 10 to 12 sets in height.

However soft the ground may be it will be possible, even with comparatively light timber, to hold a stope only 8 or 9 feet in width running across the vein in the solid, well drained ore. This will take the place of winzes and cross drifts at much less cost, and will serve as a pocket or chute to hold the ore which can be drawn from it into the cars below, or the mill or chute through which the ore is sent down can be built, say 3 feet 6 inches by 4 feet in the clear section, of round hardwood sticks lined with hardwood plank as in the Iron River mine, on the foot-wall as shown in the drawings. By a little care in packing around it, this can probably be held in the packing as a waste "mill" or chute through which waste material may be sent down from the surface, or, if it be found desirable the "mill" can be cut in the foot-wall as indicated by the dotted lines in the drawing.

When the cross stope reaches the upper worked-out ground, longitudinal stopes C C C, of one or two sets in height and one set in width, are driven to half the distance between the cross stopes, or, as in the drawing, six sets, leaving intervals or pillars between them of two sets in width, or more, if the ground will permit. These longitudinal stopes are timbered lightly, having to stand but a very short time, and being in the solid undisturbed ore with the filling from above resting on each side of them on solid ore. When the mid-distance between the cross stopes is reached, the back stoping commences by taking out the ore on each side E E E of the C C C stope, to the width of a set, or half the pillar left between the longitudinal stopes C C C, supporting the "gob" roof while doing so, and laying lagging poles or slabs across the floor of the stope as the work proceeds. Any waste rock or material available or desirable may be thrown back in the packing, and when a space E E E, the area of one or two sets, is worked out on each side of the last sets of the longitudinal stope C, the temporary timbering is drawn, and the "gob" roof with the lagging previously laid under it, is allowed to drop on the bottom of the stobe C C C, E E E lagged to receive it. Light poles and even brushwood will serve for thus keeping the ore from mixing with the waste.

It will probably be found possible, as well as advantageous in many cases, to drive these longitudinal stopes C C C two sets high and draw back the upper one a little in advance of the lower, and as they can be driven out at any point in the cross stope B B, as shown in Fig. 2, a whole horizontal slice or section of the ore body, no matter what its thickness, can be opened out, say two sets in height at the same time.

It is not necessary to enter here into further details that must necessarily be subject to local conditions, and that can be laid out by the engineer in charge.

The advantages claimed for this system of mining are :

First. There is no dead work in it—all the work is simply stoping.

Second. All the levels and stopes that have to be timbered are in solid, undisturbed ore and are only one "set" in width, so are easily held and require but light timber, while much of this is drawn and saved in letting the roof down. When the stope comes up to the filling, this has only to be supported over one set of timber while it rests on the solid ore on each side of this.

Third. The packing follows the ore down, and as long as this occurs the cave on the surface can be constantly filled from "borrow pits" much cheaper than sending the filling below. If finally found desirable, the filling can be sent down as in other cases through "mills," etc.

Fourth. This system enables to obtain practically all the ore in the vein, and to get it free from mixture with waste.

Fifth. Disastrous caves or crushes are absolutely impossible.

Sixth. There are more working faces, and therefore more ore can be extracted from a given amount of ground in a given time than by any other system.

It is believed that, as compared with the Chapin system, there will be a very large saving in dead-work, in timbering, in filling and in wages, the latter from working in safer ground. As it is simply impossible to continue the present method of mining in use on the Gogebic, there is no need of making any comparison of cost with that now in use there, though the proposed method would undoubtedly be much cheaper than that.

A special system of mechanical ventilation will have to be adopted in any case as the mines become extensive, and there is no difficulty in adapting a system of ventilation to this method of mining. When the ore is hard, little or no timbering would be required, and as the system is adapted to any kind of ore, there is no reason why, with proper modifications, it may not be applied in such mines as the Calumet & Hecla, where it would of course do away with the heavy timber account and render fires impossible.

THE MINERAL PRODUCTION OF CANADA IN 1887.

Mr. W. Hamilton Merritt, of Toronto, has collected the following statistics of production for the Dominion of Canada in 1887. We have no means of judging of the accuracy of all these figures, but in the case of copper Mr. Merritt's figures are certainly too high.

Coal, tons	1,935,273	Petroleum, crude, bbls.	768,333
Gold, dollars	1,000,000	Phosphates, tons	21,738
Gypsum, tons	163,975	Asbestos, tons	4,500
Iron ore, tons	73,347	Mica, lbs	30,000
Manganese ore, tons	1,586	Antimony ore, tons	174
Copper, tons	5,267	Pyrites, tons	35,000
Silver, dollars	214,937	Plumbago, cwt.	7,180
Salt, tons	65,800	Barytes, tons	3,000

Land and gravel, building stone and marble, grindstones, lime, granite, serpentines, slate, flagstones, bricks, tiles, and miscellaneous clay products, say \$2,000,000.

The export of products of the mines for 1887 was: To the United Kingdom, \$477,722; to the United States, \$3,085,431; to all other countries, \$242,806; making a total of \$3,805,959.

The total export of the product of the mines for 1887, as given by the Trade and Navigation returns, was a little short of that recorded in 1886. In the aggregate, the production of mineral does not seem to have increased materially, notwithstanding that the output of coal, iron, salt, and petroleum was larger; but while the quantity mined in one or two products may have fallen off temporarily, the result of the past year's work shows that the mining at large has been persistently continued in every department, and that prospecting and preliminary development has made enormous headway, particularly in the Rocky Mountains and Selkirks, in the Kamloops District, and in the Georgian Bay and Lake Superior districts.

This fact, in conjunction with the awakening public interest, will, without doubt, very soon show remarkable results, and, we may hope, will place our mining industries on the permanent footing which they should undoubtedly occupy.

Elimination of Bismuth in Refining Silver.—Dr. H. Pirngruber suggests the following method: Bismuth in any appreciable quantity induces heavy losses of silver during cupellation and especially towards the end or brightening period. This is due to the fact that the alloy of bismuth and silver melts at a much higher temperature than silver. Bismuth can be eliminated by adding a mixture of equal parts of litharge and charcoal powder to the finishing silver cake; 60 pounds of the mixture are added in three doses to every 400 cwt. of refined silver expected. By this expedient, the bismuth alloy is reduced from 5 per cent to 0.5 per cent. The litharge drawn during the operation is reduced and recupelled and the resulting litharge worked for bismuth by the present methods.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

- PATENTS GRANTED FEBRUARY 28TH, 1888.
- 378,418. Gas-Enriching Apparatus. Joseph H. Ames, Reading, Pa.
 - 378,438. Valve Mechanism for Blowing Engines, Pumps and Similar Apparatus. Robert Forsyth and John A. Potter, Chicago, Ill.
 - 378,448. Friction-Clutch. Willis C. Jones and Winfield S. Rogers, Cincinnati, Ohio.
 - 378,450. Ore-Crusher. Stephen Kendall, San Francisco, Cal.
 - 378,481. Drill for Mining Coal. William A. J. Thompson, Ottumwa, Iowa.
 - 378,490. Process of Manufacturing Water Gas. Reinhold Boeklen, Brooklyn, N. Y.
 - 378,502. Traction Engine. Andrew K. Gibson, Kimbolton, Ohio.
 - 378,544. Means for Carrying off Escaping Gas from Gas Mains. Josiah W. Ellis, Pittsburg, Pa. Assignor to George Westinghouse, Jr., same place.
 - 378,550. Bosh Plate for Blast-Furnaces. Julian Kennedy, Pittsburg, Pa.
 - 378,560. Test-Box for Underground Electric Wires or Cables. Richard S. Waring, Pittsburg, Pa.
 - 378,561. Conduit for Electric Wires or Cables. Richard S. Waring, Pittsburg, Pa.
 - 378,575. Rail-Joint. Henry F. C. x, Philadelphia, Pa.
 - 378,588. Treatment of Ore. Ira Hersey, New York, and Michael R. Conley, Brooklyn, Assignors to William Bell, New York, N. Y.
 - 378,599. Drive-Chain. Benjamin A. Legg, Columbus, Ohio, Assignor to the Lechner Manufacturing Company, same place.
 - 378,609. Air-Pump Governor. Edward G. Moore, Wilmington, Del.
 - 378,612. Bloom-Manipulator for Rolling-Mills. Robert Naysmith, Pittsburg, Pa., Assignor to himself and William H. Roberts, same place.
 - 378,619. System of Bailing Wells. Solomon C. Rhodes, Bradford, Pa.
 - 368,626. Ore-Washer. Thomas Sharp, Nashville, Tenn.
 - 378,638. Automatic Air-Brake. Renaldo Solano, Brooklyn, Assignor to Howard & Morse, New York, and David R. Morse, Brooklyn, N. Y.
 - 378,642. Cut-off Piston-Valve. Fardon Armstrong, Providence, R. I.
 - 378,643. Nail-Making Machine. Forrester Bryant, Haverhill, Mass., Assignor to the Bryant Nail Company, Portland, Me.
 - 378,657. Automatic Electric Air-Brake. J. Fairfield Carpenter, Berlin, Germany.
 - 378,658. Valve for Electro-Pneumatic Railroad Brakes. J. Fairfield Carpenter, Berlin, Germany.
 - 378,663. Steam-Motor. Otis E. Davidson, Nashville, Tenn.
 - 378,698. Electrical Stop-Motion for Steam Engines. Robert Exley, Philadelphia, Pa.
 - 378,673. Apparatus for Making Sulphurous Acid. Chas. E. Getchell, Waltham, Mass., Assignor of one half to Stephen N. Bourne, Manchester, N. H.
 - 378,674. Hydraulic or Other Elevator. Wm. P. Gibson, London, England, Assignor to the American El-va-or Company, same place.
 - 378,684. Apparatus for Manufacturing Salt. Hascal A. Hogel and Oliver L. F. Browne, Syracuse, Assignors to themselves and Ethelbert Belknap, Youkers, N. Y.
 - 378,701. Hydraulic Motor. George W. Mason, Sharon, Pa.
 - 378,721. Means for Preventing the Creeping of Rails and Rail-Joints. James J. Reilly, Spokane Falls, Washington, Assignor of one fourth to C. W. Tozer, San Francisco, Cal.
 - 378,726. Pressure Regulator for Pumps. Phillip Schuff, New York, N. Y.
 - 378,746. Apparatus for Tempering Wire. Edwin J. Watson, Worcester, Mass.
 - 378,747. Drilling Machine. William Wattie, Worcester, Mass.
 - 378,748. Multiple Drill. Fredric C. Weir, Charles Partington, Nathaniel O. Goldsmith, and Edward W. Harden, Cincinnati, Ohio, Assignors to the Weir Frog Company, same place.
 - 378,749. Blast-Furnace. Earl A. Wheeler, Sharon, Pa.
 - 378,750. Process of Amalgamating Gold and Silver. William W. Wheeler, Meriden, Ct.
 - 378,751. Balance Slide-Valve. Louis Adams, Terre Haute, Ind.
 - 378,754. Die-Press for Forming Coal-Hods. Edward Barrath, Cincinnati, Ohio, Assignor to Victor E. Knecht, same place.
 - 378,755. Die for Coal Hods. Edward Barrath, Cincinnati, Ohio, Assignor to Victor E. Knecht, same place.
 - 378,756. Apparatus for Treating Metal Pipes. Henry G. Beater, Ithaca, N. Y.
 - 378,765. Box for Washing Gravel, etc. Thomas W. Carrico, San Antonio, Tex.
 - 378,769. Manufacture of Sheet Metal Tubes. Edward K. Coes, Providence, R. I., Assignor to the Providence Cylinder Company, Nashua, N. H.
 - 378,774. Process of Treating Sludge Acid. Hector de Groussillers, Potsdam, Prussia, Germany.
 - 378,820. Blasting-Plug. Alfred Winder, Washington, D. C.
 - 378,839. Furnace. Arthur C. Huidekoper and Luc Houze, Meadville, Pa.
 - 378,848. Combined Pump-Piston and Check-Valve. Joseph M. Norman, Springfield, O., Assignor of one half to Jacob K. Mower, same place.
 - 378,852. Hydrocarbon-Furnace. William B. Smith, Chicago, Ill., Assignor of one half to Merrill Spalding, same place.

THE METALLURGY OF STEEL.*

By Henry M. Howe.

(Continued from page 165.)

This evidence points so strongly^a to solution that it is well to scrutinize it very carefully. Henry was a most careful analyst: Bessemer's reputation, or better renown, is known to all. It is to be observed, however, that his statements are made in the discussion of another gentleman's paper: that they refer to experiments made some twenty-five years earlier; that it is not clear that they are not made in considerable part or even wholly from memory; that the gas, consisting apparently of carbonic oxide unaccompanied by hydrogen and nitrogen, differs materially from that recovered by Cailletet and Müller from molten iron, and by Stead from iron in the soaking pits, which always contained a considerable proportion of hydrogen and nitrogen.

Still worse, that which Müller obtained from unrecarburized ingot iron (and this appears to be what Bessemer experimented on) contained only from 8.8 to 48% of carbonic oxide, and probably less on an average than that from any other class of molten iron. I think it just to call attention to these points, which certainly detract from the weight of Bessemer's testimony.

Now, if the gas which he obtained were of the composition which Müller found in similar cases, containing perhaps 25% of carbonic oxide and 75% of hydrogen and nitrogen, it is altogether possible that the fall of pressure caused the latter gases to escape from solution, and that the stirring caused by their escape gave carbon and oxygen previously present in the iron, but not united, an opportunity to unite and escape as carbonic oxide, and that the quantity of this gas thus set free might form one quarter of the total escaping gas. I do not say that this would be a probable, but a conceivable explanation.

Were we to reject Bessemer's experiment, then the evidence which has been adduced, together with further evidence to be detailed chiefly in §§ 213, 214 and 218, and consisting chiefly of the resemblance of the behavior of carbonic oxide to that of hydrogen and nitrogen in escaping in iron; of the protracted and deferred escape of carbonic oxide when no reaction forming it is to be expected; of the arrest of the escape of carbonic oxide by chemical additions which would be expected to stimulate it; and of the remarkably close similarity of the blow-holes which are probably partly formed by carbonic oxide to those formed by air in ice, as regards their shape and position; these still seem to create a strong probability that carbonic oxide does dissolve, but not to prove it.

§ 189. OTHER INSTANCES OF THE EVOLUTION OF CARBONIC OXIDE are condensed in Table 68. In cases 1 to 4 the gas was extracted by heating in vacuo: in 5 and 6 it

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^a It is quite possible that, accepting Bessemer's statement, these may be merely dissociation phenomena. If carbonate of lime is highly heated in a closed vessel it dissociates and evolves carbonic anhydride: the escape of gas may be completely arrested and started again by raising or lowering the pressure of this gas, its gaseous tension. Now in Bessemer's experiments the molten metal may not have contained carbonic oxide as such but some oxycarbide of iron. Lowering the pressure might cause the non-volatile iron-carbon or iron-oxygen compounds to dissociate, and their dissociation would lead to the formation and escape of carbonic oxide: increase of pressure would again check their dissociation and stop the evolution of gas. But by parity of reasoning every case of evolution of gas by a liquid may be regarded as an instance of dissociation by those who regard solution as a form of chemical combination. Indeed, even some of those who class these as radically different processes regard some apparently typical cases of gas solution as chemical unions, believing for instance that carbonic anhydride, CO₂, when dissolved in water forms a true acid H₂CO₃, which is broken up when carbonic anhydride escapes from the liquid. (Watts, Dict. Chem. I., p. 772.)

was collected from molten or solidifying metal: in 7, 8 and 9 it was recovered by boring under water.

The greatest quantity is that obtained by heating in vacuo, 5.29 volumes being found by Graham and 135 by Parry: next comes that evolved from molten and solidifying metal, reaching perhaps about 1 volume: while that obtained by boring cold metal does not exceed 0.011 volumes, expect perhaps in those cases where gas is found in distinct blisters.

TABLE 68.—CARBONIC OXIDE IN COMMERCIAL IRON PREVIOUSLY UNTREATED.

No.	Observer.	Model of extraction, etc.	Cast-iron.		Wrought-iron.		Steel.	
			%	Vol.	%	Vol.	%	Vol.
1.	Graham	Heating in vacuo.	0.021@	1.39@	0.080	5.29	0.008	0.2
2.	Troost and H.	" "	0.007	0.4	0.025	1.67	0.008	0.2
3.	Parry	" "	0.006@	0.46@	0.103	6.8	0.065	4.3
4.	Zyromski	" "	2.04	135.00	0.33	2.18	0.015	1.24 (?)
5.	Müller (see note)	Evolved from molten or solidifying metal.	0.0069	0.46@	0.091	0.60	0.0028	0.19 (?)
6.	Stead (see note)	" "	0.00015	0.001@	0.00017	0.011	0.00075	0.006
7.	Müller	Boring cold metal.	0.00015	0.001@	0.00017	0.011	0.00075	0.006
8.	Stead	" "	0.00015	0.001@	0.00017	0.011	0.00075	0.006

1. Journ. Chem. Soc., XX., p. 285, 1867, and Chem. News, XV., p. 278, 1867. Wrought-iron wire and horse nails, Nos 24 and 27, Table 56. 2. Comptes Rendus, LXX., p. 562, 1873. Iron cylinders weighing 500 grammes were heated at 800° C. in vacuo for 190 hours. Nos. 11, 16 and 30, Table 56. 3. Journ. Iron and St. Inst., 1872, II., p. 240; 1873, I., p. 430; 1874, I., p. 98; and 1881, I., p. 189: these cases are given in detail in Table 56. 4. Stahl und Eisen, 1884, p. 536; Journ. Iron and St. Inst., 1884, II., p. 625. Nos. 21 and 22, Table 56. 5. Iron, 1884, p. 138. Müller found from 1 to 1.5 volumes of gas of undetermined composition escaping from Bessemer steel during solidification: and in gas escaping under similar conditions he found in general from 8.8 to 82.6% of carbonic oxide: the figures in this line are only very roughly approximate. See Table 55. 6. Stead found 12.5% of carbonic oxide in the gas escaping from solidifying steel. Assuming that, as found by Müller, the steel evolved about 1.5 volumes of gas, we have 0.19 volumes of carbonic oxide thus evolved. This, like the preceding, is simply to give a rough idea of the evolution of this gas. 7. and 8. The solidified metal is bored under water, and the gas thus released caught and measured. See Table 54. Also Iron, 1883, pp. 51, 115: Stahl und Eisen, 1883, p. 466.

§ 190. THE APPARENT ABSORPTION OF CARBONIC OXIDE by iron has been observed by Graham, Troost and Hautefeuille and Parry. The former three observers found that much less carbonic oxide could be extracted from iron on heating in vacuo when in its natural state or after soaking in hydrogen, than when the samples previously exhausted after soaking in hydrogen were later exhausted after heating in carbonic oxide. Clearly if the carbonic oxide evolved arose from oxygen and carbon derived in process of manufacture and initially present, the iron would evolve less of it at each heating in vacuo than at the preceding: therefore when heated in carbonic oxide it must have absorbed either that gas as such, or its dissociated elements: but which we cannot tell, for if the oxygen and carbon had been absorbed separately they might recombine and escape as carbonic oxide when the iron was again heated in vacuo.

Their results are condensed in the Table 69 and detailed in Table 57.

TABLE 69.—INFLUENCE OF PREVIOUS EXPOSURE TO CARBONIC OXIDE ON THE EVOLUTION OF THAT GAS IN VACUO.

Description.	Weight taken.	In natural state.		After heating in hydrogen.		After heating in carbonic oxide.	
		Vol. CO evolved in vacuo.		Vol. CO evolved in vacuo.		Vol. CO evolved in vacuo.	
		Per 100 of gas evolved.	Per vol. iron.	Per 100 of gas evolved.	Per vol. iron.	Per 100 of gas evolved.	Per vol. iron.
Cast-iron, T. & H.	500	16.76	0.040	2.36	0.016	86.98	0.211
Cast-steel, T. & H.	500	63.65	0.020	11.53	0.013	62.50	0.029
Wrought-iron, " "	500	58.88	0.167	4.31	0.009	97.85	0.211
Wrought-iron wire, Graham	39	67.	5.29	8.	0.040	89.9	4.150

NOTE.—The larger volumes obtained by Graham than by Troost and Hautefeuille are explicable by the fact that he treated small wire, they thick cylinders.

Parry, too, in one out of five experiments, No. 66, Table 57, found that wrought-iron, previously heated in vacuo till only traces of gas escaped, when heated in carbonic oxide during 28 hours absorbed by direct measurement 4.5 times its own volume of this gas, of which it evolved 3.2 volumes when again heated in vacuo without

removal from the apparatus.^a Here too it is uncertain whether any carbonic oxide was taken up as such, or whether the total apparent absorption was due to the dissociation of carbonic oxide: but that carbonic oxide was dissociated to a certain extent is indicated by the fact that the residual gas contained from 4 to 6% of carbonic acid,^b doubtless arising from reactions (6) or (1) and (4) of § 185.

If it were positively proved that iron does not absorb carbonic oxide when heated in this gas, this would not prove that it could not dissolve it as such under other conditions. We have seen (§§ 172-3) that iron absorbs nitrogen when heated in this gas or in air only with great difficulty, but readily absorbs it when heated in ammonia.

Hydrogen appears to escape from iron on heating in vacuo at a lower temperature than carbonic oxide. Thus Parry^c found that at and below full redness, say 1'000° C., both cast and wrought-iron evolved nearly and sometimes quite pure hydrogen, while with further rise of temperature the proportion of carbonic oxide increased. This accords with Graham's statement^d that the proportion of carbonic oxide to hydrogen evolved when horse-nails were heated in vacuo increased as the exposure was prolonged: Troost and Hautefeuille^e observed that wrought-iron evolved its hydrogen more readily than its carbonic oxide. On the other hand they found that most of the carbonic oxide evolved from cast-iron and steel in vacuo came off in the first few hours, the hydrogen being retained more tenaciously: here their results seem at a variance with those of Graham and Parry.

We may explain in two ways the fact that the expulsion of carbonic oxide requires a higher temperature than that of hydrogen. Regarding the former gas as dissolved in the metal, we may suppose that its solubility diminishes with rising temperature less rapidly than that of hydrogen: or, regarding it as formed at the instant of escape by the oxidation of carbon by oxygen present in the iron, we may believe that the relative affinity of carbon as compared with that of iron for oxygen increases with rising temperature, so that the carbon is only able to remove the oxygen from the iron at a temperature above that which renders the iron porous enough to

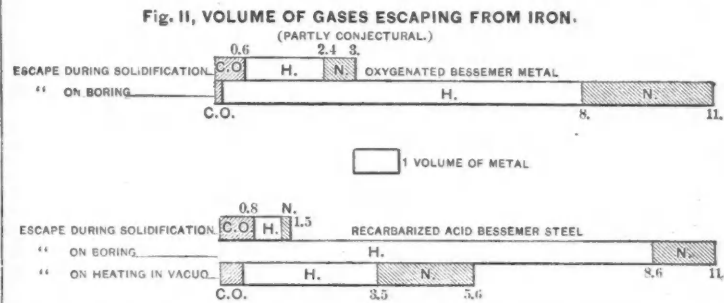
permit the escape of hydrogen. This accords with the fact that, while carbonic oxide is comparatively rapidly split up by iron and its oxides at about 500° C., this action almost ceases at bright redness. The greater diffusiveness of hydrogen than of carbonic oxide might explain why but little of the latter accompanied the first escaping portions of hydrogen, but hardly the complete absence of carbonic oxide.

§ 191. INFLUENCE OF CARBONIC OXIDE ON THE PHYSICAL PROPERTIES OF IRON.—An eminent authority^f believes that carbonic oxide acts like phosphorus, and renders iron cold-short. I have vainly applied to him for evidence. Only one consideration which throws light in on this question suggests itself. Whitworth's liquid compression should increase the quantity of gas dissolved by steel, and if carbonic oxide is soluble Whitworth's steel should contain more than others. Its excellent quality certainly opposes the belief that carbonic oxide is injurious. (See § 230.)

CHAPTER XI.

GENERAL PHENOMENA OF THE ABSORPTION AND ESCAPE OF GAS FROM IRON.

§ 200. A classification of the gases present in molten iron according to the time and condition of their escape, already sketched in § 170, is given in Table 70. Figure 11 illustrates what now appears to be the typical composi-



tion and volume of certain of these classes. The numbers here offered must be received cautiously as rough crude generalizations, necessarily partly conjectural, thanks to the scantiness of our data. For instance, I have assumed in Figure 11 that oxygenated Bessemer metal evolves eleven times its own volume of gas when bored. This is a pure guess.

(TO BE CONTINUED.)

^f Journ. Iron and St. Inst., 1881, I., p. 196.

TABLE 70.—GASES OF STEEL CLASSIFIED ACCORDING TO TIME OF ESCAPE.

Mode of escape, etc.	Effect.	Percentage composition by volume.				Volume of gas per volume of iron.				
		CO.	H.	N.	CO ₂	CO.	H.	N.	CO ₂	Total.
I. Escape while the metal is so liquid that the passages close.....	Scattering.....	5.5 @ 82.6	2.3 @ 82.5	1.0 @ 43.3	0 @ 5.4	0 @ 1.23	0 @ 1.61	0 @ 0.75	0 @ .13	0 @ 3. +
		12.9	20.47 @ 27.21	59.91 @ 66.68						
II. Remains or is formed after plasticity has set in.	May affect physical properties, as suggested in § 170.....	0 @ 2.2	52.2 @ 92.4	5.9 @ 45.1		0 @ 0.006	.03 @ 9.76	0.01 @ 1.13		0.06 @ 11.
		7.9 @ 63.65	22.72 @ 57.3	11.36 @ 34.7 [6.49]a	2.27 [16.55]a	.02 @ .43 [37.22]a	.007 @ 3.12 [32.15]a	.003 @ 1.59	[2.15]a	.031 @ 5.45 [70.5]a

^a The numbers in brackets were obtained in Parry's experiments (see § 176, C).
 The numbers in this table are derived from those in Tables 54, 55 and 56 pp. 106 to 108.
 Those in columns 7 to 10 of line 1 are very rough approximations, inserted merely to give a rough idea of the quantity of each gas escaping. They are arrived at in the following way. Müller found 1 to 1.5 volumes of gas escaping from recarburized steel and 3 or more volumes from oxygenated metal, during solidification. The minimum for each gas is 0, since in some cases no gas escapes. The maximum for hydrogen is obtained by assuming that in each of the cases in Table 55 in which the composition of the gas from recarburized steel is given 1.5 volumes escapes; and that in the case of oxygenated metal (74, Table 55) 3 volumes escapes. The maxima for the other gases is found in the same way. Thus the maximum for carbonic oxide is derived from Number 86, the maxima for nitrogen and hydrogen from Number 73, and the maximum for carbonic acid from Number 69. The assumption is of course not strictly warranted. We can only say that our present slight knowledge of the subject suggests that these numbers may not be exceeded; they cannot be considered as limits which have actually been reached.
 The numbers for Class II., A, 1, give merely the composition of the gas escaping from the ingots in the soaking pits, as determined by Stead, Number 92, Table 55.

^a Journ. Iron and St. Inst., 1873, II., p. 431.
^b Idem, 1874, I., p. 93.
^c Journ. Iron and Steel Inst., 1874, I., p. 93; 1873, II., pp. 429-431.
^d Chem. News, XV., p. 273, 1867.
^e Comptes Rendus, LXXVI., p. 562, 1873.

PERSONALS.

Prof. Byron W. Cheever, Professor Metallurgy in the University of Michigan, Ann Arbor, died on the 6th inst., at his home in that city.

Thomas J. Potter, vice-president and general manager of the Union Pacific Railway Company, died in Washington on the 9th inst., aged forty-seven years. He had been in ill-health for some time.

Mr. Peter Herdic, formerly Mayor of Williamsport, Pa., and prominently connected with many manufacturing, railroad, coal and other interests in Central Pennsylvania, died on the 2d inst., aged sixty four years.

Mr. E. D. Campbell has severed his connection with the Sharon Iron Company, of Sharon, Pa., to accept a position with the Dayton, Tenn., Coal and Iron Company, as chemist, and assistant manager of its blast-furnaces.

It is said that the name of the successful manager of the Atlantic Mining Company of Michigan, Mr. John Stanton, is mentioned in connection with the management of the greatest copper mine at the lake. Certainly the management of the Calumet & Hecla by Mr. Stanton would be worth a million dollars a year to the stockholders. We do not, however, expect any such good fortune to be in store for them.

Mr. William A. Baldwin, Manager of the Pennsylvania Company, has tendered his resignation. Mr. Baldwin is now among the oldest employes of the company. When the company was reorganized a couple of years ago, Mr. McCrea, who had been below Mr. Baldwin in rank, was elected General Manager, a position several steps above Mr. Baldwin. This was galling to Mr. Baldwin, and when Mr. McCrea was made Vice-President and John Wood General Manager of Transportation, this was regarded as another slight. Hence the resignation.

Prof. Byron W. Cheever, Professor of Metallurgy in the University of Michigan, Ann Arbor, died on the 6th inst., at his home in that city, aged forty six years. Professor Cheever returned to Ann Arbor last week from a short professional trip to Arizona. While nearing home, he contracted a severe cold, in spite of which he resumed his regular work at the University, and continued to discharge his duties as usual until Friday night. On Saturday morning he had a severe chill, which was followed by a raging fever; and from that time he steadily sank until he breathed his last at about 8 o'clock on Tuesday morning. Professor Cheever's industry, sincerity and intelligent, unselfish zeal for the advance of science and the improvement of practice were universally admitted; and his dignified, courteous and amiable presence was welcome to all.

FURNACE, MILL, AND FACTORY.

By the falling of an immense iron crane at the works of E. P. Allis & Co., at Milwaukee, Wis., on the 6th inst., two men were injured, one fatally, and the property was damaged to the extent of \$10,000.

The carbonizer at the powder mill of the Laffin & Rand Powder Company, at Cressons, Pa., exploded on the afternoon of the 6th inst., shattering and setting fire to the building, which, with its contents, was destroyed.

The Viaduct Iron Mills, at Coatesville, Pa., which have been partially closed for four months, resumed work on the 5th inst., with all departments in full blast. It is stated that the company has orders ahead to keep the works running on full-time for many months.

Judge Brown, of the United States Circuit Court of the Eastern District of Michigan, in chancery in the case of the Cylinder Oil Cup Company vs. The Detroit Lubricator Company, denied the motion of the plaintiff for a preliminary injunction. The sight-feed patents were involved.

Messrs. Cox Brothers & Co., of Drifton, Pa., intend to adopt electric haulage for their coal mines, in consequence of the success obtained by the Pennsylvania Company at Lykens Valley with the electric locomotives furnished by the Union Electric Company, of Philadelphia, Pa., illustrated and described in the ENGINEERING AND MINING JOURNAL of November 19th, 1887.

The Linden Steel Company, Limited, of Pittsburgh, Pa., has recently gone into the manufacture of thin steel plates for use in sidewalks, floors, etc. The article is the invention of Mr. W. J. Lewis, President of the company. A patent has been applied for and will cover plates of different styles and thickness of checker and diamond surface, which it is believed will prove quite an improvement and a saving in weight and cost.

Further reports in reference to the steel gun state that it was taken from the annealing furnace at the Pittsburg Steel Casting Company's works, Pittsburg, Pa., on the 5th inst., and it is said was perfect. The gun has been in the furnace two weeks, and by means of natural gas a temperature of 1400 degrees Fahrenheit had been obtained. The finishing touches will now be put on, and the gun shipped to Washington for the final tests on the 20th inst.

The Penn Iron and Coke Company, of Canal Dover, Ohio, is just completing a new hot-blast oven of the Pollock pattern. This will be the fourth oven of the above pattern built by this firm, who will run with three

working and one in reserve. The above company operates the only blast-furnace in the Tuscarawas Valley, Blackband region and mine that ore from its own ore mines, and make a special brand of iron known as "Tu carawas," made of half Blackband and half Lake Superior hematite ores.

Application for a charter for the Cyclone Coal Economizer Company, with \$1,000,000 capital, was filed at Albany, N. Y., on the 5th inst., by Erastus Winan, Albert B. Boardman, and J. G. McAuley. The company will manufacture and sell a process and service for the creation of heat for steam and manufacturing purposes by the use of coal pulverized by the cyclone principle. In the ENGINEERING AND MINING JOURNAL, of January 21st, 1888, we stated that negotiations were pending for the sale of the patents of the cyclone pulverizer to English capitalists, and in our issue of April 30th, 1887, the machine was illustrated and described.

Mr. Alfred F. Brainard, of Birmingham, Ala., has made the following analysis of the steel made by the Henderson Steel and Manufacturing Company, which we referred to in our last issue: Combined carbon, 0.752 per cent; silicon, 0.00933; phosphorus, 0.05134 per cent. Mr. James Henderson says: When we consider that this metal is high in carbon, and was dephosphorized by the aid of Red Mountain fossil hematite, the results appear remarkable. With 0.10 of carbon it will not contain more than a fair trace of phosphorus. Bessemer steel generally contains 0.10 to 0.15 per cent of phosphorus.

One of the most important features of modern fire-proof construction is the free use of iron lath, which adds greatly to the strength and durability of buildings. In the greater immunity from fires, and hence reduced expense for insurance, a marked advantage is gained by its adoption, especially in industrial edifices. The Cincinnati Corrugating Company, whose address will be found in our advertising columns, is in the field this spring with its improved type of corrugated iron lath, and report extensive contracts in the South and Southwest, and in connection with government and other large public buildings all over the country.

A jury which has been sitting at intervals for months to decide a question of damages claimed by the Pottsville Iron and Steel Company, Pottsville, Pa., by reason of the Pennsylvania Schuylkill Valley Road crossing the island on which the Pioneer furnaces are built, on the 7th inst. rendered their verdict. The iron and steel company claimed \$150,000 damages, based on interference with its furnace plant and the connections between this and the rolling-mill and steel works owned by the same company at the other end of town. The jury gave an award of \$25,950, this being the compromise offered by the railroad company, with interest added.

The Remington Armory plant, in Ilion, N. Y., was sold a second time on the 7th inst., on an order entered by Judge Williams. The first sale, to which we referred in our issue of February 18th, occurred February 1st, when it was purchased by Hartley & Graham, of New York, for \$152,200. The court, in ordering that sale, reserved the right to set it aside if the court thought it advisable for the benefit of the creditors. Upon application being made to the court to have it set aside and bonds given, that at a second sale not less than \$160,000 would be bid, an order for the sale was made. Hartley & Graham are again the purchasers, this time paying \$200,000 for the property. The firm will operate the works at Ilion, although a portion of the machinery may be removed elsewhere.

A suit was filed in the United States Circuit Court at St. Louis, Mo., on the 3d inst., by the Washburn-Moen Manufacturing Company, against the Southern Wire Company, of that city. Judgment is asked against the Southern Wire Company in the aggregate sum of \$271,500, and of that amount it is claimed that the Southern Wire Company is indebted to the Washburn-Moen Company for breaches of the covenant or license agreement in respect of royalty for use of the Glidden patent to the extent of \$71,500. Damages in the sum of \$200,000 are claimed by the Washburn-Moen Company by reason of the conveyance of the plant, stock and business of the Southern Wire Company to the St. Louis Wire Mill Company, which, it is alleged, was a mere cover and scheme to violate the license agreement and evade the provisions of the contract.

CONTRACTING NOTES.

Contracts open will be found on pages xiii and xiv. New contracts this week: No. 795, Sewers; No. 796, Cast-Iron Water-Pipe; No. 797, Masonry, Excavation and Pipe-Laying; No. 798, Reservoirs; No. 799, Wrought Iron Pipe; No. 800, Water-Works; No. 801, Water-Works; No. 802, Boilers; No. 803, Water-Works; No. 804, Iron Bridge; No. 805, Tunnel; No. 806, Water-Works; No. 807, Bridge; No. 808, Water-Works; No. 809, Drilling and Blasting; No. 810, Dredging.

The Shickle, Harrison & Howard Iron Company, St. Louis, has contracted for a large steel water-tower to be erected at St. Marysville, Cal., and for one at St. Cloud, Minn.

The following bids have been received for furnishing the Superintendent of Public Buildings, Boston, Mass., with 1500 tons of anthracite coal: A. C. Wellington Coal Company, stove, \$7.10, egg, \$6.85, and furnace,

\$6.10 per ton; H. G. Jordan & Co., \$7.10 for stove, \$6.85 for egg, and \$6.60 for furnace.

The following bids are the lowest received by the Navy Department, Washington, D. C., for furnishing 16-inch gun lathes for the Washington Navy Yard: For six lathes, the Niles Tool-Works, Hamilton, O., \$400,800; for three lathes, Bemert, Miles & Co., Philadelphia, \$117,500; for seven lathes, Binsee & Hanschild, Harrison, N. J., \$100,000.

The Carbon Iron Company, of New York, whose works are situated at Pittsburg, Pa., have contracted with Messrs. Lean & Blair of that city, for the erection of an open-hearth steel plant, to consist of two Lash patent melting furnaces of 15 tons capacity each per heat, with all the necessary hydraulic machinery, buildings, etc. The entire plant is to be in operation in 120 days from date. Work will be commenced at once.

Mr. T. R. Campbell, Luray, Va., is in the market for chemical engines. The Nashville & West Nashville Railway Company, Nashville, Tenn., for dummy engines, rails, etc. Mr. Thomas Parter and Noel Block, Nashville, Tenn., for machinery for grinding and preparing soft iron ore for paint. The Paris Foundry and Machine Works, Paris, Texas, for iron roofing, engine and boiler and other machinery. Mr. John B. Swanton, Decatur, Ga., for axles, wheels, and other hardware.

LABOR AND WAGES.

The coke workers at a meeting held at New Haven, Pa., this week, have decided to accept a six and a quarter per cent reduction under protest.

The subject of an advance in the wages of Lake Superior, Mich., copper miners is mooted, but it is conceded that there will be no advance while labor is as plentiful as at present.

The blast-furnace operators of the Mahoning Valley, Ohio, have decided on a reduction of 10 per cent in wages, to take effect March 25. The operators claim that the reduction in the price of pig-iron has made this step necessary.

Several lodges of the Amalgamated Association of Iron and Steel Workers are holding meetings to discuss suggestions for next year's wage scale. It is stated that so far there has been no tendency shown to ask for an advance of wages.

The Stout Coal Company, of Hazel township, Luzerne County, Pa., have instituted new suits to evict the miners from their homes under the landlord and tenant law of the State of Pennsylvania. Judge Woodward had recently decided against this company in eviction suits, referred to in our issue of February 4th, and they now bring action on different grounds. If the suits are successful they will evict all striking miners formerly in their employ.

A strike has been declared in the mines of the West End Coal Company, Springfield, L. I., by the federation to force the company to reduce the size of its screen. When the strike of last fall was declared off, the miners and operators adopted a uniform screen to be used throughout the Springfield district. A few weeks ago the West End Coal Company increased the size of its screen. The men made complaint to the Miners' Federation, and a strike was ordered.

The Schuylkill Coal Exchange, Pottsville, Pa., under date of the 5th inst., report that the following collieries drawn to return prices of coal sold in February, 1888, to determine rate of wages to be paid, make the following returns: Girard Mammoth Colliery (P. & R. C. & I. Co.), \$2.76-8; Ellangowan Colliery (P. & R. C. & I. Co.), \$2.84-4; Keystone Colliery (P. & R. C. & I. Co.), \$2.82-6; Preston No. 3 Colliery (P. & R. C. & I. Co.), \$2.84-7; Merriam Colliery (P. & R. C. & I. Co.), \$2.90-7. The average of these is \$2.83-8, and the rate of wages to be paid is eleven (11) per cent. advance over \$2.50 basis.

The end of the great miners' strike in Lehigh region, Pa., which has lasted about six months, is near. Out of the 20,000 men who went out on strike, nearly one half are now at work again. All of the employes of Linderman & Skeer have returned to work; four fifths of the men employed by A. Pardee & Co. have also returned. J. C. Hayden & Co., at Jeansville, and Calvin Pardee & Co., at Hollywood, resumed operations on the 7th inst., full-handed. W. T. Carter & Co. have resumed at their Colrairie collieries. Cox Brothers & Co. have announced their intention of resuming work on the 12th inst. On the 8th inst. the Middle Creek colliery of the Philadelphia & Reading Coal and Iron Company resumed operations. North Lincoln colliery started up several days ago. The rate of wages to be paid miners for February has just been fixed, and the Philadelphia & Reading Company's rolls will be prepared in accordance therewith. The rate is \$2.83 per ton, being 11 per cent advance over the \$2.50 basis.

At a recent meeting of the Miners and Laborers Amalgamated Association Executive Board, a resolution was adopted inviting a conference at an early day at some central point of representatives of all the labor organizations in the anthracite coal region for the purpose of comparing notes and taking steps for the establishment of a general basis. The resolution was ratified on the 1st inst. at the meeting of Sub-Division No. 12, of National District Assembly No. 135, and now will in turn be considered by Division 14, composed of the Mount Carmel and Shamokin Assemblies; 16 of the Wyoming region, 87 of the Middl

Lehigh, 129 of Northumberland and Dauphin, and 213 of the eccentric engineers. These organizations embrace all the assemblies of the Knights of Labor in the anthracite region, and a very large majority of the men employed in and about the mines. The project to make a general basis applicable to all the coal fields grows out of the recent negotiations terminating the Philadelphia & Reading strike. It is proposed when a plan has been drafted at this conference to appoint a committee to meet the operators and their representatives and get their approval. The convention will, it is expected, be held during this month.

GENERAL MINING NEWS.

TENNESSEE COAL, IRON AND RAILROAD COMPANY.—Official reports to us shows that during February there were received from the mines of the Tracy City division only 14,869 tons of coal and 12,176 tons of coke, making a total for the first two months of 1888 of 34,120 tons of coal and 25,308 tons of coke.

COLORADO.

MARSHALL CONSOLIDATED COAL MINING COMPANY.—The stockholders of this company some time ago appointed a committee to examine into the affairs of the corporation and suggest a means for the raising of sufficient money to properly develop its properties. The authorized capital stock of the company is \$2,000,000, and it has a bonded debt of \$300,000, owing, according to the report of the committee, which has just been presented, 3400 acres of land on the line of the Union Pacific Railroad containing a body of lignite coal with seams ten, five and three feet in thickness. It leases, at a royalty of 12 cents per ton, the Louisville mine formerly operated by the Union Pacific Company, and for the fiscal year ended November 30th last produced a total of 150,000 tons of coal. By reason of unfortunate contracts entered into by the management, all this output had to be sold at a profit of from five to twenty cents per ton, which had left the company in straightened circumstances financially. It required \$30,000 to retire bonds under the sinking fund provision, and \$25,000 for the sinking of a new shaft at the Louisville mine. No plan for raising this money has yet been formulated, but in whatever way it may be secured the proposal is to reorganize the management. The committee which investigated the affairs of the company, and which now recommends the adoption of a plan at once to secure necessary capital was composed of Messrs. Austin G. Gorham, chairman; J. E. Heinerding, J. J. Morrison, L. W. Winchester and A. Banks.

The Marshall Coal Company and its early management was one of the familiar Moffat-Chaffee deals, and the Eastern stockholders were the lambs shorn in the style with which long experience has made these gentlemen so skillful.

CHAFFEE COUNTY.

SILENT FRIEND.—Operations have been resumed at this property, owned by Mr. Edward R. Holden, and situated near Monarch, after a suspension of over six months. The mine now is in charge of C. H. Demarest.

CUSTER COUNTY.

BASSICK.—Rumors are rife and speculation high, says the Denver Mining Industry, as to the possible outcome of the bonding of the Bassick to a third party, and thereby settling the old litigation.

MICHIGAN.

COPPER MINES.

The output of mineral (about 80 per cent copper) of the seven leading copper mines of Lake Superior in February, is given by the Boston Transcript as follows:

Mines.	February.			Jan. 1 to Feb. 29.		
	1888.	1887.	1886.	1888.	1887.	1886.
Cal. & Hecla.....	1,830	2,504	2,399	3,632	5,198	4,962
Tamarack.....	610	275	200	1,241	575	374
Quincy.....	351	208	201	701	391	276
Atlantic.....	239	191	187	468	393	387
Osceloa.....	203	154	160	413	312	331
Franklin.....	170	200	304	348	402	408
Huron.....	116	85	120	236	189	247
Total 7 mines..	3,519	3,817	3,477	7,029	7,460	7,185

HURON MINING COMPANY.—Reports from the mine state, says the Transcript, that the fifteenth level is opening up stoping ground. The lode where stoping is now going on, in the back of this level, is fully forty feet in width, and twenty feet of this is productive, ten feet particularly so. At the fourteenth level south, the lode is about twelve feet wide, of which eight feet is showing a fair amount of good stamp copper, with some bar mineral. There is a large block of ground at this point which it will pay to take out. The sixteenth level north of No. 6 shaft, both in the drift and stope, is exposing some good stamp rock. Other developments are satisfactory and every thing about the mine is running smoothly. The March product is expected to be 120 tons, or four tons larger than February.

OGIMA.—This mine has been leased to Mr. A. Meads. As soon as snow goes off the mine will be unwatered and examined with a view to working it or enlisting capital to purchase the property. It is many years since the mine was worked, which at one time was a large producer of copper.

TAMARACK JR. MINING COMPANY.—Two shafts have been started on this property.

IRON MINES.

IRON KING MINING COMPANY.—Work has been suspended at the Iron King mine, and the Hurly Tribune states that nothing more will be done except to keep the pumps in operation until financial matters

are in shape,—which means until the men are paid off and other pressing claims are settled.

MASCOTTE MINING COMPANY.—Operations have been suspended at this company's property, situated near Wakefield, and which was organized by Milwaukee parties about a year ago. Considerable money has been spent in development, work and machinery, but nothing was found that would warrant a continuance of explorations.

DEER LODGE COUNTY.

BI-METALLIC MINING COMPANY.—It is stated that about \$50,000 worth of 300-ounce ore is being shipped monthly and that a considerable quantity of ore of a lower grade is being taken out. Arrangements are making for the erection of a mill.

HOPE MINING COMPANY.—The company has just made a strike in its Silver Chief mine.

SAN FRANCISCO CONSOLIDATED MINING COMPANY.—It is reported that the tunnel being run by this company is now in on the vein for a distance of about 1500 feet, and that it crossed the tops of several ore shoots in its course.

SILVER BOW COUNTY.

LEXINGTON MINING COMPANY.—The Butte Miner reports that a strike of high-grade copper ore has been made on the 1200-foot level of this mine. The ledge was encountered in the south drift, between 350 and 400 feet from the main shaft. Work at present consists of running alongside the ore-body, and what has accidentally been jarred loose in working (which is a very small amount) has been hoisted to the surface.

NEVADA.

ELKO COUNTY.

FOUND TREASURE MINING COMPANY.—Shipping ore to the reduction works was begun on the 1st inst. The company will only ship enough to pay running expenses till roads improve.

GRAND PRIZE MINING COMPANY.—The extraction of ore was discontinued on the 27th ult., owing to there being only a sufficient amount of fuel left to work what ore was broken and in the mill. The stopes were left showing more good ore than at any time previously. The mill was shut down this week, after which all necessary repairs will be made preparatory to starting up again as soon as fuel can be had.

NORTH BELLE ISLE MINING COMPANY.—During the week ended March 2d there were shipped 89 tons of ore to the mill, the average pulp assay of which was \$224.70. There was on hand at the close of the week \$52,000 in retorted bullion, and about \$18,000 in crude bullion.

STOREY COUNTY—COMSTOCK LODGE.

The Virginia City Chronicle reports the following: **GOLDEN PRIZE MINING COMPANY.**—A deed was filed at Virginia City on the 28th ult., from this company, conveying the mining property in Flowery District, Storey County, bearing that title to the Golden Prize Consolidated Mining Company. The latter is a California incorporation, while the former was incorporated in this State.

The company has written to Washington for documents relating to the patent granted the Lady Bryan Company. Governor Stevenson, who is reputed to be the principal owner of the Lady Bryan mine, ordered a suspension of work on the Golden Prize, claiming that the patented lines of the Lady Bryan cover the Golden Prize ground. The Golden Prize Company's representative claims that the Lady Bryan patent can be set aside on the ground that the application was not advertised in the daily papers, nor notices posted on the ground as required by law. The Dreadnaught, a claim on the north of the Golden Prize, is included in the Golden Prize Consolidated.

HALE & NORCROSS MINING COMPANY.—The Chronicle is also officially authorized to state that the ore now produced is of a grade which will admit of the disbursement of regular dividends when the heavy indebtedness of the company at the time of the late ore discovery is wiped out. Daily shipments of 50 tons of ore continue, of about the usual grade.

OPHIR MINING COMPANY.—On the 1465 level, from upraise No. 2, 36 feet above the south drift, near the south line, a west and east cross-cut has been started, showing so far a good ore-body. That in the west is of moderate value, but the east cross-cut shows an improved quality, and the face is looking well. The ore extracted is stored in the mine, as the surface ore-house is full.

OVERMAN MINING COMPANY.—The stamps released in the Santiago mill by the curtailment of the Yellow Jacket shipments, were to be dropping on Overman ore this week, of which there is, it is said, enough stripped to ship 100 tons daily for two months.

SAVAGE MINING COMPANY.—The grade of ore extracted from this mine is not so high as that in the Hale & Norcross referred to above, but the monthly statement will show a surplus above the cost of production.

YELLOW JACKET MINING COMPANY.—The ore extracted from the old stopes is low-grade, but the new discovery on the 1100 level near the Confidence line, is far above the "milling" value, and will be worked for all there is in it. Ore shipments to the Santiago and Brunswick mills still average 350 tons daily.

PENNSYLVANIA.

COAL

"Morea" is the name given to a new station on the P. S. V. road, between Silver Creek and New Boston, where Chas. M. Dodson & Company, of Boston, are developing coal lands. They have 100 men at work, have sunk a shaft 100 feet deep and turned gangways east and west on the Buck Mountain vein. A breaker

is to be erected and other improvements are to be made.

PHILADELPHIA & READING COAL AND IRON COMPANY.—The breaker of the Glendower colliery, situated about eight miles west of Pottsville, and operated by this company, was destroyed by fire on the afternoon of the 4th inst. The origin of the fire is unknown. This is one of the oldest of the Philadelphia & Reading collieries. The loss is estimated at from \$75,000 to \$100,000.

NEW YORK & WESTMORELAND COAL AND COKE COMPANY.—It is reported that the mine and plant owned by this company at Manor will, in a few weeks, change hands, and that the Westmoreland Gas Coal Company will be the purchasers. The company has been able to get very little more than local contracts and thus could not give its men steady work.

OIL.

Exports of refined, crude, and naphtha from the following ports, from January 1st to March 3d.

	1888.		1887.	
	Gallons.	Value.	Gallons.	Value.
From Boston.....	383,950	.....	983,295	.....
Philadelphia.....	13,815,239	19,042,269	1,583,989	2,567,796
Baltimore.....	960,294	2,924,819	58,135,369	.....
Perth Amboy.....	.....	58,444,727	.....	.....
New York.....	.....	.....	.....	.....
Total exports.....	76,529,029	82,312,718	.....	.....

UTAH.

WASHINGTON COUNTY.

STORMONT MINING COMPANY.—Mr. Charles S. Hinchman, president of the company, in a letter to Messrs. Wooley Lund and Judd, who have leased the Stormont mill, which they are running on custom ore, says that the company has no idea of leasing the Buckeye or allowing chloriders on it, but that they would consider any fair offer for the entire plant, including mines, mill and every thing owned by the company at Silver Reef. He adds that if the company is successful in recovering money from the former management, for which claims are being presented, the company would undoubtedly work the property again, and perhaps consolidate more property with it, and endeavor to get a railroad extended to Silver Reef.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, March 9.

Statistics of Production Anthracite Coal for week ended March 3d, and year from January 1st:

Tons of 2240 lbs.	1888.		1887.	
	Week.	Year.	Week.	Year.
P & Read. RR. Co.....	126,292	946,657	1,268,874	.....
Cent. R. R. of N. J.....	94,728	795,715	671,175	.....
L. V. R. P. Co.....	114,295	1,213,045	1,115,572	.....
D. L. & W. RR. Co.....	143,034	1,282,481	883,901	.....
D. & H. Canal Co.....	95,850	812,129	851,652	.....
Penna. RR.....	70,216	608,765	453,558	.....
Penna. Coal Co.....	37,297	293,231	190,048	.....
Total.....	687,712	5,952,023	5,434,780	.....

Increase..... 20,545 517,243
Decrease..... ..

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..... 4,452,936 1885..... 3,851,472
1884..... 4,098,055 1886..... 5,249,952

Production Bituminous Coal for week ended March 3d, and year from January 1st:

Tons of 2000 pounds, unless otherwise designated
EASTERN AND NORTHERN SHIPMENTS.

	1888.		1887.	
	Week.	Year.	Week.	Year.
Phila. & Erie RR.....	.....	11,054	.....	.....
*Cumberland, Md.....	61,959	522,349	471,148	.....
Barclay, Pa.....	5,377	32,797	47,691	.....
Broad Top, Pa.....	.....	.....	.....	.....
H. & Broad Top RR.....	10,147	81,536	76,788	.....
Clearfield Region, Pa.....	.....	.....	.....	.....
Snow Shoe.....	3,485	28,590	32,258	.....
Karhaus (Keating).....	4,615	38,076	26,398	.....
Tyrove & Clearfield.....	84,857	928,346	522,019	.....
Tipton.....	1,374	7,835	.....	.....
Alleghany Region, Pa.....	.....	.....	.....	.....
Gallitzin & Mountain.....	25,759	170,034	152,363	.....
Pocahontas Flat Top Coal.....	.....	.....	.....	.....
Norfolk & West. RR.....	30,253	262,287	204,847	.....
Kanawha Region, W. Va.....	.....	.....	.....	.....
Ches. & Ohio RR.....	.....	290,026	230,154	.....
Total.....	227,726	2,072,939	1,773,766	.....

* Tons of 2240 lbs. † Report not received.

WESTERN SHIPMENTS.

	1888.	1887.
Pittsburg Region, Pa.....	.....	.....
West Penn RR.....	7,017	76,577
Southwest Penn. RR.....	2,690	19,805
Pennsylvania RR.....	5,247	51,535
Westmoreland Region, Pa.....	.....	.....
Pennsylvania RR.....	33,706	284,153
Monongahela Region, Pa.....	.....	.....
Pennsylvania RR.....	4,153	60,566
Total.....	52,813	492,636

Grand total..... 280,539 2,565,575 2,233,079

Production of Coke on line of Pennsylvania RR. for week ending March 3d, and year from January 1st, in tons of 2,000 pounds: Week, 63,921 tons; year, 707,422 tons; to corresponding date in 1887, 767,568 tons.

Anthracite.

This market is decidedly weak. The sales-agents who a week ago at their meeting decided that they would never consent, have consented. The majority of them thought that prices could be maintained to the 1st of April at least, but early this week they found it impossible to hold them, and consequently agreed upon the following quotations: Broken, \$3.75; Egg, \$4; Stove and Chestnut, \$4.25, subject to the usual fifteen cents discount to the large dealers, or contractors. Pea may be quoted at \$3.10 to \$3.25, and Buckwheat,

\$2.25 to \$2.50. The Lehigh Exchange circular prices are: Lump, \$4.50; Broken, \$4.20; Egg, Stove, and Chestnut, \$4.10.

The Reading Coal and Iron Company has issued the following list of prices delivered free on board vessels.

	Philadelphia.	New York.
Lump.....	\$4.25	\$4.50
Broken.....	3.50	3.75
Egg.....	3.70	4.00
Stove.....	4.00	4.25
Chestnut.....	3.90	4.15
Pea.....	2.75	3.00

These prices are from 10 to 15 cents higher than the prices of a year ago, and 50 cents lower than the prices ruling January 1st last.

Though these prices all show the heavy decline of about 50 cents a ton from those of a week ago, it is still possible to shade them by perhaps twenty-five cents among the independent operators or dealers.

There has been no change in railroad freights, though they are being discussed with some warmth, and, while they stand as they are, it can not be expected that producers will stock coal and pay these rates, when, in all probability, lower prices will have to be taken before long.

The miners in the Lehigh region are all rushing back to work, no condition being asked; nothing in fact, but permission to work. Coxe Bros.' Eckley collieries have already started, and their Drifton and Beaver Meadow collieries are to commence work on Monday next. The Hazleton miners are also getting back to work, so that the Lehigh will very shortly be in full production. If it has been impossible to hold up the prices before these collieries had resumed work, it may be asked what will happen when they are all producing?

It must not be assumed that the prices will decline materially at present, though we expect to see them lower during the year. The western trade will absorb a very large quantity of coal, and the furnaces in the East will shortly commence active operations again, and though the iron market does not promise any such activity as it showed last year, a very large amount of metal will still be required, and a large consumption of coal may safely be counted on, as large a consumption, perhaps, as last year.

The next question of importance in the trade will be the allotment of tonnage, and this the companies appear to fight shy of at present; it must, however, be settled before long, and it is to be hoped that past experience has not been altogether forgotten, and that wisdom and prudence will control ambition in deciding it.

Bituminous.

Nothing has been done since fixing the prices announced in our last issue, which were as follows: Free on board at Philadelphia, Norfolk, Newport News, Baltimore and Georgetown, \$2.60 per ton of 2240 pounds. Free on board at South Amboy, Perth Amboy, Elizabethport, Port Johnson, Weehawken, Hoboken and Port Liberty, for shipment to points on the North River south of Fifty-seventh street, and to points on the East River west of Hell Gate, \$3.25 per ton. Delivered alongside in New York harbor south of Fifty-seventh street, North River, and on the East River west of Hell Gate, \$3.50 per ton. For Eastern markets the prices have not been fixed yet, but will, no doubt, be the same as last year.

Some little discussion is going on as to whether the price from Amboy should not be increased ten cents a ton, but no change will probably be made. In the allotment of tonnage the Cumberland Region has gained about 3 per cent at the expense of the Clearfield, but each will be able to do a profitable business at the present rates. No contracts are yet being made, except possibly by some of the small producers who are in the habit of sharing prices. We hear in fact of figures considerably below the standard prices having been asked by these concerns. The principal producers of Clearfield and Cumberland coal are standing firmly by their quotations.

The drop in anthracite will probably not materially affect the bituminous trade, unless it should go beyond the present figures, then, of course, the soft coal prices would have to conform to those of anthracite. We do not, however, anticipate any change in them.

Vessel freights are greatly demoralized, and are offered at eighty cents and discharge to Boston. Even lower figures than these have been taken. Nominally, the rate is ninety cents and discharge. Sound freights are also lower, Providence being seventy-five cents and New Haven fifty-five cents.

Boston. March 7.

[From our Special Correspondent.]

At last the Lehigh strike is over, or at least that claim is made. Incredulous Bostonians are inclined to wait a bit and see if it be indeed so, as its importance to the coal trade will be very great if the Lehigh people are to resume full mining. The hesitancy of the New York companies to sell ahead even at unchanged high f.o.b. prices looks a little peculiar, if it be true that the labor troubles are settled. Prices remain nominally unchanged, however, and sales are small. The weather is rather favorable to continuance of high prices, but, of course, can not continue so much longer.

The new prices for bituminous coal have been put around the trade pretty industriously in the past few days, and while no transactions have been reported some developments may be expected in another week. Whether there will be any large buying movement at the opening of the season remains to be seen. The new price of \$2.60 f.o.b. at all shipping ports is an advance of ten cents a ton practically, as last year most of the larger contracts, whether to railroads or other parties, were placed at \$2.50, and not very much was done at \$2.60. It is, of course, too early to say whether this advance in being maintained. There

is some coal outside the pool offering at enough less than \$2.60 to make it attractive, but how much influence this will have remains to be seen. It is easy enough to see that your correspondent does not feel very greatly impressed with the stability of the pool at first sight of the new prices. There is much talk here, and most of it mere talk, I suppose, such for instance as the statement that one agency here sold 200,000 tons before pool prices came out.

The arrangement with middlemen in reducing their discount from ten cents to six is intended to check the practice, said to be so common last season, of dividing commissions. This discount is only to middlemen buying 5000 tons or over. A week or two will begin to show whether the advance in price really advances or not.

In freights there is a much easier feeling. We quote, exclusive of discharging: New York, 90c. @ \$1.00; Philadelphia, \$1.15 @ \$1.25; Baltimore, \$1.25; Newport News and Norfolk, \$1.15.

The Boston Tow Boat Company keeps branching out as a coal carrier. Of its two new steam colliers, the "Mars" and "Orion" the "Mars" has just cleared from this port in return from its first trip. It brought 3100 tons, which is the largest single cargo ever brought into this port. The "Orion" is expected in Boston on its first trip right away. It will carry 2500 tons. This company intends increasing its capital from \$800,000 to \$1,500,000 and erecting boiler and repair shops in East Boston. I have already mentioned the floating coal elevator which this company is building at Fall River for use in Boston harbor. The two steamers mentioned above will discharge into this elevator.

There are no developments of importance in the retail trade this week.

We quote delivered prices: Stove, \$7.25; Egg, \$7.00; Broken, \$6.75; Franklin, \$8.50; Lehigh Egg, \$7.25; Broken, \$7.00; Bituminous coal, on the wharf, \$4.75.

Buffalo. March 8.

[From our Special Correspondent.]

"You can say but little," says a coal dealer, with reference to business present and future, "for there is really nothing stirring in trade, or any subjects for comment; wait until the end of the month, and then there may be a few topics of interest." This is a specimen of current gossip.

Quotations unchanged. Trade dull; only for immediate requirements are the orders received, both for local, near-by, and Western points. Market easy.

It is reported that an offer has been made to carry 50,000 tons of iron ore from Two Harbors to Buffalo at \$1.60 per ton. Cannot trace report to any reliable source, therefore merely mention it as a pointer.

Grain freights Chicago to Buffalo on opening of navigation have declined from four cents to two and one half cents per bushel. Several vessels have taken that rate for corn. The quotations of opening rates for coal grow more uncertain every day; only time alone will tell.

The Erie Railroad people are reported to have secured the largest share of the Grand Trunk Railroad contract—hence their order for new cars etc.

At Cleveland last Monday vessel owners representing over one half of the ore and bituminous coal tonnage of the lakes met and signed an agreement not to start a boat until May 1st. To guard against season charters at low rates was the object in view. The owners of the ore craft are hopeful for an active and paying business this year. Vessel owners at other ports may probably join in the movement, but a majority of ours consider it a shrewd game of the Cleveland men, as their trade is principally with Lake Superior ports, and little if any business is done before the first or second week in May, whilst from Buffalo vessels leave directly navigation opens as a rule, provided the news from the Straits is satisfactory enough to warrant the entry of Lake Michigan. A contract has been closed for the erection of 800 feet of new docks at Ashtabula, L. E., along the river for a new railroad. The Pennsylvania Company is putting up 1,000 feet of new trestle and 400 feet of new docks.

Pittsburg. March 8.

[From our Special Correspondent.]

We have to report a dull and unsatisfactory market in the coal trade; prices weak, but not quotably lower. Prices in Cincinnati and Louisville have declined to a low figure. River shipments, since our last, about 2,500,000 bushels. The miners in the pools are all at work.

PRICE OF COAL PER 100 BUSHELS = 7,600 LBS.

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

The coke men in the Connellsville region have so far come to no satisfactory conclusion. Meetings are still held, when they agree to disagree. The railroads have under consideration a reduction of freights. Just how it will be decided is further along. It is estimated that nearly 30 per cent of the coke-ovens are idle.

The cokers in the convention at New Haven, on the 7th inst., accepted the 3 1/4 per cent reduction in wages under protest, but resolved to resist the reduction of 10 per cent as in force at Schoonmaker's Connellsville Coke and Iron Company's Youngstown, Perry and Mt. Braddock works. The men at these works were recommended to strike rather than accept the reduction. An equal division of labor at works where the shut-down is in force was also demanded, with a strike as an alternative.

Operators say the cokers need not take action on a reduction, as a farther one may be made; also a more complete shut-down, as they can find no market for coke.

FREIGHTS.

The latest actual charters to March 8th, per ton of 2240 pounds:

From Baltimore to:—Bangor, 1.15; Bath, 1.15; Boston, 1.15; Bridgeport, Conn., 1.00; Bristol, 1.05; Charleston, .90 @ 1.00; Fall River, 1.00; Galveston, 3.20 @ 3.25; New Bedford, 1.00; New Haven, 1.00; Newburyport, 1.30; New York, 1.00; New London, 1.00; Portland, 1.15; Portsmouth, N. H., 1.25; Providence, 1.00; Quincy Point, 1.15 @ 1.20; Savannah, 1.05 @ 1.10; Somerset, 1.00; Weymouth, 1.20; Williamsburg, N. Y., 1.00; Wilmington, N. C., 87 @ 90.

From Philadelphia to:—Boston, 1.25*; Charleston, 1.15; Marblehead, 1.35*; Norfolk, Va., 70.

From New York to:—Boston, .8*; Bridgeport, Conn., .55; Chelsea, .80*; Com. Pt., Mass., .80*; E. Boston, .80*; E. Cambridge, .80*3c.; Fall River, .75; New Bedford, .85; New Haven, .55; Newport, .75; Portsmouth, N. H., .90*; Providence, .75.

* And discharging, 3c. per bridge extra.

MARKETS.

NEW YORK, Friday Evening, March 9.
Prices of Silver per ounce troy.

Mar.	Sterling exchange	London Pence.	N. Y. Cents	Mar.	Sterling exchange	London Pence.	N. Y. Cts.
3	4.87	43 3/4	94 3/4	7	4.87	43 9/16	94 1/2
5	4.87	43 3/8	94 3/8	8	4.87	43 3/8	94 3/8
6	4.87	43 7/16	94 7/16	9	4.87	43 3/8	94 3/8

* Nominal. + 3/16 @ 9-16. † 94 3/4 @ 3/4.

Market has been quiet, although there is a feeling we may have lower prices, owing to the possibility of the India Council offering their bills freely prior to April 1st, the end of their fiscal year.

Foreign Bank Statements.—The governors of the Bank of England at their weekly meeting made no change in its rate for discount, and it remains at 2 1/2 per cent. During the week, the bank gained £259,000, and the proportion of its reserve to its liabilities was raised from 44.90 to 45.42 per cent, against an advance from 46.08 to 48.80 per cent in the same week of last year, when its rate for discount was 3 1/2 per cent. Thursday, the bank lost £20,000 bullion on balance. The weekly statement of the Bank of France shows a loss of 2,725,000 francs gold and a loss of 4,475,000 francs silver.

Copper.—The improved condition of this market, which we reported in our last issue, has become more pronounced during the course of the week just closed, and with rather more general buying on the part of consumers an advance in prices can be recorded. On Monday last a very large business was done, the buying in the first place being stimulated by the receipt of higher quotations from Europe, and the generally credited reports which are current both in Europe and in this country that an arrangement has been arrived at between the French syndicate and the large lake companies as to their output. The stocks of copper of all descriptions in store have recently been somewhat reduced, and it is expected that they will continue to be drawn upon to a considerable extent during the next few months, as the lake companies have now only moderate stocks at the lakes, and they are inclined to suspend shipments from thence until after the opening of the navigation season, and thus save the difference in freight which is equal to nearly 1/2c. per lb.

As previously reported, it is now quite evident that consumers have at last made up their minds that they must come into the market for their supplies without waiting any longer. They have held off as long as they possibly could, hoping to be able to buy at lower prices, but as they now see nothing to encourage such an expectation for some considerable time to come, and as their stocks are almost, if not entirely, exhausted, they are compelled to recognize the altered condition of things, and have consequently been placing their orders with greater freedom. For the commoner sorts of copper than Lake the demand continues very great, but of Arizona copper nothing whatever is in the market, as every pound is being exported. Casting qualities are also exceedingly scarce, and in consequence are held for comparatively high prices. For Lake descriptions we quote: Spot, 16.25c.; March, 16.25c.; April, 16.35c.; May, 16.45c.; June, 16.50c.; July, 16.40c.; August, 16.40c.; casting copper, 15 1/4 @ 15 1/2c.; electrolytic, 16c. In London the market has been very firm throughout the week and Chili Bars, which closed at the end of last week at £79, opened on Monday at £80, and steadily rose to £81 12s. 6d., closing very firm to-day at £81 5s. English tough is quoted £78 @ £79. Best Selected, £79 @ £80. Strong Sheets, £90.

It is said the French syndicate has made its arrangements with the English smelters, and their prices are to be £80 per ton for Best Select. This would be equivalent to about 17 cents per pound here. It is generally assumed that our prices here will range between 16 and 17 cents per pound for Lake, unless the European market should advance, when this market will follow.

There appears now no reason to doubt that the Calumet & Hecla, the Osceola, Tamarack, Quincy, and in fact all the important lake mines, have either sold or are on the point of selling their output for the next three years to the French syndicate. It is said in some of the Boston reports that no limit has been put upon the output; but it is certain no sane speculator would enter into any such arrangement.

The production of the lake mines is increasing, as shown in the usual monthly report published in our mining news.

The Boston News Bureau says: "We can officially announce that the Calumet & Hecla has sold its entire product for the next 3 years to the French syndicate. We can announce unofficially that the price is substantially the same as that made to the other Boston Lake Superior copper companies, and that the syndicate deposits a letter of credit for the millions necessary to cover the amount. There is no restriction in the sale as to production, and when the Calumet fire is out, the mine will be made to yield the largest output ever recorded; also, the delivery of the 50,000 long tons which the Montana Consolidated has sold to the French syndicate will probably be made as follows: 14,000 tons in 1888, 17,000 tons in 1889 and 19,000 tons in 1890. Figures are made up showing that with a profit of 4 cents per pound, which is liable to be increased, as it is believed the cost of production may be lessened, and deducting \$156,000 for interest and sinking fund each year, there would remain net profits of \$1,164,000 for stockholders per annum. The stock that has been sold to Paris parties has been sold by the Larrabee following probably, and it is believed the stock will be listed upon the Paris Bourse."

There is a strong odor of the stock market about this. Boston Transcript, March 8th, says: "The Osceola sells its product for three years, from May 1st, at 13c. per pound and one half of the profits made by the purchasers. There is no limit as to the amount of production, the syndicate taking the entire output, and the mine is expected to get out from 4,000,000 to 4,500,000 pounds of ingot per year, the lower figures being the extreme minimum. This will give \$3 per share per year on Osceola stock with ease and leave a substantial surplus. The company's product up to May 1—about 1,250,000 pounds—is sold at an average of about 16½c. per pound."

A later report says: "President Clark, of the Osceola, says that the contract for the sale of their product to the French syndicate has been agreed upon, but the final papers have not yet been signed."

The Calumet & Hecla improved slightly over its January figures. Until the shafts in the main part of the mine are opened and begin producing again, it is probable that the output of the Black Hills shafts will be maintained at about 2,800,000 pounds of ingot copper per month. The Tamarack output fell off twenty-one tons from January. The company is not disposed to crowd work at present, but the monthly output will be increased materially before long. The company will have some 14,000,000 pounds of ingot to deliver to the French purchasers this year. Besides this the Tamarack will probably get out some part of the 5,000,000 pounds which its contract permits it to produce for its own purposes, "to play with," as the Tamarack people put it. The Quincy product is unusually large for this season of the year.

The Tamarack-Osceola rolling-mill at Dollar Bay will probably be rolling sheet copper in a month or six weeks.

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

To	Copper matte.	Lbs.	By S. S.	Germanic	Copper	Lbs.
Liverpool	177	181,698			\$8,000	
London	1,484	163,680			11,480	
England	1,593	184,788			11,508	
Republ.	2,041	240,720			12,300	
City of Berlin	1,463	146,300			10,000	
Republ.	739	90,110			4,600	
City of Berlin	326	29,900			1,600	
To Liverpool						
S. S. Ohio	183	25,018			4,253	
Germanic	151	51,320			7,350	
Republ.	146	51,850			7,740	
City of Berlin	548	75,275			12,796	
Republ.	30	56,187			9,000	
City of Berlin	478	152,268			24,000	
To Havre						
S. S. La Champagne	35	55,534			8,855	
Republ.	410	387,500			43,360	
City of Berlin	665	221,823			33,000	
To Rotterdam						
S. S. Lee-dam	11	22,849			3,500	

The exports of copper from January 1st, 1888, to date, were as follows:

To	Copper matte,	Copper,
	pounds.	pounds.
Liverpool	14,438,949	8,898,052
London		219,292
Havre		5,666,313
Bordeaux		694,000
Rotterdam		230,349
Amwerp		126,964
Hamburg		67,496
Leghorn		1,789,762
Total	14,438,949	11,691,528

In addition to the above, there was exported 9884 lbs. of old copper; 10,054 lbs. of old sheathing and 68,149 lbs. of old brass.

Tin.—Importers have moderated their prices to a slight extent, and have been offering futures at rather tempting figures. During the week a large amount of business has been transacted, and between 700 and 800 tons have changed hands, about half of the quantity having been sold on the Exchange. Spot is still held for comparatively high prices, and as all available stocks have been carefully locked up, consumers still have to pay between 36½@37 for prompt. Futures, however, were mercilessly hammered down this afternoon, and the decline for the week is from 1 to 1½c. for the distant months. Closing prices are: Spot, 37c.; March, 35c.; April, 32c.; May, 30½c.

Lead.—The speculative buying continued pretty freely during the earlier part of the week, but was not so conspicuous later on, and the total transactions have been small as compared with the two or three previous weeks, amounting to a total of probably not more than 500 to 600 tons during the whole week. Buying on the part of consumers has been almost nil. No confirmation has yet been received about the reported European "syndicate" to put up prices. In

face of the quieter tone now prevailing we have to lower quotations slightly, which are to-day as follows: Spot, 5½; March, 5-15; April, 5-17½; May, 5-20; June, 5-20; July, 5-20; August, 5-22½; September, 5-22½.

The European market is also reported rather weaker, and the price of Spanish lead in London has given way to £14 12s. 6d., and English lead to £15, whilst it appears that some transactions have even taken place at lower prices.

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

The market is rising, excited, and unsteady, and it is difficult to give exact quotations, but the buying is principally speculative. Nominal quotation, 5c. Consumptive demand is limited.

Messrs. John Wahl & Co., of St. Louis, telegraph to-day as follows:

There is a steady, increasing demand in our market, and since our last report prices have further advanced. Sales have been made at 4-95, which is the asking price at the close for both Common and Argentiferous lead.

Spelter continues quiet and calls for no special remark. We quote Domestic, 5½@5½c.; Foreign, 6@6½c. The London quotations are unchanged, and the market is reported firm.

Antimony is quiet here, and we have to reduce quotations slightly, Hallett's to 10¼@11c.; Cookson's, 14@14½c. In England the producers are still very firm in their ideas, Hallett's being quoted £47 1s. @£48, and Cookson's £55, which prices are somewhat above the parity of our market.

THE NEW YORK METAL EXCHANGE COMPILES THE FOLLOWING MOVEMENT OF BONDED METALS, PORT OF NEW YORK, FEBRUARY, 1888.

METALS.	Imports.	Exports.	Stocks.	Stocks.
	February.	Jan., 1888.	Jan. 1.	Mar. 1.
Iron ore	4,630 tons	125 tons.		
Pig-iron	4,710 "	100 "	2,542 tons	2,142 tons.
Spiegel-iron	8,789 "	"	2,439 "	3,298 "
Old rails	182 "	"	16,781 "	17,498 "
Scrap-iron	1,040 "	"	1,442 "	1,961 "
Scrap-steel	221 "	"	965 "	611 "
Steel blooms and billets	537 "	"	824 "	824 "
New st. rails	"	"	"	"
New ir. rails	"	"	"	"
Wire and nail rods	8,455 "	"	9,910 "	12,590 tons
Iron bars, etc	256 "	19½ tons.	"	"
Iron beams	277 "	"	"	"
Sheet iron	152 "	15 "	1,707 "	1,700 "
Steel sheets and plates	139 "	½ "	16 "	16 "
Cotton ties	"	"	592 "	592 "
Steel tires and forgings	420 "	"	62 "	62 "
Steel tubes	12 "	"	14 "	14 "
Steel bars, etc	660 "	1 ton.	79 "	79 "
Tin plates	147,517 bxs.	"	55,778 bxs	46,603 bxs
Taggers' ir'n	913 "	"	"	"
Pig-tin	1,019 tons	"	"	"
Copper ore	"	3,951 tons.	"	"
Copper mat.	33,600 lb.	"	"	"
Ingot cop.	"	5,417,918lb	"	"
Copper (old)	2,132 lbs.	"	66,740 lbs.	67,728 lbs.
Brass (old)	5,808 "	"	470 "	1,647 "
Pig-lead	"	"	2,943 tons	2,876 tons.
Lead (old)	"	"	468 lbs.	468 lbs.
Spelter	55 tons.	6 tons.	47 tons	47 tons.
Sheet zinc	"	"	11 "	11 "
Scrap-zinc	"	"	13,400 lbs.	13,400 lbs.
Antimony	401 cks.	"	155 cks.	171 cks.
Nickel	11,180 lbs.	"	13,022 lbs.	1,672 lbs.
Type metal	80 tons.	"	"	"

Chemicals.—There is almost no change in the heavy chemical market since our last.

Liverpool caustic soda ash is not wanted to any extent, and the quotations are nominal at 1-25 @ 1-35c. High test is also very dull, and is quoted at 1-12½@1-15c.

Carbonated soda ash 48 per cent continues quiet at former quotations. Very little if any thing is done in high test; the nominal quotations are 1-12½@1-15c.

English sal soda has shown some animation in a jobbing way, spot lots being sold for 1-07½@1-10c., according to quantity.

Caustic soda continues very dull and depressed at our former quotations.

Bleaching powder is without animation and no improvement in price. The quotations are 1-82½@1-90c., according to quantity and time of delivery.

Acetic acid continues about the same as in our last. The business done is entirely of a jobbing character. There is no change in the quotations of 2½@2½c.

Oxalic acid is not particularly active. There is no change in prices. Buyers apparently do not fear an advance in the near future, as the sales are all for small quantities, 7@7½c. is the price, according to quantity, etc. Sulphuric acid has not changed any since our last writing. The demand is fairly good. The quotations of 90@95c. for large lots and \$1@1.10 for smaller quantities remain unchanged. There is an unabated demand for fertilizing chemicals.

Muriate of potash is in very good demand and the market is firm at 1-72½ for sail shipments, 1-75 @ 1-77½ steamer shipments. Goods on the spot are quoted at 1-77½@1-80.

Sulphate of ammonia is firm at \$3.30 per 100 pounds. The price on kainit has weakened somewhat on the spot on account of recent arrivals; \$10.50 is now paid for goods ex store in large quantities. The price on futures has not changed any since our last; the demand remains good.

Double manure salt is selling fairly well, 1-20 is paid for goods on the spot and 1½@1-15 for forward delivery.

Nitrate of soda is firm; 2-20@2-25 is demanded for goods ex store; afloat in port, 2-12½@2-15. Future shipments are quoted at 2-20@2-07½ according to time of delivery.

Brimstone continues dull with more or less nominal quotations. Spot is offering at \$21 per ton; future shipments at \$20@20.50. Thirds may be had for \$1 less.

Quicksilver continues firm but dull with 63@65c. as the range of quotations.

Mr. T. F. Edmonds & Co., of Boston, Mass., issued the following circular March 1st:

NITRATE OF SODA.			
	1888.	1887.	
	Tons.	Tons.	
Exports from S. A. to Europe since Jan. 1.	65,900	55,000	
Exports from S. A. to U. S. since Jan. 1.	13,000	8,000	
Total exports	78,900	63,000	
Loading in S. A. for Europe, Feb. 29.	30,000	20,000	
Loading in S. A. for U. S., Feb. 29.	12,000	8,500	
Total loading	42,000	28,500	
	Bags.	Bags.	
Stocks at Atlantic Ports, March 1, 1888.			142,000
Afloat and due in Atlantic Ports, March 1.	44,000		
Afloat and due in Atlantic Ports, April 1.	53,000		
Afloat and due in Atlantic Ports, May 1.	45,000		

Visible supply for U. S., March 1 to May 30, 1888.	205,276
Deliveries for consumption in U. S. for above time in 1887.	91,132
Deliveries for consumption in U. S. for above time in 1886.	65,910
Deliveries for consumption in U. S. since Jan. 1, 1888.	57,943
Deliveries for consumption in U. S. since Jan. 1, 1887.	71,239
Deliveries for consumption in U. S. since Jan. 1, 1886.	42,462

IRON MARKET REVIEW.

NEW YORK, Friday Evening, March 9.
There is no improvement yet noticeable in the general condition of the iron trade. Discussion of the new tariff bill continues to absorb much attention, but it is generally believed that the present Congress will make no change in the existing rates of duties on iron and steel, and that the discussion is only the preliminary skirmishing for position for the approaching presidential campaign.

There is little change to note in American pig-iron. Choice foundry brands continue scarce and in good demand. The Lehigh and Schuylkill furnaces are not yet receiving a full supply of their usual coal, and the curtailment of production in those regions is the largest for many years. Out of 58 furnaces in the Lehigh neighborhood, only 29 are now in blast.

Inquiries for future deliveries of foundry pig are more numerous, and there have been several sales at full prices for delivery when obtainable. Quotations of standard Eastern brands are unchanged.

On the other hand, Southern and Ohio irons have been freely offered in the markets usually supplied by Eastern furnaces, at low quotations—considerably lower than what is claimed to be cost of delivery of Eastern irons. This affords an index of the present condition of the Western trade.

Scotch irons are weaker in this market, and Glasgow quotations for special brands are about 6d. lower all around.

Bessemer pig is unchanged and nominal. There has been some inquiry for Spiegel and we note a sale of domestic at \$26.50. Quotations are unchanged on English and German. Ferro-manganese has been sold in small lots, some that was contracted for not being delivered on account of the closing of the Edgar Thomson works, and the consumers being obliged to buy elsewhere.

Wire rods have been more active, and there have been several sales. Some hard foreign rods have been sold as low as \$39.50, but soft rods are not obtainable below current quotations.

The steel rail market is disturbed by the western strikes, and it is reported that some of the mill owners take a gloomy view of the situation, and predict that this year's demand will not be more than half of last year's. It is even hinted that there may be a concerted attempt to advance prices, but this is hardly likely in the face of a prospective small demand. On the other hand, it is maintained that in the present volume of general business, repairs and renewals alone will make work enough to employ all the mills for ten months of this year.

New sales of steel rails are reported, aggregating over 50,000 tons, of which 10,000 tons are from eastern mills, and 35,000 tons from Pennsylvania and Western mills to the Minnesota and Northwest Railroad. There are several large inquiries, and there is no doubt that large orders will be placed when the Western strikes are adjusted.

Old rails are decidedly weaker, and are offered at less than our last quotations. There have been sales of a few thousand tons.

The Treasury Department has decided that charcoal iron and crop ends are dutiable at the rate of \$22 per ton, thus concurring in the opinion of the United States Attorney General against the views of some importers.

Louisville, March 6.

[Reported by Messrs. HALL BROTHERS & Co.]

Some noteworthy events have transpired during the past week, among the most notable being several round sales of Southern mill iron for future delivery, although the exact quantity and prices can not be determined, as the sales were made on a confidential

basis. It is believed, however, that the aggregate was large, and the sales being made confidentially would lead to the belief that the prices were very low. These occurrences have been somewhat surprising, as it seemed generally believed that the Southern furnaces were largely sold ahead, and especially so on mill grades of iron, and the prices firmly fixed. Outside of these large transactions the current business has been light, although several other large negotiations have been pending for several days; but these buyers seem to have a feeling of apprehension and fear of lower prices, and in consequence some of these transactions have fallen through, while others are still awaiting developments.

There is no material change in the general quotations. Our figures, cash f.o.b. cars at Louisville, will be found in the weekly register of prices.

Pittsburg. March 8. [From our Special Correspondent.]

The market since our last has presented nothing very new or important. Prices are uncertain and very irregular. It is difficult to find two persons who hold the same views in regard to the present or future of the iron trade. During the past two days there were some indications of an approach to more activity, but not sufficient to warrant any very positive impression on the subject. Certain dealers, in the absence of sales, reported more inquiries than the week previous. On the whole, the feeling in some respects was more cheerful. The general opinion was that the bottom had been reached and that in the near future we may look for an increase in the volume of business. As things are now situated it is not easy to define the conditions of the market accurately, unless by calling it a waiting one. In other words, buyers are beginning to find that they cannot make their own prices entirely; they can get what they want at quoted rates, but sellers are disposed to stand firm, and decline any thing offered that involves further concessions. The unsettled condition of affairs at Braddock, McKeesport, Etna, Sharpsburg with iron workers, and twelve furnaces out of eighteen in Allegheny County banked or shut down, besides a large number outside the county at various points in a similar condition; with the coke question in the Connellsville region unsatisfactory, with strikes threatened and the coke owners not able to agree among themselves; freight matters not satisfactory, presents a picture that is not pleasant to contemplate.

Wm. Clark & Co. started up their second finishing mill this morning. Their entire works is run by non-union men. A dispatch from Washington, this morning, states the Home Committee on Claims has reported favorably a bill, to refund the excess duty on steel blooms collected in 1880-1882. Messrs. H. E. Collins & Co. have a large interest in this legislation, as well as many others.

At a convention of cut nail manufacturers of the West held in this city on the 8th inst., the price of nails was unanimously advanced to the \$2.10 card rate, free on board, mill usual terms. The meeting was the largest held for some years. Trade was reported improving, with the outlook more encouraging. Another meeting will be held in this city on April 11th.

Quotations will be found in our weekly register of prices.

SALES REPORTED SINCE OUR LAST. Coal and Coke Smelted Lake Ore. 500 Tons Bessemer 17.85 cash. 500 Tons Gray Forge 16.10 cash. 500 Tons No. 1 Mill 16.00 cash. 300 Tons Bessemer 17.50 cash. 100 Tons White Bessemer 16.00 cash. 1000 Tons Bessemer 18.25 4 mo. 100 Tons No. 1 Foundry 18.00 cash. 150 Tons No. 2 Foundry 17.00 cash. 75 Tons No. 2 Foundry, all ore 18.25 4 mo. 65 Tons No. 1 Foundry, all ore 18.75 4 mo. Coke, Native Ore. 350 Tons Gray Forge, storage 15.00 cash. 100 Tons Gray Forge 16.00 cash. 40 Tons Silvery 18.00 60 d. 25 Tons Silvery, extra 19.00 cash. 25 Tons No. 1 Foundry 18.00 cash. Charcoal. 100 Tons No. 1 Foundry 23.50 cash. 65 Tons Cold Blast 24.00 cash. 50 Tons No. 1 Foundry 23.50 cash. 25 Tons Warm Blast Extra 30.00 cash. 25 Tons Cold Blast 27.00 cash. Steel Slabs and Billets. 500 Tons Billets 29.25 cash. 500 Tons Slabs 19.00 cash. 500 Tons Billets 19.50 cash. Muck Bar. 500 Tons Muck Bar 27.25 cash. 500 Tons Muck Bar 27.75 cash. Steel Rail and Crop Ends. 500 Tons Rail Ends 19.00 cash. 350 Tons Rail Ends 18.50 cash. Scrap Material. 200 Tons No. 1 Wrought Scrap, net 20.00 cash. 100 Tons No. 2 Wrought Scrap, net 18.00 cash. 200 Tons O. H. Steel Scrap, gross 16.00 cash. 100 Tons Cast Iron Borings, gross 13.00 cash. Old Iron Rails. 500 Tons American T's 23.50 cash. 500 Tons American T's 23.75 cash. 400 Tons Imported D. H. 25.00 cash.

Philadelphia. March 8. [From our Special Correspondent.]

The brokers talk strong prices for standard brands of pig-iron. Quite a number of April deliveries of Foundry No. 1 were ordered this week on a \$21 basis. Two or three brands are held higher. No. 2 has sold at \$18.50, and some companies have offers for large lots if lower prices could be named. The inferior grades of foundry and forge are being sought after, and there is no doubt entertained by sellers but that

the concessions already named will result in large sales. So far foundry transactions have covered only one, two and three hundred ton lots. In forge, sales on 1000 ton lots have been made in perhaps a half dozen cases this week, and to-day agents and brokers have inquiries which look like big mill iron sales are at hand, in poor qualities. Makers show a disposition to realize before the Schuylkill Valley output is thrown on the market. Handlers of foreign material have no transactions to report. The muck bar mills have picked up no new business. Bar iron makers became tired of waiting, and cut prices a tenth, early in the week, to capture a few hundred tons of business, and they say there are a good many orders yet to come in at the drop. Refined iron has not been shaded and no large lots are being called for. Car work in hand will keep mills busy for some weeks, but new orders are few in number. The rail situation has not changed. The plate and tank iron makers figure up probable orders for a thousand tons or more, but buyers are sending in dribble orders until prices are fixed.

The sheet mills have gathered some fresh business this week by shading the card. A downward tendency has struck merchant steel. Structural iron makers report a steady run of small orders at current rates. Steel rail orders are for 500 to 600 ton lots for standard sections, and smaller lots for mine and street rails. Old rails are dull, because of the delay buyers are indulging in, with the hope of better prices. Scrap dealers report no change and an ordinary demand.

The coal situation is changing to cheaper prices. Coke and bituminous coal will be more largely used in Eastern markets hereafter. Quotations will be found in our weekly register of prices.

FINANCIAL.

NEW YORK, Friday Evening, March 9.

Mining Stocks.

There is absolutely nothing of interest to report in the mining market, which remains dull and featureless.

El Cristo has demanded some attention, but shows a downward movement. The price of the stocks opened at \$1.50 and has since declined to \$1.20, at which price sales were made to-day.

Reports from Phoenix of Arizona are favorable. The company last month, it is said, cleared something like \$5000, and it will do better when the additional ten stamps—now being erected—have begun operating. Reports state that a considerable block of the stock is held in weak hands and may at any time come upon the market, which is scarcely in a condition to stand up under it. Sales this week were made at 40 to 70c. San Sebastian, which last week sold at \$2.95, at

which figure it has been kept by the manipulators for many weeks, sold this week at 10c. The cause of this sudden decline is unknown. Our advices about this property are not favorable. The stock was listed at the Stock Exchange—unlisted securities, in May, 1887, at \$3.50, and within a week advanced to \$5.75. The sudden advance and the high figures at which the stock was held for a long time, caused considerable comment, and the company was obliged to issue an explanatory circular in reference to its standing, which will be found in the ENGINEERING AND MINING JOURNAL of October, 1887.

Little is doing in Carupano, which remains unchanged at \$2.

Raf pahannock is quiet at 19@20c. Santiago records a sale at \$3.30.

The interest in the dealings of Proustite continues. Sales were again large, and prices steady at from \$2 to \$2.10.

Castle Creek is neglected at 8c., and Holyoke at 7 and 6c.

There was little doing in Horn-Silver, which sold at from \$1.20@1.25. A few shares of Ontario changed hands at from \$25.50@27.50.

Silver King attracted some attention and sold at from \$5.75@6.

Colorado stocks were quiet. Iron Silver sold at \$4, Silver Cord at 36c., Lee Basin at from 55@60c., Cashier at from 9@12c., Monitor at from 13@15c. Security declined, going from 75@55c. Denver City at 9c. and 10c., Little Pittsburg at 39c., Little Chief at 26c. Dunkin went from \$1.40@1.15, Chrysolite at 40c.

Some business is reported in Eureka at from \$11 to \$11.25.

Martin White shows sales at from 90c. to 95c.

Navajo shows a larger business, the stock sold at from \$1.65 to \$1.75. North Belle Isle shows one sale at \$6.38. Belle Isle declined from 70c. to 55c. Found Treasure was quite active, at from \$2 to \$2.15. Tornado at 70c.

The Comstocks show a small business with little change in prices. Consolidated California & Virginia, as usual, attracted the most attention and sold at from \$15.50 to \$16.50. Sutro Tunnel went from 14c. to 11c. The sales amounted to 24,700 shares.

Homestake shows a few sales at from \$10.50@ \$11.88. Father de Smet one at 49c., and Caledonia a few at \$1.80.

There has been considerable anxiety on the part of the stockholders in reference to the fire at the mines of the Plymouth Consolidated Gold Mining Company, to which we referred in a previous issue. A circular just issued by the company states the following: "The management announces the existence in the mine of a fire of greater or less magnitude. It originated from a blast at a point between the third and fourth levels,

IMPORTATIONS AT NEW YORK DURING WEEK ENDING MARCH 6, AND FROM JAN. INTO SAME DATE.

Spelter.	Week. Tons.	Year. Tons.	Pig-Iron (Cont'd).	Week. Tons.	Year. Tons.	Old Rails.	Week. Tons.	Year. Tons.
American Metal Co., Lt.	129	129	Le & Co., James.	100	100	Brown Bros. & Co.	688	688
Friedensville Zinc Co.	23	23	Milne & Co., A.	15	15	Crossman & Bro., W. H.	1,005	1,005
Total	152	152	Sanderson & Sons.	2	2	Frankfort, M.	100	100
Corres. date 1887	25	409	Stetson & Co., G. W.	250	3,100	Geisenheimer & Co.	100	100
			Williamson & Co., Jas.	700	700	Neumark & Gross	1,912	1,912
						Stetson & Co., Geo. W.	230	230
Tin Plates.	Boxes.	Boxes.	Total	250	9,127	Total	4,115	4,115
American Meter Co.	128	128	Corres. date 1887	8,267	8,267	Corres. date 1887	3,615	29,258
Bruce & Cook	1,748	13,433	Steel & Iron Rods.	Tons.	Tons.			
Byrne, I.	2,605	2,605	Abbott & Co., Jere.	25	2,019			
Central Stamping Co.	1,153	3,524	American Screw Co.	23	363	Bar-Iron.	Tons.	Tons.
Coddington & Co., T. B.	4,023	27,884	Bacon & Co.	109	197	Abbott & Co., Jere.	1,069	1,069
Cort & Co., N. L.	1,226	19,893	Carey & Moen	197	305	Abel Bros.	3	3
Cons. Fruit Jar Co.	425	425	Dana & Co.	23	13	Bacon & Co.	13	13
Crooks & Co., Robert.	2,991	12,334	Downing & Co., R. F.	144	854	Lillienberg, N.	5	5
De Mill & Co., H. R.	2,493	2,493	Galpin, S. A.	17	773	Lundberg, Gustaf.	112	112
Dickerson, Van Dusen & Co.	4,667	49,088	Heyn, A.	20	115	Milne & Co., A.	95	95
Lalanc & Grosjean Mfg Co.	215	215	Leug, J. S.	152	115	Naylor & Co.	25	25
Lombard, Ayres & Co.	1,500	1,500	Lundberg, Gustaf.	150	1,026	Page, Newell & Co.	20	20
Merchant & Co.	1,205	1,205	Milne & Co., A.	20	35	Philip, C. M.	20	20
Mersick & Co., C. S.	1,531	1,531	Montgomery & Co.	441	2,420	Wallace & Co., W. H.	12	12
Morewood & Co., G.	1,983	1,983	Muller, Schall & Co.	152	152	Totals	1,274	1,274
Naylor & Co.	2,076	3,552	Naylor & Co.	441	2,420	Corres. date 1887	7	1,190
Phelps, Dodge & Co.	14,477	72,145	Page, Newell & Co.	10	549	Scrap-Iron.	Tons.	Tons.
Potts, W. A., Son & Co.	33,909	33,909	Pierson & Co.	5	35	Brown Bros. & Co.	20	20
Pratt Mfg Co.	716	716	Roebling's Sons, J. A.	5	1,000	Burgess & Co.	172	172
Shepard & Co., Sidney.	295	295	Walschid Co.	30	686	Crossman, W. H. & Co.	47	47
Taylor, N. & G.	2,268	25,416	Washburn Mfg. Co.	27	565	Geisenheimer & Co.	15	15
Thomson & Co., A. A.	8,209	8,209	Whittemore & Co.	1,000	15	Muller, Schall & Co.	76	76
Whittemore & Co., H.	500	1,400	Wolff & Co., R. H.	27	35	Neumark & Gross	35	35
Wolf & Reesing	165	165	Total	653	10,851	Trowbridge & Co., D.	7	7
Wright & Sons, Peter.	165	165	Corres. date 1887	2,805	20,123	Ward & Co., J. E.	50	100
Total	39,529	284,190	Steel Blooms, Billets, etc.	Tons.	Tons.	Total	50	1,030
Corres. date 1887	14,318	208,04	Abbott & Co., Jere.	36	104	Corres. date 1887	50	2,828
			Bowker, C. F.	2	12	Spiegeleisen.	Tons.	Tons.
Tin.	Tons.	Tons.	Cohn, M.	7	14	Abbitt & Co., Jere.	5	5
Abbott & Co., Jere.	1,345	1,345	Crooks, R. & Co.	7	7	Crocker Bros.	306	306
American Metal Co.	134	134	Downing & Co., R. F.	10	10	Dana & Co.	51	51
Crooke Smelt. & Refin. Co.	29	80	Henderson Bros.	7	7	Geisenheimer & Co.	8	8
Dickerson, Van Dusen & Co.	10	10	Hugill, Chas.	20	481	Jansen, J. A.	750	7,133
Hendricks Bros.	11	65	Lalanc & G. Mfg. Co.	5	546	Naylor & Co.	546	546
Muller, Schall & Co.	11	440	Mersick & Co.	17	1,000	Perkins, C. L.	1,000	1,000
Naylor & Co.	45	45	Milne & Co., A.	25	27	Total	750	9,089
Phelps, Dodge & Co.	11	47	Muller, Schall & Co.	5	30	Corres. date 1887	895	13,966
Thomson & Co., D.	11	47	Maus, J. & Son.	15	8	Iron Ore.	Tons.	Tons.
Total	51	2,057	Naylor & Co.	15	27	De Flores, R.	893	1,582
Corres. date 1887	15	2,157	Ogden & Wallace	30	98	Earnshaw, A.	543	2,663
			Pierson & Co.	27	1,021	Ennis & Co.	1,021	1,021
Pig-Iron.	Tons.	Tons.	Pilditch, F. S.	8	2,344	Naylor & Co.	1,630	2,344
Abbott & Co., Jere.	500	500	Power, P. W.	2	500	Wright, Chas. L. & Co.	500	500
Baldwin Bros. & Co.	100	100	Roebling's Sons, J. A.	25	176	Total	3,066	7,543
Bartlett & Co., N. S.	1,300	1,300	Wagner, W. F.	25	14,408	Corres. date 1887	1,966	7,114
Crocker Bros.	2,000	2,000	Walschid, C. A.	5	5			
Crooks & Co., R.	600	600	Wallace, W. H. & Co.	5	5			
Dana & Co.	300	300	Wolff, R. H.	12	27			
Henderson Bros.	410	410	Total	176	1,068			
			Corres. date 1887	2,100	14,408			

WEEKLY REGISTER OF CURRENT QUOTATIONS.

CHEMICALS.

Table listing various chemical products and their prices, including acids, alkalis, and salts.

Table listing various metal products and their prices, including Strontium, Sulphur, and Talc.

BUILDING MATERIAL.

Table listing various building materials and their prices, including bricks, stone, and slate.

THE RARE METALS.

Table listing various rare metals and their prices, including Aluminum, Barium, and Bismuth.

METALS.

Table listing various metals and their prices, including Aluminum, Copper, and Lead.

IRON AND STEEL.

Table listing various iron and steel products and their prices, including American Pig-Iron and Scotch Pig-Iron.

Table listing Bessemer Pig and Spiegelisen products and their prices.

Table listing Steel Blooms, Steel Nail Slabs, and Steel Wire Rods.

Table listing Structural Iron and Steel products and their prices.

Table listing Iron Pipes and Merchant Steel products and their prices.

Table listing Cast-Iron Pipe and Wrought Iron Pipe products and their prices.

Table listing Boiler Tubes and Nail Fastenings products and their prices.

Table listing Wrought Scrap and Old Car Wheels products and their prices.

Table listing Louisville Prices for Hot Blast Irons and Forge Irons.

Table listing Pittsburgh Prices for Coke or Bituminous Pig and Charcoal Pig.

Table listing Philadelphia Prices for Foundry No. 1 and Foundry No. 2.

Table listing Plate Iron, Tank Iron, and Steel Rails.

STOCK MARKET QUOTATIONS

Table listing Baltimore, Md. stock market quotations for various companies.

Birmingham, Ala.

Table listing Birmingham, Ala. stock market quotations for various companies.

Pittsburg Stock Quotations.

Table listing Pittsburg stock market quotations for various companies.

London Quotations.

Table listing London stock market quotations for various companies.

Paris Quotations.*

Table listing Paris stock market quotations for various companies.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Main table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES, ASSESSMENTS, DIVIDENDS, and NON-DIVIDEND-PAYING MINES. Includes entries for Adams, Alice, Alhambra, etc.

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 \$2,390,000. Previous to the consolidation of the Copper Queen with the Atlanta, Aug., 1887, the Copper Queen had paid \$1,360,000 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 March 3 to March 9, Sales, and Price. Includes a summary row at the bottom: 'Total New York, 127,978'.

BOSTON MINING STOCK QUOTATIONS.

Table of Boston Mining Stock Quotations. Columns include Name of Company, dates from March 2 to March 8, Sales, and Price. Includes a summary row at the bottom: 'Total Boston, 38,357'.

COAL STOCKS.

Table of Coal Stocks. Columns include Name of Company, Par value of sh'rs., and prices for dates from March 3 to March 9. Includes a summary row at the bottom: 'Total sales, 723,153'.

San Francisco Mining Stock Quotations.

Table of San Francisco Mining Stock Quotations. Columns include Company, and closing quotations for dates from March 2 to March 8. Includes a summary row at the bottom: '*Ex-dividend.'

*Of the sales of this stock 77,920 were in Philadelphia, and 405,480 in New York.

Total sales, 723,153.

*Ex-dividend.

and the men were driven from the mine by smoke before the flames could be extinguished. The mine was at once closed, and it is supposed that the fire has already been smothered. The shafts will be kept tightly sealed for a few days longer, when the mine will be carefully examined and the amount of damage ascertained. Meanwhile our mills are forced to remain idle and all operations are suspended.

"It is impossible to make any estimate of loss until the mine is reopened, but it will be considerable, besides the hindrance of work.

"By reason of the disaster above described, for the first time in the history of the company, the board is constrained to omit the usual monthly dividend. The company's record is a brilliant one, and it is hoped that the present may be but a temporary interruption."

The company's record has indeed been a brilliant one. It was organized on June 1st, 1883, by the consolidation of the Empire, the Amador Pacific, and the Plymouth companies. Prior to the consolidation about \$2,500,000 gold bullion had been produced. Since that date and up to January 1st, 1888, the production has amounted to \$3,804,499.36. The operating expenses during that period were \$1,442,074.08—and the cost of constructing works, purchasing machinery, real estate, etc., amounted to \$217,626.17. The company paid during this period fifty-five dividends amounting to \$2,200,000. Since January 1st, 1888, the company has paid two dividends amounting to \$80,000, making a total to date of \$2,080,000—or 22.80 per share. One sale of 55 shares was made this week at \$10.50.

Brunswick continued to attract considerable attention, the transactions amounting to 31,300 shares. The price has been firm, ranging from 20c. to 30c. during the week. To-day the stock sold at from 18c. to 26c.

It is said that there is a movement on foot to secure control of the Bulwer Consolidated in the interest of the Standard Consolidated Mining Company, and to this end proxies are being solicited in the name of Joseph Tate, to be voted at the annual election to be held shortly. The Bulwer and Standard properties adjoin each other, and it is to the interest of both that they should be worked harmoniously. Recently there has been some friction between the two interests to which we referred in previous issues, and to do away with any further conflict it is desired to bring the two companies into closer relations. The price of the Standard continues to show an upward tendency, and advanced from \$2.90 to \$3.50, selling to-day at \$3.30, with sales of 2615 shares. Bulwer shows sales at 75@80c. Bodie has been quiet, selling at from \$2 to \$2.20, assessment unpaid, and from \$2.50 to \$2.55 assessment paid. Mono declined from \$1.95 to \$1.75.

We have had numerous inquiries in reference to the assessment levied by the Taylor Plumas Mill & Mining Company. We are officially advised by the officers of the company that the assessment was levied for the purpose of prosecuting the work at the mine. The previous assessment being a voluntary one, but few responded to it; those that did pay it are credited with the amount on this call. The officers state that they have every reason to be hopeful as to the prospects of the company.

No sales of the stock are reported. Middle Bar has advanced a few cents, going from 37 to 45c. Amador went from \$1.25 to \$1.50 in the beginning of the week, but towards the close declined to \$1.35. Quicksilver Preferred has been quiet and lower, going from \$35.25 to \$33.75. Common sold at \$10.

Auction Sale of Stocks.

The following securities were sold at auction in this city on the 7th inst.: \$6000 Oxford Nail and Iron Company 1st mortgage 6 per cent bonds, due 1913, 50; \$2000 Oxford Nail and Iron Company 6 per cent trust mortgage, due 1905, 25; 126 shares Oxford Iron and Nail Company, \$131; 10 shares Sloss Iron and Steel Company, 20; 126 shares Warsaw Salt Company, of Warsaw, N. Y., 20; 250 shares New Jersey Extraction Company, of Elizabeth, 7; 600 shares Central Arizona Mining Company (for lot), \$32; 500 shares Climax Mining Company (for lot), \$5; 50 shares Kessler Mining Company (for lot), \$1; 200 shares Breese Mining Company (for lot), \$33; 100 shares Bald Mountain Mining Company (for lot), \$4; \$10,000 Central R.R. of New Jersey 7 per cent consolidated mortgage bonds, due 1899, 117; \$12,000 Mineral Range R.R. Company 4 per cent bonds, due 1938, 34; 200 shares Mineral Range R.R. Company, 19.

Meetings.

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

Alamo and Coahuila Coal companies, office of Lyman K. Bass, Colorado Springs, Colo., March 12th, at ten o'clock A.M.

Amy and Silversmith Consolidated Mining Company, No. 18 West Broadway, Butte, Montana, March 15th at four o'clock P.M.

Bulwer Consolidated Mining Company, No. 11 Pine street, New York City. Stockholders are requested to send in their proxies for the annual election before April 1st.

Cashier Mining Company of Colorado, No. 35 Pine street, Room 3, New York City, March 15th, at twelve o'clock noon. Special meeting to take such action as may be required for the future development of the properties of the company.

Colorado Coal and Iron Company, Colorado Springs, Colo., April 2d, at twelve o'clock noon.

Fort Pitt Coal Company, No. 1010 Penn avenue, Pittsburg, Pa., March 20th, from two to four o'clock P.M.

Midas Petroleum and Improvement Company, Room 10, McClintock Building, Pittsburg, Pa., March 15th, at ten o'clock A.M.

Midland Mining Company, No. 234 South Fourth street, Philadelphia, Pa., March 20th, at twelve o'clock noon.

Pewabic Mining Company, No. 19 Congress street, Rooms 11 and 12, Boston Mass., March 28th, at eleven o'clock A.M.

Rockhill Iron and Coal Company, No. 320 Walnut street, Philadelphia, Pa., March 20th, at half past eleven o'clock A.M.

Total Wreck Mining and Milling Company, No. 18 Broadway, Boom 526, New York city, April 10th, at three o'clock P.M.

Dividends.

Barclay Coal Company, of Pennsylvania, has declared a semi-annual dividend of seventy-five cents per share, payable March 19th, in Philadelphia.

Colorado Central Consolidated Mining Company, of Colorado, has declared a dividend, No. 21, of five cents per share, or \$13,750, payable April 10th, in New York.

Consolidated California & Virginia Mining Company of Nevada has declared Dividend No. 15, of fifty cents per share, or \$108,000, payable March 10th, in San Francisco.

Assessments.

COMPANY.	No.	When levied.	D'l'nq't in office.	Day of sale.	Am't per share.
Alaska, Cal	7	Feb. 21	Mar. 26	Apr. 16	10.00
Anchor, Utah	4	Feb. 7	Mar. 10	Mar. 31	.20
Andes, Nev	33	Feb. 25	Apr. 2	Apr. 23	.25
Bodie Cons., Cal	8	Feb. 13	Mar. 20	Apr. 26	.50
Bullion, Dak	4	Feb. 4	Mar. 10	Apr. 2	.004
Cent. Eureka, Utah	1	Feb. 24	Mar. 27	Apr. 13	1.00
Cora, Dak	1	Jan. 31	Mar. 6	Mar. 23	.014
Crocker, Ariz	5	Feb. 5	Mar. 27	May 1	.25
Day, Nev	16	Feb. 8	Apr. 9	May 7	1.00
Equitable, Utah	33	Feb. 14	Mar. 30	May 9	.15
Exchequer, Nev	25	Feb. 7	Mar. 13	Apr. 4	.20
Found Treasure, Nev	2	Jan. 31	Mar. 7	Mar. 28	.06
Golden Fleece, Cal	12	Jan. 28	Mar. 15	Apr. 10	7.00
Heath, Idaho	3	Feb. 8	Mar. 19	Apr. 13	.05
Kennedy, Cal	3	Feb. 20	Apr. 2	Apr. 23	.10
Keyes, Nev	1	Feb. 15	Mar. 20	Apr. 16	.20
Mexican, Nev	35	Jan. 17	Feb. 21	Mar. 13	.25
Mayflower, Cal	40	Jan. 19	Feb. 23	Mar. 16	.50
Mutual, Dak	4	Feb. 1	Mar. 21	Apr. 7	.01
North Bonanza, Nev	8	Jan. 10	Feb. 15	Mar. 14	.15
North Peer, Nev	4	Feb. 24	Mar. 28	Apr. 23	.05
Omaha, Cons., Cal	1	Feb. 20	Mar. 24	Apr. 26	.25
Paradise Valley, Nev	4	Jan. 28	Mar. 1	Mar. 23	.10
Pioche, Cons., Nev	4	Feb. 30	Mar. 4	Mar. 22	.20
Pittsburg, Cal	20	Feb. 15	Mar. 17	Apr. 8	.75
Quartz Mt., Cal	20	Jan. 17	Feb. 20	Mar. 15	.70
Rattler-Gilroy, Dak	10	Jan. 21	Feb. 24	Mar. 14	.014
San Francisco, Cal	2	Feb. 3	Mar. 10	Apr. 3	.40
Spanish, Cal	2	Jan. 4	Mar. 10	June 2	.04
Spring Valley, Cal	2	Jan. 11	Mar 17	Apr 16	.50
Summit-Red Bird, Utah	4	Jan. 31	Mar. 10	Mar. 28	.15
Taylor-Plumas, Cal	3	Feb. 20	Mar. 31	.....	.03
Virginia Creek, Cal	5	Feb. 28	Apr. 4	May 1	.05

* The delinquent day and day of sale were postponed to dates given above.

† Stockholders who paid the voluntary assessment No. 2 will be credited with the same on surrendering the company's obligation to repay said assessment out of the first earnings of the mine.

‡ Under the resolution levying the assessment, each shareholder is credited as paid on this assessment, the amount paid to the company by him on his shares on and since August 9th, 1887.

Pipe Line Certificates.

Messrs. Watson & Gibson report the following: The Stock Exchange, in looking for something that they could add to their list that would be active and at the same time crush the Consolidated, hit upon the plan of listing oil. They were probably satisfied Tuesday with its activity, as it rose to \$1.45 cash, against 99 cents, the highest "regular" price in that Exchange; but that part of the plan designed to crush the Consolidated didn't seem to work. The Stock Exchange were "hoist with their own petard," and were alone the sufferers by the squeeze. Those who were instrumental in placing oil on the Stock Exchange are understood to have claimed that its members carried about all the actual oil held in New York, but Tuesday's operations disclosed the fact that their members were practically destitute of certificates. If this were not so the purchase of the comparative small lot of 34,000 barrels cash (corresponding to 340 shares of stock) would not have advanced the price 50 cents per barrel.

The Herald of Wednesday had an amusing head line, which read: "The Stock Exchange's new pet (oil) scared its keepers yesterday." The breeze in the market occasioned a large amount of good-natured chaff, but the fact is that the best of feeling exists personally between members of the Stock Exchange and the Consolidated. Officially they are opposed to each, but they are like two lawyers who contend with each other in court but ride up town in the same cab and dine together. We all recognize the superior financial ability of the Stock Exchange, but we do not think it fair for any of them to disparage the safety of contracts on the Consolidated. By one-thirty o'clock Wednesday all of Tuesday's transactions were cleared, and not a failure or dispute arose in oil from an extreme advance yesterday of 6 1/2 cents. This corroborates our previous assertions that prudence and conservatism characterize the dealings in the Consolidated Exchange. The total sales of oil yesterday were 5,566,000 barrels, against 880,000 barrels in the Stock Exchange.

At the opening, Wednesday, the oil ring was like a mass meeting, and a scene of great excitement. The first sales were made at \$1. Later prices broke to 96 1/2c., rallying to 99 1/2c. and closing at 97 3/4c. Tuesday's antics of cash oil frightened shorts, and they were the chief buyers at the opening. The short interest was, in a great measure, eliminated, and the excitement of yesterday was followed by a calm to-day.

The market Thursday got down to 94 1/2c., closing Friday 94 1/2c. The excitement has subsided, and the short interest has eliminated, and the market settled down to dullness. The statistical position is strong, but it is uncertain how soon activity may bring better prices.

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

Mch.	Opening.	Highest.	Lowest.	Closing.	Sales.
3	82 3/4c.	94 1/2c.	92 1/2c.	93 3/4c.	1,026,000
5	93 1/2	94	93 1/2	93 3/4	981,000
6	93 1/2	\$1.00	93 1/2	99 1/4	3,566,000
7	\$1.00	1 00	96 1/2	97 3/4	4,140,000
8	96	96 1/2	94 1/2	95 1/2	1,840,000
9	94 1/2	95 1/2	94 1/2	94 1/2	1,895,000

Total sales in barrels.....15,457,000

The following were the quotations and sales at the New York Stock Exchange:

Mch.	Opening.	Highest.	Lowest.	Closing.	Sales.
3	93 1/2c.	93 3/4c.	92 3/4c.	93 3/4c.	263,000
5	93 1/2	93 1/2	93 1/2	93 1/2	457,000
6	93 1/2	\$1.45	93 1/2	99	830,000
7	99	1 00	97	97 3/4	610,000
8	96 1/2	96 1/2	95	95 1/2	501,000
9	95 1/2	95 1/2	93 1/2	95 1/2	351,000

Total sales in barrels 3,012,000

San Francisco Mining Stocks.

The following mining companies were delinquent at the San Francisco and Exchange Boards, at San Francisco, for non-payment of the annual dues of \$100 each: Quinn, Sutro, Niagara, Rock Island, Liverpool Consolidated, North Comstock, Succor Consolidated, Manhattan & Contention companies. These stocks were to have been officially stricken from the list on the 1st inst., but the matter has been deferred for a few days.

The San Francisco Mining Stock Board last week appointed a committee to inquire why more dividends are not paid out of the working of the Comstock mines. As it is now, milling expenses eat up all the profits, although it is known that half a dozen of the leading Comstock mines have ore that would justify paying good dividends. There is so little confidence in the present mining management that something must be done or the market will collapse. Three quarters of the daily transactions in the stock boards are merely "wash" sales between insiders.

Turn about is fair play, says the San Francisco Report. It is reported that some of the Comstock mine managers seriously contemplate appointing a committee to investigate the stock-brokerage business, as conducted through the medium of the Boards, with the view of better protecting themselves, who are the heaviest dealers in the Comstock shares, as well as the public at large.

They complain that the charges for dealing in stocks are excessively large; that while the cost of milling ores, the market rates for mining supplies of all kinds and the value of the silver produced by the mines have all steadily declined for several years past, the commissions charged by the brokers for buying and selling stocks have remained at the excessively high rates of one half of 1 per cent, and that the interest charges of the brokers have been kept at the usurious rate of 1 1/2 per cent per month, or 18 per cent per annum, with interest compounded monthly.

They also complain that while the mining interests have thus been languishing, the cost of listing stocks at one of the Boards has been raised to the exorbitant sum of \$1000 for each stock, with annual dues of \$100. And, as the brokers seem honestly bent upon good reforms, the committee of the mine managers will ask them to modify these excessive charges, which without doubt have done much to depress the mining industry.

And being bent on still greater reforms, the committee of the mine managers, as it is reported, will endeavor to stop such occasional practices among unscrupulous brokers as these, loaning their customers' stocks to short sellers, dumping the contents of their tin boxes upon a weak market, so as to buy the stocks back at reduced prices and make a good turn out of the property of their clients; turning stocks in themselves and reporting genuine purchases and sales; making fictitious prices to deceive and injure their customers, comparing order books with each other just before the regular sessions and thus exposing their customers' business; influencing their customers to buy and sell for their own (the brokers') aggrandizement; failing without a share of their customers' stocks on hand, but with all their obligations with fellow members of the Board fully settled, and afterwards resuming their seats in the Board.

Boston Mining Stocks. March 8.

[From our Special Correspondent.]

The market for copper stocks the past week has shown greater activity and a better tone throughout. The feature has been the sharp advance in Boston & Montana, a new favorite, which we alluded to in our last letter. It was reported that the French syndicate had an option on 10,000 shares of this stock at \$40, which expired yesterday, and it was expected that the stock would be taken and the price put much higher. This feeling induced outside buying and the stock was run up yesterday to \$47 from \$38 1/2 early