



of NAUMANN, except that the term "unstratified" deposits has a negative form and a dangerous comprehensiveness.

Bergrath GRODDECK defends but offers to modify his own system. As given in his text-book (1879), it was as follows :

- A. ORIGINAL DEPOSITS (*Ursprüngliche Lagerstätten*).
  - I. Stratified Deposits (*Geschichtete Lagerstätten*).  
Formed at the same time as the country-rock.
    - 1. Solid Ore-Strata (*Derbe Erzflötze*).
    - 2. Strata of Segregation (*Ausscheidungsflötze*).
    - 3. Ore-Beds (*Erzlager*).
  - II. Massive Deposits (*Massige Lagerstätten*).
  - III. Cavity-Fillings (*Hohlräume-füllungen*).  
Formed later than the country-rock.
    - 1. Fissure-Fillings (*Spaltenfüllungen*).
      - a. Veins in Massive Rocks.
      - b. Veins in Stratified Rocks.
    - 2. Cave-Fillings (*Hohlenfüllungen*).
  - IV. Metamorphic Deposits.
- B. DEPOSITS OF DEBRIS (*Trümmerlagerstätten*).

He proposes now to strike out class B, since deposits of *débris* may be included among stratified deposits, and also to substitute the terms "sedimentary" and "eruptive" for "stratified" and "massive," because the proposed terms more clearly express the genetic character of the system. He thus obtains four principal groups : 1. Sedimentary deposits ; 2. Eruptive deposits ; 3. Cavity-fillings ; 4. Metamorphic deposits.

The trouble with these changes is that, for the sake of simplicity and (to coin a word) *geneticity*, they sacrifice more important things. Deposits of *débris* are not always sedimentary or even stratified. The *débris* may be in place, as the result of a rock-decay and the removal of a part of the original material. Nor are stratified deposits always sedimentary, or massive deposits always eruptive. In short, this is a good illustration of a main difficulty which attends a natural, genetic classification : it is necessarily based largely on theories of formation ; and as such theories are to a considerable extent still unsettled, the time for a complete scheme of such a classification seems not to have arrived.

It is but fair to say that the distinguished author we have quoted recognizes this difficulty, though perhaps he undervalues it. According to him, the remedy is to include in the system only the simplest and best established geognostic views. This is easier said than done. And Herr GRODDECK'S attempt to do it is not wholly satisfactory.

Still less does he succeed in avoiding the other great difficulty of the case—namely, that his genetic classification, so far as it goes beyond the old distinction between beds and lodes (which is common to all systems), furnishes no sharp distinctions, after all. Ore-deposits are abundant which would belong to two or more of his classes at once ; and there are innumerable cases in practice, in which neighboring parts of the same deposit would be classed under different heads. Of course, the "metamorphic" class will include anything that one chooses to put in it, on the theory of the old-fashioned field geologist, who called every thing "metamorphic" which was so changed that he couldn't recognize it.

We welcome, nevertheless, this new contribution to an old but ever-interesting theme ; and we heartily agree with Bergrath GRODDECK that there is great need of close observation and study of individual deposits. What POSEPNY, SANDBERGER, and others have accomplished in this way, and what the geologists of our United States survey have done in their admirable monographs, may be accepted as examples of the progress which will ultimately bring us much revelatory light. GRODDECK'S book, with its numerous descriptions of "types," is a product of this tendency. We think mining engineers generally will bear us out in the statement that all the text-books, GÄTZSCHMANN, COTTA, GRIMM, GRODDECK, BURÁT, PHILLIPS, and many more, are chiefly referred to for their descriptions rather than their theories and classifications. As for generalizations, we may say of them as the immortal Yellowplush said of spelling, "hev'ry gen'lman 'as 'is hown."

EXPENSE OF RUSSELL'S LIXIVIATIONS.

We are indebted to Mr. E. H. RUSSELL for interesting figures showing the actual cost of raw lixiviation by the Russell process at Bullionville, Nevada, where it is applied to tailings, on the scale of 175 tons daily. The costs are in detail as follows :

HAULING BY HALLIDIE ROPEWAY (UP GRADE).

	Per day.	
4 men filling buckets.....	at \$2.50 = \$10.00	= 27½ cents per ton.
2 men dumping buckets.....	2.50 = 5.00	
1 blacksmith.....	4.00 = 4.00	
1 engineer.....	4.00 = 4.00	
2 teams and men.....	4.00 = 8.00	
3 cords of wood at \$4.50 and hauling.....	.40 = 14.70	
Repair materials.....	2.00 = 2.00	
	<b>\$47.70</b>	

MILLING LABOR.

	Per day.	
4 men on ore-tubs.....	at \$3.00 = \$12.00	= 24 cents per ton.
2 men on cars.....	2.50 = 5.00	
2 men on precipitating tubs.....	3.00 = 6.00	
1 man on press and roaster.....	3.00 = 3.00	
1 engineer and night foreman.....	5.00 = 5.00	
1 carpenter.....	3.50 = 3.50	
1 man on tailing pit.....	2.50 = 2.50	
1 assayer.....	3.00 = 3.00	
1 roustabout.....	2.00 = 2.00	
	<b>\$42.00</b>	

CHEMICALS AND SUPPLIES.		Per day.	
1½ pounds hyposulphite, per ton.....	at .06¼ =	\$17.06	= 51½ cents per ton.
3 pounds blue-stone, ".....	.07¼ =	38.06	
3 pounds sulphur (native), ".....	.01¼ =	6.56	
2 pounds lime, ".....	.01 =	3.50	
Coke, crucibles, oils, and repairs.....		10.00	
3 cords wood, per day.....	\$4.00 =	14.70	
		<b>\$89.88</b>	

GENERAL EXPENSE.			
Office, \$12 ; management, \$10.....		\$22.00	= 17¼ cents per ton.
Insurance and taxes.....		3.50	
Freight on sulphides.....		2.50	
Traveling expenses.....		2.00	
		<b>\$30.00</b>	

A Stetefeldt furnace will be used to chloridize material that needs such treatment before lixiviation. This furnace is not yet running ; but the following is a careful estimate, on the basis of 100 tons a day, of the cost of both chloridizing and leaching by this process. The smaller product per diem should be kept in mind when this is compared with the preceding statement of actual costs :

LABOR.			
<i>Ropeway.</i>			
2 teams and teamsters.....	at \$4.00 =	\$8.00	
2 filling and 2 dumping buckets.....	3.00 =	12.00	
6 men.....		<b>\$20.00</b>	
<i>Rolls, Driers, and Stetefeldt.</i>			
6 driers (8 hours).....	at \$2.50 =	\$15.00	
3 firemen ".....	3.00 =	9.00	
6 cooling-floor (8 hours).....	3.00 =	18.00	
2 on rolls.....	3.00 =	6.00	
2 on salt.....	2.50 =	5.00	
19 men.....		<b>\$53.00</b>	
<i>Leaching.</i>			
4 on ore-tubs.....	at \$3.00 =	\$12.00	
2 helpers.....	2.50 =	5.00	
2 precipitating and 1 sulphide press.....	3.00 =	9.00	
9 men.....		<b>\$26.00</b>	
<i>Miscellaneous.</i>			
1 superintendent.....	at \$10.00 =	\$10.00	
1 day foreman.....	5.00 =	5.00	
1 night foreman.....	4.00 =	4.00	
2 engineers, 1 machinist, 1 carpenter.....	4.00 =	16.00	
1 blacksmith.....	4.00 =	4.00	
1 blacksmith helper.....	3.00 =	2.00	
1 teamster and Co. team, and 1 assayer.....	4.00 =	8.00	
1 on tailing pit and 3 roustabouts.....	2.50 =	10.00	
15 men.....		<b>\$59.00</b>	
<i>SUPPLIES.</i>			
<i>Wood—Cords.</i>			
Driers and furnace, 12 cords.....	at \$4.50 =	\$54.00	
Boilers, 5 cords.....	4.50 =	22.50	
Hauling same.....	0.40 =	6.80	
17 cords.....		<b>\$83.30</b>	
<i>Chemicals.</i>			
325 lbs. sulphur.....	at .01¼ =	\$4.06	
200 " hyposulphite.....	.06¼ =	13.00	
175 " caustic soda.....	.05 =	8.75	
300 " blue-stone.....	.07¼ =	21.75	
1,000 lbs.....		<b>\$47.56</b>	
<i>Salt.</i>			
5 tons.....	at \$26.00 =	\$130.00	
Incidentals, oils, assay materials, repairs.....		\$12.00	
		<b>\$142.00</b>	
<i>GENERAL EXPENSE.</i>			
Office management, etc.....		\$27.00	
Total.....		<b>\$457.86</b>	
<i>EXPENSES PER TON.</i>			
Labor.....		= \$1.58	
Supplies.....		= 2 73	
General expense.....		= .27	
Total cost per ton.....		<b>\$4.58</b>	

Evidently the Russell process is going to be a boon to such millmen as have the right kind of ore to treat by it. It is a pity that the low-grade carbonates of Leadville are not suitable. \*

THE MARTIN PATENT CASE.

The case of COOPER and HEWITT against the Pennsylvania Steel Company for infringement of the Martin patent for the manufacture of open-hearth steel was argued recently before the United States Circuit Court at Philadelphia, after several years and a large amount of money had been spent in taking and printing testimony. The court has now decided that it has no jurisdiction (that is, no equity jurisdiction), because the bill, which was filed in January, 1882, was subsequently amended twice ; the second of these amendments was made in October, 1882, and the court holds that this was the real date of the commencement of the suit ; wherefore, it being admitted that the Martin patent expired in July, 1882, and that remedy in equity can not be had after the expiration of the patent, it follows that this proceeding began too late ; and if the plaintiffs seek a remedy, they must begin a suit at law. We have, of course, no opinion to express concerning this purely technical decision. It is, of course, unfortunate that so large an amount of expert testimony and research has been in vain ; and the prospect of getting any judicial determination of the validity of the Martin patent in this country is farther off than ever. An appeal to the Supreme Court on the legal point



above stated is not particularly promising as a means of swift redress. On the other hand, the prospect of presenting to a jury, *de novo*, a case it has taken three years and a half to try the first time, and which, in its present form, fills several octavos, and involves, on the question of "priority" alone, the discussion of about a hundred patents and other publications, is enough to appall the stoutest heart.

Meanwhile, as a mere matter of history, the claims of the Martin invention are settled beyond doubt. Two separate expert commissions in France have reported in their favor, after prolonged and thorough investigations, in which every thing urged against the Martin invention (on the score of novelty) in the recent American case was considered. In fact, the ammunition of the defendants in the latter case, to judge from their pleadings and proofs, was chiefly taken from the arsenal of the French cases. That the plaintiffs were thrown out of court on a preliminary plea, not touching the merits of the case, is a painful instance of the law's uncertainties.

## 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. We do not hold ourselves responsible for the opinions expressed by correspondents.]

## Magnetic Pyrites of the Ely Mine.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Referring to Mr. Cazin's criticism of my remarks on the "Magnetic Pyrites" of the Ely mine, I desire to say that I accept the justice of the same, and merely retained the popular nomenclature; for though the mineral in question is certainly devoid of magnetic qualities, it possesses all other physical characteristics of pyrrhotite, and I had supposed its chemical composition to be the same.

I should be glad to have Mr. Cazin enlighten us on these points, and also to give this substance a name.

I believe that many varieties of *magnetic pyrites* (or pyrrhotite) lack the quality of magnetism, and that it is not an essential accompaniment.

DORCHESTER, MASS., June 22.

EDWARD D. PETERS, JR.

## The Eames Iron Sponge in the Metallurgy of Copper, Silver, and Gold.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In all cases where gold or silver or both are constituents in Western copper ores, wet extraction would appear preferable to smelting, as it permits the obtaining of base and fine metals separately. In all methods for wet extraction of copper, the technical success of which has been established beyond doubt, metallic iron is used for the precipitation of copper. It is this necessity of metallic iron, whenever it had to be obtained from distant points of production, that rendered the smelting and shipment of matte or black copper economically preferable to our Western copper producers. Sponge iron has often been suggested as a material easily produced and peculiarly fit for the purpose of copper precipitation; but so far, its production has not been accompanied with satisfactory results.

Supposing the results, as stated in your issue of June 6th, of Dr. Eames's endeavors to be established—and I see no reason to doubt them—the production of metallic sponge iron for metallurgical purposes would become a matter of every day practice in our territories. Magnetic iron ore of great purity is of such frequent occurrence in our territories that it may be readily procured, and impure plumbago is almost as frequently met with.

In Colfax County, New Mexico, at Clifton, and in the neighborhood of Trinidad, Colorado, extensive deposits of plumbago are known to exist (coal veins metamorphosed by contact with and proximity to trap eruptions).

In the San Isidro Mountains, Fuerte Mountains, and in the Cañon San Diego de Guadalupe (where brimstone also occurs in abundance), only short distances from the plumbago, magnetic iron ores occur, thus offering all the local advantages desirable for sponge iron industry near the Trinidad coal, in a position available to copper producers in Colorado, New Mexico, and Arizona, at a time when the question of cost of production has become one of life or death to this industry.

The cost of plant required being proportionate to capacity demanded, and the process being a simple one, there is nothing in it to deter the copper producer himself from entering on the manufacture of sponge iron in connection with lixiviation. With the production of sponge iron made easy and economical, the Western copper producers may turn confidently to the wet extraction methods for copper, either leaving the fine metals, in part or in whole, in the residue for amalgamation, or dissolving and precipitating them by special treatment, according to the other facilities the special locality may offer. With metallic iron at hand at a reasonable outlay, the more complicated methods of wet extraction may be avoided, and some common-sense practice may be built up in the matter of lixiviation, the same as on this continent we did with amalgamation. In this respect, attention may be drawn to the Maidanpec (Servia) practice (see ENGINEERING AND MINING JOURNAL, October 11th, 1884), where, under the presence of both oxygenated and pyritic copper ores free from carbonates of lime, of magnesia, and iron, heap-roasting alone of the ore pressed to briquettes is sufficient to absorb all the copper as sulphate, the entire process being purely and simply the hot water solution and precipitation on iron. In our Western copper camps, both kinds of ore are frequently available, or iron pyrites where those of copper are lacking. There is a reasonable expectation, also, that the Stetefeldt spontaneous roasting process applied on ores thus mixed, as at Maidanpec, even in case the oxygenation of part be the consequence of previous treatment, will give, under proper regulation, the same result of sulphatizing the total of copper. The result of sulphatizing roasting is easily controlled as far as copper is concerned, and can be carried out to perfection in practice. Hot water dissolves all the sulphate of copper and what  $Ag_2SO_4$  there may be, and the latter is precipitated on copper,

the former on iron, and the solid residue is, with proper precaution, left in good shape for amalgamation, and for thus recovering the remainder of fine metal.

With a method of so simple a character, possible only where cheap metallic iron can be permanently procured, the Western copper producer, with his high percentage ores, may, on the one hand, easily avoid the Charybdis of complicated methods of extraction, and, on the other hand, avoid the Scylla of the costly smelting of matte or black copper under the necessity of depending on the Eastern or European refiner for the extraction of his fine metal. He thus may safely go into competition with the native copper mines working ores of low percentage.

Very respectfully,  
COPPERFIELD (formerly ELY), June 9.

F. M. F. CAZIN.

## Civil vs. Military Engineers.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In his last article, "Spectator" again touches upon the superior advantages of West Point as an engineering school, and the marvelous qualifications of its best graduates as *civil* engineers. This subject is important, and I shall have to postpone its discussion for a short time, until I can find a little more of the leisure that "Spectator" so amply possesses. I promise to lay before your readers such an additional array of facts as will make it apparent to the minds of all disinterested men that, neither in length of course nor thoroughness of instruction, does West Point compare favorably with many other schools of civil engineering in this country.

There are, however, a few simpler propositions in arrears that I would like to touch upon in my letter of to-day, concerning the practical side of the question under discussion, and its bearing upon the relative cost of work done by civil and military engineers. "Transit" has shown in his short but pointed statement that one civil engineer is worth four military engineers from an economic stand-point; or that the training and fitness of the civil engineer represents a saving of so many dollars and cents. Now, in any organization conducted on business principles, the promotion of the better man would naturally have followed; but such was not the case, and here we have a powerful element in the item of military waste in the execution of public works. The civil engineer knows that success in his "professional struggle" depends on his power to plan and execute work well and economically; the West Pointer knows that, at all events, the question of lack of economy will not be used with much force against him. His blunders, expensive as they may have been, will be covered up by the mantle of charity and *esprit de corps*, which is just large enough to take in all the officer, but fails to cover with its folds or exercise protective influence over any shortcomings of the civilian.

"Spectator" will ask, How can blunders be covered up in a system so well organized as ours, second to none in the world for its efficiency and fixedness of unavoidable responsibility, directness of action and economy? Of course, the answer would be difficult to give should we acknowledge the truth of the assertion. But we shall do nothing of the kind. There can be no economy in the system emphasized by "Transit." That it lacks efficiency, will appear from another extraordinary piece of harbor work at Galveston. Any student of this interesting bit of official literature will find in it ample proof of irresponsibility, disorder, ignorance, and lack of business principles in the conduct of this part of the government's business.

One officer says, with the authority of his office, that a certain part of a jetty was not under way, and could not of course have been constructed, not having been even located; while, at the same time, the Chief of Engineers had officially reported that nearly two miles of the part in question had been actually constructed. In another place, a denial of this statement is made; and contradiction follows contradiction in such a manner that one is forced to the inevitable conclusion that the persons in charge added to ignorance of construction (for which there may be the excuse that "Spectator" *cares not to accept*) ignorance of administrative systems—a grave fault that admits of no palliation. The estimated cost of the work to which I refer was \$169,000; the amount spent was \$500,000; and the effective result of the work is now buried as deeply as would have been the reputation of any civil engineer, had such a one been in charge of the work—nay, even more than that; for, had the latter been able to extricate himself sufficiently from a similar misfortune to stand again on his feet, he would have learned a lesson, though an expensive one to himself and the government. The military engineer, however, having suffered nothing in reputation or emoluments, as his civil competitor would, failed to profit by the lesson, and repeated the same blunder with a conspicuous lack of engineering intuition at an additional cost of probably \$2,000,000. Now, I hold that the system of teaching practical civil engineering to military graduates is altogether too expensive a luxury; especially, if we take into account not only the total loss of the above and similar examples of practical training, but also the considerable expense incurred in maintaining the excellent theoretic school from which the government evolves the *élite* of American engineers. It looks as if this sheet of the government account were all debit and no credit.

I desire to take up briefly another point on which "Spectator," feeling as sure of his ground as if he had the choicest desk-room in the "army building," impugns my veracity and displays either ignorance or want of candor. He says, contradicting me, "No officer under the rank of captain is assigned to the charge of public works," or "placed with authority in charge of construction." I deny it, and here are the proofs: Lieut. Dan C. King is now in charge of improvements in Yellowstone Park. Lieut. W. L. Fiske is disbursing officer in charge of surveys of the Mississippi River Commission. Lieut. S. S. Leach held this same commission for five years, while a lieutenant, and until October last. Lieut. W. L. Marshall was two years in charge of improvements at Lake Providence. Lieutenants C. F. Powell, Ed. Maguire, Ph. M. Price, and D. W. Lockwood have been in charge of work on North and North-western Lakes, and placed in authority over men of much experience and high attainments. Had I more time to hunt up more cases, it is probable the above list could be increased.

The question as to where the lieutenants did gain the practical experience fitting them to hold as subordinates civil assistants with years



of service, study, and professional experience, was asked by "C. D. M." "Spectator" feebly dodged the issue by saying that they were not where I "pretended" that they were. But he will have to admit that the machinery of promotion is, after all, the strongest qualification for fitness; and that, promotion or no promotion, the practical experience necessary to direct river work has dated in most cases, if not in all, from the instant of the first appearance of these officers on the works. Furthermore, "Spectator" flatly denies that army engineers are employed in the survey of the lakes. Yet, in the Chief Engineer's report for 1885, p. 345, estimates are given to prosecute the work of the North and Northwestern Lakes for the fiscal year ending June, 1886, these surveys being in charge of Lieut.-Col. O. M. Poe.

"Spectator" has evaded the explanation demanded as to why the West Point organization has failed to obey the regulations of Congress in reference to the appointment of civil engineers in charge of works. Is it because he would be obliged to admit the intolerance and greed of the military engineers? Such is the intensity of this intolerance and prejudice against civilians, that even line officers are converted into civil engineers rather than break the continuity of the military wall of unmanly prejudice. This forces me to point out the Jesuitical evasion of "Spectator," p. 259. [d]. He says: "There are no engineer officers employed in geographical explorations." But he knows that the above statement would be false had he said "army officers." Yet he must be well aware that, if the engineer officer is objectionable, the infantry and cavalry officers would be far more objectionable for the purposes involved in this controversy; even if his assertion were true, which it is not; for at least one engineer officer is so employed. A perusal of this controversy will show clearly that I make no distinction between the words West Pointer, army engineer or officer, military engineer or officer, in so far as these words affect the right of any military person, of either the army or navy, to perform duty as civil engineer to the detriment, subjugation, or exclusion of the latter. Many such officers are doing duty in the Signal Service; and they have been sending circulars to colleges deceiving young graduates into a service demanding a complete surrender of almost every possibility of success in life, if these inexperienced lads once fall into the trap.

What is true of the Signal Service is also true of the Alaskan Surveys. In spite of "Spectator," we find that Lieutenant Abercrombie has had charge of them till very lately; and that Lieutenant Allen is going out there this season.

Bearing upon this whole question and that of military encroachment, keeping in mind, also, how small the handful of military engineers is, section 1158 of the Revised Statutes says: "Engineers (army) shall not assume, or be ordered on any duty beyond the line of their immediate profession except by the special order of the President."

"Spectator," armed with his "esoteric" wink, gives a sly slap at the Coast Survey, becoming a historian, and quoting (?) law. For a man so strict as to the object of quotations, his "coolness" "fairly takes the breath." [His statements as to my misquotations will be considered as rhetorical padding until he specifies the misquotations.] "Spectator," in order to prove that the Coast Survey has swallowed the continent, and is the wolf that scolded the lamb that, etc., etc., quotes as follows, section 4687 Revised Statutes, "Officers of the army and navy shall, as far as practicable, be employed in the work of surveying the coasts of the United States;" but cautiously omits to add, "whenever, and in the manner required by the department having charge thereof;" and entirely forgets section 4648, which gives the President the power to detail the same officers in such a manner "as will be compatible with the successful prosecution of the work." Since "Spectator" boasts of being well posted in history behind the scenes, he may see much light in these modifying clauses, if he chooses to open his eyes. A chronological history of that struggle will make racy reading that "Spectator" is at liberty to record in the public prints. I neither challenge him, nor advise caution. The Coast Survey, which is a high recognized authority throughout the civilized world, as "Spectator" should know if he reads at all, can well take care of itself. The army engineers, no doubt, would like to absorb it and crawl into its *prestige*, just as the line officers of the navy have been attempting to take possession of the National Observatory; but God forbid that the ambition of deceived schemers should ever silence these two important public benefactions. I am ready for "Spectator;" he is not the only one who knows secrets. Some other people happen to know a few things that patriotic pride may have prevented from bleaching in sunlight.

I may as well say that I have not now, never have had, and never intend to have any connection with the Coast Survey.

Respectfully yours, C. U. E.

**New Caledonia Mineral Production.**—New Caledonia is in minerals the richest of the French colonies. In 1883, it produced 9025 tons of nickel ore, which yielded about 824 tons of nickel, worth 6,592,000 francs, or 8000 francs (\$1600) per metric ton. The production of chromium amounted to 3850 tons. French Guinea produced in 1882 1558 kilograms of gold, worth about five million francs (\$1,000,000).

**Electric Lights on Engines.**—The Lehigh Valley Railroad has contracted for the equipment of its engines with electric head-lights, subject to certain tests that are to be made between Easton and Jersey City early next week. The dynamo is run by a small engine of one and a half horse-power, attached to the side of the regular boiler, and fed by it. The invention is a Western one, manufactured and controlled by a company in Ohio. It is already in operation on the Pan-Handle Railroad west of Cincinnati.

**Electric Light Suit.**—The suit instituted June 25th by the Consolidated Electric Light Company, the owner of the Sawyer-Man system, against Thomas A. Edison and others, will probably determine the vexed question, who laid the foundation for successful incandescent electric lighting. The discovery of the use of the fibrous filament was awarded by the Patent-Office to Sawyer & Man after a long and exhaustive fight with Mr. Edison. This suit is brought to restrain Edison from infringing that patent. The amount involved is estimated at many millions. The Sawyer-Man Company has the patent. The Edison Company denies its right to it.

## THE MINNESOTA GOLD EXCITEMENT.

Correspondence of the Engineering and Mining Journal.

The entire collapse of this North Sea's bubble has not surprised intelligent and honest assayers to whom samples of the "gold rock" were submitted.

Just where the blame rests is a little in doubt at present; but all circumstances seem to point to an accidental concurrence of a few amateur, dishonest, self-styled assayers, who gave high returns on any rock, simply to add a few dollars to their incomes, without knowing the similar rascality of the others, or suspecting the extent of the excitement that was to be raised.

The chief culprit in these false returns now claims simply carelessness and want of knowledge of assaying to account for giving, during the past six months, hundreds of dollars per ton to any gabbro boulder, the necessary pyrites giving him the clue for a gold return. The same rock at another time would run high in silver. One St. Paul expert, after giving 25 ounces of gold per ton, with the remark that it occurs as "chloride of gold" (in those old weather-beaten, moss-covered rocks of Lake Superior), calmly says he does not think it much of a country for gold either, but looks for large silver yield.

Besides the assaying, no one but the United States Land-Office seems to have made any thing. Some \$100,000 have been paid for worthless land, mostly rocks, bluffs, and swamps, difficult to explore or reach, devoid of valuable timber or agricultural land. The fishing, however, is good. If it were not for the difference of level of the lakes, it would be difficult to decide whether to call the country an archipelago of lakes or of islands.

On our trip, in canoe, from Vermilion Lake to Grand Portage, we crossed 55 lakes and made 54 portages (32 miles portages), poled up six rapids, ran down many more, and yet did not go where the lakes were very plentiful, following mostly the United States boundary line of large lakes.

To the west of Emery's camp, the center of the gold excitement, only the upper traps rise above the water, so that it is doubtful if any thing will be found until the Vermilion Lake belt is reached. To the east, however, especially east of Gun Flint Lake, the Animikie or Canadian silver-bearing belt is very well developed, so that it is possible that rich silver deposits like those of Silver Islet, Rabbit and Silver Mountains, may be found. A dense underbrush and a heavy covering of moss make exploration especially difficult. There is without doubt a fine belt of iron ore nearer Lake Superior. For beautiful scenery, fine fishing, and opportunity to study greenstone trap in all its forms, this country is unsurpassed.

It might be justice if the United States Geological Survey would devote part of the \$100,000 obtained for these lands to determine the construction and continuation of the veins in this district.

DETROIT, MICH., JUNE, 1885.

W. M. COURTIS, M.E.

## BUTTE, MONTANA, NOTES.

Correspondence of the Engineering and Mining Journal.

In my last letter, I endeavored to show, by the mention of a number of valuable developments made during the last twelve months in the immediate vicinity of the Alice mine, which might be considered the silver center of the camp, that the opportunities for the profitable investment of capital were fully as numerous and promising here as in any of the newer fields that are now attracting attention. I had purposed to go in similar detail through the four or five miles square that compose the district, and to give a list of leased mines that have made names for themselves and profits for their operators, and of mines that after years of idleness have been reopened by the owners with gratifying results. To do this, however, would be a task of some magnitude, and would unduly tax the patience of your readers. Suffice it to say, that they are numerous, and several of them may now rank in the first class of properties. A less tedious way to show the openings for investment is to point to the fact that, among many hundred locations showing strong and promising veins, nearly 200 have shipped ore in larger or smaller quantities to the mills or the smelters, and of these but about seventy or eighty are now worked. On the remainder, work has been suspended for various reasons. Some were worked at a time when 60-ounce ore was the least that would pay at the high rate then charged for reduction, and have since been allowed to cave in, or belong to owners who have drifted away to other places. The remainder have generally been stopped at water-level for want of capital, or from the disinclination so often felt by prospectors and workmen to undertake operations to which they are not accustomed. It is more to a growing familiarity on their part with pumps and steam hoists than to any other cause that the discoveries and developments of the past few months are to be credited. The owners of these prospects are generally, I think, reasonable in their views, and are willing to give investors a fair "lay out." The water, although such a bugbear, is far from being difficult to deal with, light steam-pumps being sufficient to a depth of 300 or 400 feet, and those who have had the enterprise to tackle the problem have generally regretted that they had delayed so long.

One thing must be remembered to the credit of Butte. It has never had a "boom." Very little outside capital has been invested here, at least so far as silver mines are concerned. The Walker Brothers, of Salt Lake, invested thirty or forty thousand dollars in the Alice and Magna Charta mines, partially developed them, and put up a 20-stamp mill, which repaid their outlay in six or seven months. The Lexington Company purchased a mine that had already made its owner rich, and the Colorado Smelting Company erected its works and made a few purchases of mines that had carried ores peculiarly adapted to its smelting operations. Besides these and a few small purchases of the last few months, I remember no outside capital that has been invested here. The solid buildings in and around Butte, the stocks of goods, the flourishing bank accounts, are all the outcome of the work of men who came to the camp poor, and have made for themselves comfortable and in some cases very considerable fortunes.

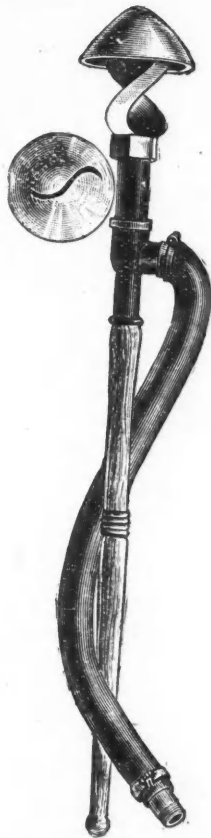
MINER.



EMPTYING ZINC RETORTS BY A STEAM-JET.

Written for the Engineering and Mining Journal by F. L. Clero, M.E.

Some time last fall, at the zinc-works of the Granby Mining and Smelting Company, in Pittsburg, Kansas, I saw an operation that, if a novelty, will prove of interest to some of your readers. It was the discharge of the residues from the retorts by means of a jet of live steam. The tool that is used in place of the ordinary "hook" and "heavy scraper" is about twelve feet long. About half of its length consists of a three-quarter inch steam-pipe, fitted at the free end with a right-angled elbow. To the other end of this pipe, is joined a shank or handle of solid iron, which is looped at the end to give it a more convenient grip. Between the open pipe and the solid handle, is inserted a "tee," with a branch pipe, to which is joined a nipple for the attachment of the coupling of a steam hose. In front of this "tee," is a shield from 8 inches to 10 inches in diameter, which is slightly "belled" toward the furnace. About 20 feet of pressure hose connects this tool with the stationary overhead steam-pipes, which bring the steam along both fronts of the furnace, from a boiler carrying from 40 to 45 pounds of steam. There are two points on each side of the furnace at which the hose can be attached to the steam-pipe, and from which half the retorts on that side can be reached. At each of these points, is a throttle-valve, by which the steam can be turned on or off from the cleaning tool. The furnace is about sixty feet long, and contains four hundred retorts, of which two hundred are on each side. These are arranged in four horizontal rows, each containing fifty retorts. Consequently the top row is within easy reach of a man standing on the



floor: a screen covering one row of retorts, and of convenient length, about 16 feet, is lowered in front of the row to be cleaned. This screen is pierced by holes 2½ inches in diameter, corresponding to the openings of the retorts. The manner of operating is as follows:

The steam having been turned on, the workman inserts the cleaning tool through the aperture in the screen, and pushes it back to the end of the retort. The cinder flies in all directions, but is mostly received by the screen, and directed downward into the cinder-pockets below; the shield protects the workman and the rubber hose from the hot cinder projected through the opening in the screen. As the workman withdraws the cleaner, he gives it two or three half-turns, and directs the jets against all parts of the retort. In order to clean out the butts of the retorts effectively, a small hole is made at the turn in the elbow so as to give two opposite steam-jets. The men get very expert in the use of this tool, and accomplish the work not only quickly, but with very few motions.

In practice, it works beautifully. The retorts, as I saw them, looked as clean as if they were new; at the instant the tool was withdrawn, they appeared somewhat dull, about a bright cherry-red, but they quickly brightened to a vivid orange. This method of cleaning has been in use for more than six months, and no evidence has been gathered that it injuriously affects the retorts, nor is it reasonable to suppose that it would be so severe a strain upon them as the scraping back and forth with the heavy iron scraper, or the filling them while hot with a moist charge. Any one who has assisted at the pandemonium of cleaning an old-fashioned seven or nine high double-decker of a Belgian furnace, and has seen a man perched on top of a table amid a shower of sparks, wrestling with a retort full of red-hot cinders, and felt the air resound with cries of "Hi, Hi, Hi, Hoo-ree! Oop, Hoo-ree. Oop!" must be struck as I was with the contrast, when he sees the same work more quickly accomplished by a man standing aloof from the furnace, with no more exertion than is needed to lift the somewhat heavy tool and slide it back over a rest to the end of the retort. Not only are fewer men required, and the labor of these diminished, but the time it takes to make the

charge is also reduced, and the furnace does not become so chilled, and its reducing capacity is considerably increased.

The honor of introducing this method of cleaning the retorts into Pittsburg, Kansas, belongs to the works of Mr. Robert Lanyon, who has humorously named the new contrivance "the steam half-shift man," and claims it as the invention of his sons. The other works in the neighborhood have paid him the compliment of not being slow to follow his lead, and it is now in use in some five or six of them. I have not given exact dimensions or particulars of construction of the cleaning tool, because they differ in different works. A very good general idea of it may be got from the tool for cleaning by steam the tubes of a locomotive flue boiler, which we illustrate; the relative dimensions being proportioned to suit the size of the retorts and to balance the tool so that it is easily handled. The blacksmith at the works makes and repairs the tools.

When the thing was first talked of, old zinc men, furnace brigadiers, shook their wise heads, and said that it had been tried and abandoned. Now that it is an acknowledged success, they explain the former failure by the fluxing of the charge in the retorts, and claim that steam will not blow out a softened slag such as is formed from some lean ores. I am not able to settle this question of originality or priority. Perhaps some of your readers are in possession of information bearing on the subject, and will be willing to further enlighten us.

THE CYANIDE AND BATTERY METHODS FOR THE DETERMINATION OF COPPER CONTRASTED.

Written for the Engineering and Mining Journal by Messrs. Torrey & Eaton, New York.

(Concluded from page 386.)

III. COMPARISON OF THE TWO METHODS.

The following are the comparative results deduced from the experiments on the two processes in question, which formed the subject of the preceding sections of this article:

When silver is present, the copper in the solution can be determined in a much shorter time by the use of the cyanide method, and with just as much accuracy as may be obtained by the employment of the battery; provided, of course, the necessary care is taken with the manipulations.

In the case of ores or alloys containing bismuth, the cyanide is unquestionably the best method for rapidly and efficiently determining any copper that is present. It is true that traces of bismuth are invariably carried during filtration into the ammoniacal filtrate; but, on the other hand, a small quantity of copper is retained by the precipitated bismuth, which is inseparable by mere washing. This serves as a correction to results that would otherwise be a trifle too high (that is, from .05 to .15 per cent).

If the battery method is made use of, the bismuth must afterward be determined in the deposited metal, thus involving a second analysis, and imperiling the accuracy of the results.

The copper contained in ores or alloys largely composed of lead or arsenic may also be estimated with accuracy by the cyanide method; while, if the battery be employed, incorrect results are obtained when large quantities of lead are present, or any amount of arsenic whatever is in solution. In the latter instance, the arsenic must be made the object of a special analysis of the deposit.

The copper in iron ores, etc., can be most accurately and quickly determined by the cyanide process, aided by the hydric sulphide separation, or, better still, by the rapid resolution of the iron precipitate and re-precipitation with ammoniac hydrate, and filtering; repeating this and adding the filtrates obtained to the main bulk of the solution until no blue tint is perceptible in the last filtrate. Excellent results are also obtainable by the use of the battery, but the process is not as rapid.

Nickeliferous and zincic copper ores are best examined by the battery method of analysis, although good results are yielded when the hydric sulphide modification of the cyanide process is substituted. Antimonial ores may be subjected to either method.

Before bringing our article to a conclusion, we insert the following table showing the results obtained when a number of ores, mattes, and metals were subjected to comparative tests by both of the processes:

TABLE OF RESULTS.

No.	Character of ore or metal.	Percentage obtained by cyanide.	Additional percentage obtained by resolution of iron, precipitate, etc.	Percentage obtained by battery, with remarks.
1	Borings of copper probably containing Bi.	96.81	Only traces of Fe, consequently no copper in precipitate.	Good-colored deposit. 97.40
2	A green carbonate, having some Fe and SiO <sub>2</sub> .	39.77	Trace.	Good-colored. 39.35
3	A sulphide of copper and iron, with silica.	4.01	Trifling.	A purple-tinted deposit speckled over with black spots. 3.00
4	A red-brown ore, containing Mn, Fe <sub>2</sub> O <sub>3</sub> , and pyrites.	7.83	No appreciable amount.	Fair deposit. 4.12
5	Considerable Fe, S (Ag), and Cu (a matte).	29.32	5.08 The precipitate from this contained a trace.	Deposit dark-colored. 39.57
6	Ore containing As, together with much SiO <sub>2</sub> , Fe <sub>2</sub> O <sub>3</sub> and Cu.	22.86	3.23	Deposit had dark-gray color, gave a garlic odor on heating. 27.30
7	Black copper, containing Ag, Bi, Fe in small quantities (is rather brittle).	95.896	Very faint trace.	Deposit had a brownish-gray hue, not a bright color. 97.05

We think that the cyanide is preferable in all cases to the method by battery; the latter, however, being useful in special determinations

where time is not an object, or where a check is desired on the cyanide method in the case of a doubtful ore.

Unless the cyanide process is employed only by practiced operators, it will be found of little use, save for rough "assays" of copper ores, or approximate analyses of alloys and mattes.

#### MODERN AMERICAN METHODS OF COPPER SMELTING.\*

By Edward D. Peters, Jr., M.E., M.D.

##### CHAPTER V.—CONTINUED.

The fact that lime mortar is totally unadapted to ordinary metallurgical uses, although doubtless universally known, is for some unaccountable reason frequently not acted upon, and the result in most cases is the rapid and total destruction of the furnace arch, chimney, flue, or whatever structure may happen to have been put together with such unfit material. The acid vapors immediately form a sulphate with the lime present in the mortar, and this, absorbing water, becomes gypsum and crystallizes, expanding with great force, breaking the joints, and soon crumbles and washes away. It is quite proper to use lime mortar in such portions of the structure as are free from contact with sulphurous gases, and yet require unusual strength, which can not be obtained with the clay substitute. Such, for instance, as in the construction of chimneys for metallurgical purposes, where the best results can only be obtained by the employment of both of these substances; lime mortar for the outside work, while the common clay mud is merely used for the inside layer, and the joints thoroughly protected against any invasion of the sulphur gases by plastering the whole interior with a thin coating of clay mortar, tempered with sand to such an extent that it will not crack and fall off in sheets. Further reference will be made to this point in the chapter on Furnace Building. The constant and flagrant violation of this law is a sufficient reason for its frequent reiteration. A recent example suggests itself, where the arches of a number of very expensive and nearly new calcining-furnaces have fallen in, causing a very heavy loss. A conversation with the mason who built them brought out the fact that they were constructed with lime mortar, he having had no orders to the contrary.

The size of the stall is somewhat dependent upon the quality of the ore to be roasted, a highly siliceous ore with a comparatively low percentage of sulphur permitting a much wider and higher stall than an ore with little gangue, and especially than one containing a considerable portion of iron pyrites, in which case extensive and unavoidable sintering will follow any attempt at increasing the size of the stall. A safe size for an average ore, containing a moderate amount of pyrite and demanding careful handling, is 8 feet in length by 6 feet in height by 6½ feet in width, the latter measurement being the maximum that is safe under any ordinary circumstances. It is best to build the lateral walls of the same thickness as the rear division, the increased stability and durability of the entire structure well repaying the slight additional expense in labor and material. The bottom should be paved with the same slabs placed flatwise and exactly reversed from the position in which they lay when formed; their upper surface now going downward, while their original lower surface, which should be perfectly smooth and level, now comes upward. The connection with the main flue is effected by means of eight or ten small rectangular openings—2 by 6 inches—in the rear wall, in two or more rows, and at a considerable distance from the ground. These are kept tightly closed by means of a bunch of old rags or a ball of clay, when there is no occasion for their remaining open; otherwise, the draught of the entire system might suffer.

The only air admitted to these stalls originally, at the Parrot works, came through such interstices as were left in roughly building up the temporary front wall; but experiments led to the addition of some four or six similar openings in each lateral wall, which did not communicate with the main culvert, but connected with the outside air by means of a small flue running longitudinally through each division wall, though not extending so far as the central passage. This innovation has been followed by a decided improvement in the oxidation of the ore and a great diminution in the amount of matte produced. An essential precaution in the management of these stalls is to maintain a thick coat of clay plastering over their entire interior surface, by which the heated ore is kept from sticking to the walls and causing the rapid destruction of the mason-work. A few moments' attention to the empty structure after each operation will keep the plastering intact and greatly lessen the cost of repairs. As the entire success of this process depends upon the strength and regularity of the draught, a stack of considerable size and height is essential.

A battery of 56 stalls as described requires at sea level a chimney 75 feet high, and with an internal area of at least nine square feet, as will be further explained in the chapter on the construction of calcining-furnaces. Any economy in the direction of diminishing the size of this important adjunct will be immediately noticed in the lengthening of the roasting process, and may reduce the capacity of the stalls to an incredible degree. The draught is regulated by means of a sheet-iron damper hung in the main flue, close to its junction with the chimney, while the same office is accomplished for individual stalls by partially filling the draught-holes in the rear wall with bits of bricks or balls of clay. In no portion of the process, are the skill and care of the roasting foreman better displayed than in his management of the draught, which must be varied according to the season and temperature of the air, as well as to the changing character of the ore.

As already intimated, a stall of the size and pattern just described will hold about twenty tons of pyritous ore, which should be kindled with the very smallest possible quantity of wood that will set it thoroughly on fire. This is essential for a far more important reason than the mere saving in fuel; for the slightest increase in the contents of the bed of wood on which the rock is heaped will, with pyritous or otherwise easily fusible ores, cause an amount of sintering and a formation of matte entirely disproportionate to the cause. Repeated trials can alone determine the various minutiae of this description essential to

the best possible results with the material under treatment; but in most cases, where the ore is at all pyritous, good sound wood will be found to produce too fierce a heat for the purpose, and recourse must be had to decayed wood, which can usually be obtained at from one half to two thirds of the price of the sound fuel. For an ore containing 30 per cent sulphur, and say 25 per cent silica, 25 cubic feet of rotten wood, or about one fifth of a cord, will be found ample; but this small proportion of fuel—only one one hundredth of a cord to the ton—must be utilized in a proper manner and with the most rigid economy and exactitude, or the heap will miss fire completely, doubling the cost of the operation as well as interfering with the estimated production of the plant. A quarter of an hour spent in watching the manipulations of an experienced roaster is better than pages of description, though the operation of preparing a stall for its ore charge is far from complicated.

After seeing that the layer of clay on the inclosing walls is renewed with the plastering-trowel where necessary, and that the draught-holes are open to the extent dictated by former experience, a central longitudinal and two lateral flues are constructed on the floor of the stall out of large, irregular fragments of ore. These are merely to introduce air to the interior and to insure the rapid and thorough kindling of the entire structure. They are filled and surrounded with dry kindling-wood, and the greater part of the fuel, split into long, thin sticks from the large rotten logs and poles that are usually provided, is disposed in a thin layer over the bottom of the stall, the amount slightly increasing toward each side. The structure is now filled with coarse ore and the ragging distributed throughout the entire contents rather than concentrated in a considerable layer merely upon the surface. As the stall becomes gradually filled, single small sticks of wood are placed between the ore and the lateral and back walls; while between the contents of the stall and the front wall, which is built up with large lumps of ore or stall matte, a considerable quantity of light wood is introduced to insure the thorough desulphurization of the anterior surface. A single car-load of ragging is spread on top of the coarse ore, and upon this a three-inch layer of shavings, bark, and chips is placed as a bed for about one and a half tons of raw fines, which, if disposed in the exact manner indicated and covered thoroughly with well-roasted ore from a contiguous stall, will be thoroughly desulphurized, and the covering layer itself being in a well calcined condition, the entire contents, after burning, may be passed on to the next operation.

It is only by employing great care and after repeated trials that the requisite skill will be attained to thoroughly calcine the large proportion of fines just indicated; but when one reflects that it amounts to some seven per cent of the entire ore, and perhaps one half of the total fines produced, it will be seen that the result is worthy of any pains that can be expended on it. The large pieces of raw ore that are employed in building the flues and front wall become gradually oxidized upon the surface, and slowly crumble away and mix with the finished product until they totally disappear and are replaced by fresh pieces. When the ore is to be removed, the front wall is taken down, and the lumps of ore from it are piled out of the way between the railroad that runs parallel, for the next occasion.

The stall should be fired at night, as the smoke is so dense during the first few hours, and the draught so sluggish, that only a small part of the fumes find their way into the proper channel; but by the time the wood is consumed, the entire structure has become so much warmer as greatly to improve the draught. The sulphur and other products of volatilization and "sweating"—alluded to in describing the management of roast-heaps—form a sort of crust upon the surface, and seal all interstices connecting with the atmosphere, and force nearly all fumes to pass into the flue, thus greatly abating a nuisance. For the first twenty-four hours, the fire is confined to those portions of the ore that were in immediate contact with the fuel. The process of oxidation advances very rapidly, and by the close of the second day it is hardly possible to bear the heat upon the middle of the upper surface of the stall, showing that at least one half the contents is already in combustion. By the end of the fourth day, a similar degree of temperature may be felt upon the upper surface at the very back of the stall, proving that the process has by that time invaded the entire length and breadth of the stall, though considerable time is still necessary for its thorough completion.

The successful progress of the process is clearly marked by the great rise in height of the entire contents, gaining some three inches in a single day, and frequently ascending some 12 inches above the level of the walls, at which it stood at the beginning of the operation, aside from the free space left to be filled out with ore from the disappearance of the fuel, amounting to some 25 cubic feet. This striking phenomenon, unfamiliar to those accustomed only to heap roasting, where a settling rather than a rising of the entire mass occurs, is simply due to the fact that, in all cases of oxidizing roasting, a greater or less, though always very marked, increase in bulk occurs from the swelling and fissuring of the oxidized ore. The contents of the roast-heap being perfectly free and unconfined, simply spread out laterally, while the consumption of the thick bed of fuel on which it rests detracts considerably from its height. The walls of the stall, however, inclose the ore in a rigid grasp, making it absolutely necessary that any increase in bulk, beyond that very slight amount necessary to replace the space occupied by the fuel, should take place vertically. In a badly burned stall, where extensive sintering has taken place, a sufficient amount of the sulphides has melted into a solid mass to cause a decided diminution in bulk instead of an increase, and the occurrence of crater-like depressions in the surface of the ore is positive evidence of such local fusions. That the pressure resulting from the increase in bulk is something quite tangible, may be inferred from the frequent pushing outward or even overturning of the heavy lateral walls of a stall, provided one or the other of its contiguous compartments are either empty or unbraced, while the temporary front wall would inevitably be thrown down within the first day after kindling if not strongly supported by timbers.

The length of time necessary for the process under consideration is another uncertain factor. If the stall be left undisturbed, it will usually burn quietly for a period of twelve days, demanding little or no attention beyond an occasional shovelful of covering if heating too fiercely at any one point, and requiring about three days additional to cool sufficiently to remove with comfort; but under ordinary every day circumstances,

\* Copy-right, 1885, by the Scientific Publishing Company.



no such moderation can be practiced, and the period of each operation can be curtailed, without any especial damage, to one half this time. To accomplish this without detriment to the process of desulphurization, the following precautions must be adopted: As soon as the anterior surface of the ore is so cool as to impart no disagreeable sensation to the hand, the temporary front wall should be removed, the natural adhesion common to all sulphureted ores when roasted in lumps preventing the caving of the vertical ore face, which should be most carefully attacked with pick and shovel, every precaution being taken not to penetrate beyond the line of comparative cooling, and only so much ore being removed at any one operation as is consistent with the uninterrupted progress of the roasting in the mass behind. At least six or eight inches of ore should be left between the outer air and the line of fire, and any sudden elevation of the surface temperature, as well as increased difficulty in detaching the ore from the face on which work is prosecuted, are signs to stop. To illustrate the ease with which the contents of a well-burned stall can be handled, the entire charge of ore from such a stall can be removed with nothing stronger than a shingle.

The first car-load is usually taken from the stall at the close of the fourth day, and the amount capable of removal may be rapidly increased, until in seven days the compartment is again empty.

By this careful method of constant and systematic slicing, some two or three tons of well-burned ore may be taken daily from 40 or 50 stalls, and the capacity of the roasting plant rendered more than double what it would be if they were left untouched for the time necessary for their complete desulphurization and cooling; while the process of oxidation does not suffer in the slightest degree if the precautions just enumerated are adhered to.

In the case of ores containing arsenical pyrites, or indeed in the presence of any form of arsenical or antimonial combinations, a considerable proportion of the same that would otherwise go into the next operation in the shape of antimonates and arsenates may be volatilized and completely dispersed by the admixture of chips, small coal, brushwood, or other carbonaceous materials, which, as in heap roasting, exercise a powerful reducing influence upon the products of oxidation just mentioned, and volatilize them in a metallic form. This simple precaution is of much greater value in the calcination of similar compounds in a pulverized condition in furnaces, where the different periods of oxidation and reduction are under the control of the operator, and can be made to follow each other in the manner most conducive to the object in view; but even in the rude processes under consideration, experience has shown in many cases that a decided improvement in the grade of copper has resulted from this device, the simplicity and economy of which are among its strongest recommendations.

The results obtained in stall roasting vary little as compared with those from burning in heaps. On the whole, it is not quite so easy to prevent the formation of matte in the former practice, nor do average and oft-repeated examinations show quite as good results in the elimination of the sulphur.

As circumstances may arise where it becomes the duty of the constructing metallurgist to decide between these two systems, to the positive exclusion of all methods involving the pulverization of the ore, and to give his reasons for and against each method, that his employers may also have some idea of the matter on which to base their advice or to rest the confirmation of his decision, it will be well concisely to review the comparative advantages and drawbacks of heap and stall roasting.\*

The first and most obvious advantage of the system of heap roasting is the apparent cheapness and simplicity of the plant, only a level area being required, without furnaces, flues, stacks, or other expensive appurtenances.

The extreme simplicity of the method and the very satisfactory results obtained under proper management also speak in its favor; but further than this, no arguments can be advanced in support of the process.

Even the economy in first cost of plant will be found more apparent than real, when the expense of the trestle-work and track, as well as the establishment of the different grades between spalling-shed, roast-yard, and smelting-house levels are considered, and no one will deny the absolute necessity for such an arrangement if work on a large scale is to be prosecuted with any degree of economy.

A careful comparative calculation of costs, corrected by the results of actual work, shows that under ordinary circumstances the difference in cost between the two plants under consideration is too trifling to have much weight in the choice of methods, and may even be on the side of the stalls in cases where the natural conformation of the land is unfavorable for the establishment of the terraces necessary for cheap heap roasting.

A far more important reason for the adoption of the stall system is the great saving in time, by which the delay incidental to the cruder process of calcination is diminished by at least eighty per cent.

In works of large capacity, this becomes a question of vital importance; for few smelting companies are so amply provided with capital as to carry a constant stock of some ten thousand tons of ore, representing a money value of several hundred thousand dollars, which is not at all an extravagant estimate for works of the capacity under consideration. The circumstance that this amount may be reduced to a sum not exceeding one fifth of the above by the substitution of the quicker method of calcination is a weighty argument for its adoption.

By a careful comparison of the expense of the two operations, we have already seen that a saving of about one third may be effected by the use of stalls, owing principally to their greater economy in fuel and labor.

A still further advantage may be claimed for them in the concentration of all noxious fumes into a single flue, and their discharge into the atmosphere at such an elevation as to insure their gradual diffusion and dispersion without annoyance or damage. This is a great boon to the surrounding country, and more especially to the workmen employed in the process of roasting, as any one familiar with the atmosphere of an establishment where heap roasting is practiced can testify.

\* See article on "The Mines and Smelting-Works of Butte City," by the author, in the United States publication on *Mineral Resources* (by A. Williams, Jr., 1885). The third method of roasting lump ore—that is, in continuous kilns, is only suited to certain peculiar conditions, and need not be considered when comparing the other two systems.

## THE NEW MINING CODE OF MEXICO.\*

By Richard E. Chism, M.E., Saltillo, Coahuila.

(Concluded from page 426.)

### IX.

Title IX. treats of contracts of habilitation and other contracts with reference to mines.

The contract of habilitation, or to furnish necessary moneys to the mine-owner for working his mines, may be made by the habilitator becoming part owner in the mine or as a simple loan or assistance. In either case, the stipulations of the contract between the parties are to be observed, or, if no contract exists, the provisions of the law.

When the agreement is, that the habilitator acquires a part of the mine, he shall keep his part as long as he maintains the habilitation; the profits shall first go to pay off the habilitation debt and afterward be divided between the owner and habilitator according to the part of the mine each one represents. If the habilitator should cease to habilitate, he shall lose that part of the mine that he has conditionally acquired, but shall have a right to be repaid all the capital spent on the mine.

The mine-owner can not be held with his other property to pay capital advanced for working mines; such debts are to be paid from the profits of the mine, of which fifty per cent is to be used in paying off the habilitation debts; that of shortest standing is to be paid first, and so on.

The debts, incumbrances, or mortgages that a mine may have are extinguished in case of losing the property on account of abandonment or for non-observance of the precepts of the code.

Habilitation debts can be secured by mortgage on other property, distinct from the mine; they are preferred over all other debts against the mine except workmen's wages. Among several habilitators, the preference shall be given to the last. These rules shall take effect even when the mine and business are attached and sold judicially.

If an habilitator agrees to furnish a certain amount of capital or to habilitate for a certain time, he must carry out the agreement under penalty of losing the right to collect whatever he may have paid in; and the miner may bring suit against him to compel fulfillment. A miner to whom the habilitator does not advance in time money to pay the workmen, may sell any available effects or tools to raise the necessary funds, and any loss thereon shall be for account of the habilitator.

Every habilitator who does not administer the mine may put in an inspector for his account, and the mine-owner may do the same when the habilitator administers. These inspectors shall not interfere with the administration of the mine, but shall watch and examine the operations, books, and accounts, and give notice to their employer of whatever he ought to know.

In sales and contracts with respect to mines or shares therein, there shall be no rescission on account of wrong, nor resource of integral restitution.†

Mine-owners and workmen are free to contract with each other to work mines on shares, or for salaries, or in any other way, and the contracts relative thereto shall be governed by the provisions of the common law.

### X.

Title X. treats of legal proceedings in mining lawsuits. The Mining Deputations must subject themselves in all economical and executive proceedings to the provisions of Titles IV. and VI. of this code.

Mining lawsuits must be substantiated and decided in each State by the proper judges and tribunals of that part and according to the laws of proceedings there in force, but with observance of the rules contained in this title.

The proceedings shall be summary whenever by its own nature the suit has not an especial or a short form according to the local laws in force.

The work of a mine or metallurgical works can not be suspended on account of litigation or attachment; an inspector can only be put in. The machinery, tools, utensils, and provisions necessary for or on hand in a mine or metallurgical works can not be attached or sequestered separately from the business for any debt of the mine-owner, except that, for the pay of the workmen, there may be taken and sold of the above objects enough to cover the debt. In every case of sequestration or execution of a mine or metallurgical works, the products thereof shall be devoted, first and of preference, to keeping up the workings.

### XI.

Title XI. treats of taxes upon mining. During the term of fifty years, counting from January 1st, 1885, the date of this law, all mines of mineral coal, iron, and quicksilver are to be exempted from direct taxes of every kind. Mining products are to be free from all taxes on their circulation within the republic, and quicksilver is to be free from all customs dues and all direct taxes.

Besides the coinage and exportation duties now levied, or that may be established, the mines not of the class especially excepted as above are not to pay more than one direct tax, which is to be fixed according to the value of the ore or substance in exploitation without deduction of expenses, and which shall not exceed two per cent of said value. This tax is to go to the State in which the mine may be situated, or to the Federation if the mine should be in the Federal District or the Territory of Lower California.

### XII.

Title XII. contains general provisions. It lays upon the Mining Deputations the obligation to watch over the exact fulfillment of this present

\* A paper read at the Chattanooga Meeting of the American Institute of Mining Engineers, May, 1885.

† The action for rescission on account of wrong holds where the party who buys any thing pays twice its value, or where the seller of any thing receives only one third its value. The resource of integral restitution holds in behalf of a minor for the return of a property wrongfully sold by a trustee or guardian, when the goods of the guardian are not sufficient to indemnify the wronged party, or for the rescission of sales made by a minor under tutelage with the consent of the tutor, if loss has resulted to the minor thereby.



law under direction of the Ministry of Encouragement. Where there is not time to communicate with that functionary, the deputations may, on their own responsibility, take such urgent measures as may be necessary for the preservation and regulation of work in mines, and the executive authorities must lend them all necessary assistance thereto.

The Mining Deputations and their employes shall be responsible for official misdemeanors or abuses according to the penal code of the Federal District. They and the experts, etc., shall be paid by fees according to the schedule formed by the Secretary of Encouragement, which fees are always to be paid by the denouncer or promoter of any proceeding or question.

Proprietors or habilitators of mines must have an agent or attorney in the district where their mines are seated, duly authorized for all legal proceedings. In default of such agent, any proceedings may be taken against the administrator, or person in charge of the mines, without any necessity of notifying the mine-owner.

Owners of mines or metallurgical works are obliged to supply such statistical data as may be asked for by the Mining Deputations, according to the instructions of the Secretary of Encouragement or of the General Directory of Statistics.

All mining properties legally acquired before the date at which this law commences to be in force are to continue to be held, even if of deposits or substances not comprehended in this law, or if their claims should have dimensions different from those now established. If such properties should be of substances that the present law awards to the owners of the soil, those at present in possession thereof, by virtue of denouncement, shall continue to hold the same, and shall enjoy an especial protection from denouncement for two years from the date of this code, in order to arrange for putting their properties in exploitation. After this time, if such properties are abandoned or forfeited, all rights therein shall revert to the owners of the soil.

Those States whose taxes upon mining and metallurgical works of any kind are not in conformity with the provisions of this code are to pass the necessary legislation to make them so before July 1st, 1885.

This code, dated November 22d, 1884, took effect all over the republic from and after the 1st day of January, 1885, at which time the Mining Ordinances of May 22d, 1783, and all laws, decrees, and regulations of the colonial epoch, of the Federation, or of the States, concerning the industry of mining, were absolutely abolished, even in those parts not contrary to this code. The digest above given contains all the main points of the new law. For the minor provisions, and for the detailed proceedings under the code, I must refer to a complete translation, which I expect to publish in another place.

#### ALASKA AS A MINING TERRITORY.

Frederick Schwatka, in *Bradstreet's*, says: For the small amount of Alaska that has been explored by those able to judge of its mineral capacities, it might be truly said that the prospect of its taking rank among the mineral-bearing territories may be said to be fair at least. Until very recently, people were prohibited from legally gaining any rights to mineral lands, and consequently those "prospects" that were good, but needed further verification to solicit capital, were legally strangled at once, if that verification called for an outlay of money. The law so recently thrown over Alaska coming on the same wave with the present financial depression, it is hardly fair to judge what good it may do until the latter is well past. On Douglas Island, in the southeastern horn, mines have been discovered of sufficient importance to build up the largest town in Alaska, Juneau. One mine here, the Treadwell, has a large quartz mill, while \$16,000,000 have been declined for it, owing to the prospects in sight. Indians, it is said, took the prospectors to this mine, or it might have remained a secret for another century. The Treadwell ore is gold-bearing and is a light-tinted quartz, crushing easily. Many other less satisfactory mines exist in this district; but as they are all near the little settlements, not previously determined by their existence, it is fair to presume that many valuable mines are yet hidden in the less accessible parts.

When I crossed over to the head of the Yukon River through a pass in the Alaska coast range of mountains, I knew that prospectors had preceded me, but with what luck was unknown. This river, the Yukon, is 2045 miles long. About 1700 miles from its mouth, where a large affluent, the d'Abbadie River, comes in from the east, prospects of gold commence and last in varying amounts almost to the mouth of the river. I afterward ascertained that miners had gone up the d'Abbadie River 200 miles prospecting. Everywhere we found gold that gave from ten to twelve "colors to the pan." Sometimes at the mouth of an incoming stream or in other favorable places, it would amount to twenty "colors," and sometimes sink to three or four, but it seemed to exist everywhere, but in no place could it be traced to much better prospects. To the very head of the d'Abbadie, it was the same, and one miner I afterward met, who had been in on this part of the river, said that this wide-spread diffusion of fine gold could even be traced up the sides of the steep hills. The Pelly River, a large tributary of the Yukon from the east, and about 1500 miles from its mouth, is the only tributary of the great river where miners have found placer gold in paying quantities, and even this can only be inferred from their returning from year to year to work on this stream, the amounts they realize being unknown to the outside world.

The Tanana, an immense tributary of the Yukon, probably a thousand miles in length and wholly unexplored, sweeps, according to Indian reports, along the foot-hills of this range, further westward, sending many little streams into the mountains themselves, and offering, I believe, from all the surrounding circumstances, the best field for prospecting in Alaska. It could be reached by descending the Yukon as I did in 1883. The current of the Tanana is very swift, a great obstacle in ascending it, but assuring a good deposition of placer gold if there be any. The Indians near the boundary, however, say they know a trail that leads to its head. The Scheffelin brothers prospected the Lower Yukon the year I was upon it (1883), and I understood from the elder brother, the discoverer of the Tombstone mines of Arizona, that he found ounce diggings on the Melozecargut, that might well pay individual enterprise, but would not suffice for extended capital. Gold-bearing

deposits on the Kenai peninsula were once claimed by the Russians, but they do not seem to have met expectations since.

#### SILVER.

Argentiferous galena mines have been worked in Golovin Bay, on the north shore of Norton Sound, and when I was near there in September, 1883, a sailing vessel, the Alaska, was loading with this ore for San Francisco. It was said to assay \$57 to the ton, and the supply seemed good. I afterward was told that the Alaska had never been heard from since. When at St. Michael's, on the southern side of Norton Sound, I was informed by an employe of the Alaska Company that the natives had shown him specimens of the same kind of ore taken somewhere between Golovin Bay and Unalachleet, and told him the supply was inexhaustible, they having become familiar with the ore by seeing it often at the Golovin mines, where they had been.

#### COPPER.

Native copper for years has been brought down the Copper or Atna River of Alaska by the Indians, and from here found its way to many white people in the way of trade, and so on. The Copper River is not navigable, except in stretches, being full of rapids, falls, etc., by Indian reports at one place a glacier jutting into the stream. So far, the Indians have prevented the whites from entering this valley far, and have refused to disclose the whereabouts of the mine. The river is said by them to have two principal forks, and each one heads in a lake. When I was upon the Yukon River, I was shown specimens of copper ore taken from the valley near the boundary, which at once indicated good azurite or the blue carbonate of copper. It came from quite an extensive ledge cropping out. All the rest that is known concerning it is from Indian reports, but agrees so well with what would be expected that I give them. This blue-stone, they say, crops out here and there for a distance inland equal to a day or two's journey in the winter with dogs and sledge, or probably from twenty to thirty miles; they then have the same appearance of a reddish stone for a like distance, and then they come to a lake in the mountains, where is found native copper in sheets, and where they get enough for arrow-heads, although they seldom visit it, owing to hostile Indians living about it. Geologically, their reports agree well with facts. In the mountainous country, where igneous action has been at work since the copper was deposited, it has been smelted by natural operations, and appears in sheets as native copper, while the azurite or blue carbonate is in its original form of deposition, while half-way between, the heat, though not great enough to smelt, has driven away an equivalent of carbonic acid, leaving it as cuprite or red oxide. If the deposits are any thing near like the dimensions given by the Indians, this copper field must rival any district now known of that mineral. The Yukonis navigable well past this district, and large quantities of Sitka spruce cover the country near it, from which coke could be made for smelting, while coal exists, though not tested, on the river a little lower down. Agriculturally, Alaska is poor, though hardy vegetables by extra care can be raised in some parts sufficient for local consumption, although, if other industries open lines of transportation, they too will be imported.

Stock-raising, however, seems perfectly feasible in most of the Aleutian Islands, and were it not for the mosquitoes, other districts could be named for hardy breeds. The advantages of the Aleutian Islands are the monopoly of ranges without fencing, and advantages of assorting where there are many islands, the needlessness of branding, the abolishing of "round-ups," etc. The climate of this chain is phenomenal for so high a latitude, the coldest weather ever recorded—about fifty years ago—being two degrees above zero, and since the United States has had it, six degrees above was the coldest noted at any United States signal station on them. The islands are covered with a perfect network of little streams, so that stock would have no great distance to travel to water—a cause of tough beef. Luxurious grasses grow in the valleys up to one's knees, while the rolling hills are covered with a shorter bunch-grass up to 2000 feet above the sea-level. During the shipping season in the summer and fall, a steady northwest wind can be depended upon, materially assisting shipments to the United States ports lower down. Of course, a company must be large enough to control its own ships, etc., which would practically bar small capital from operating, at least until friendly larger companies had first started.

**A New Secondary Battery.**—At a recent meeting of the Berlin Physical Society, Dr. Kalischer described a new secondary battery, intended to overcome the disadvantage of the usual accumulators—namely, that the sheet of lead used as anode is very soon destroyed. This object he is said to have attained by adopting a highly concentrated solution of nitrate of lead as electrolyte, and iron as anode. The iron, on being immersed in the solution of lead, becomes passive, and resists every corroding effect of the fluid; in other respects, the peroxide of lead on the electric charge becomes deposited at the anode as a very firm, coherent mass, enveloping and protecting the iron on all sides. The charge is continued till the greater part of the nitrate of lead is decomposed, a condition that is marked by the occurrence of a greater development of gas at the anode. At the beginning of the charge, all development of gas must be avoided, as otherwise the peroxide of lead, or more correctly, the hydrate of peroxide of lead, becomes covered with bubbles. As cathode, a sheet of lead is used, but it is attended by two disadvantages. In the first place, the lead, during the charge, separates itself at the cathode into long crystal threads, which soon pass through the fluid and produce short closing (of the current). In the second place, the nitric acid, which remains in the fluid after the separation of the lead, acts very powerfully on the sheet of lead. Both disadvantages Dr. Kalischer avoids by amalgamizing the cathode. This accumulator of iron, concentrated solution of nitrate of lead, and amalgamized lead yields, after the electric charge, which can be carried out without any special preparations, a current of about 2 volts; after about six hours' discharge, however, the electro-motive force sinks to 1.7 volts, but, on the battery being left to itself for twenty-four hours, it becomes a little increased. According to the measurements hitherto taken, the functions of this accumulator are satisfactory. An attempt to substitute sulphuric manganese for nitric lead in this battery does not answer the purpose, as the peroxide of manganese separates itself, not in a continuous layer, but in loose scales.



**FURNACE, MILL, AND FACTORY.**

To the Cincinnati Corrugating Company has been awarded by the New Orleans Exhibition a gold medal of the first class for "corrugated iron for building purposes."

The Griffin Manufacturing Company, No. 92 Liberty street, this city, recently erected a mill at the phosphate-works of Read & Co., Newtown Creek, Long Island, N. Y. It is running steadily about one and one half tons an hour, sixty mesh, at a speed of 200 revolutions a minute. The dynamometer shows that it requires from 18½ to 19½ horse-power. Another mill has been ordered, and orders are expected for three more within thirty days. The trial has been entirely satisfactory.

Lombard, Ayers & Co., oil refiners at Bayonne, New Jersey, have a 60 horse-power Westinghouse automatic engine driving a fan, which was started some time last November, and has made 320 revolutions each and every minute, running continuously.

The Keystone Bridge Company, of Pittsburg, this week began rolling the massive steel girders, four feet deep, that form the anchorage sixty-two feet below the summit of the pedestal of the Bartholdi statue.

Orders have been received to keep the Baltimore & Ohio rolling-mill at Cumberland, Md., closed until July 1st.

The sheriff has levied upon the works of Byar & Co., founders and machinists at Pottstown, on an execution of \$5500. The firm's liabilities are said to be from \$13,000 to \$15,000, and their assets from \$20,000 to \$25,000.

The Wason Car-Works, at Chattanooga, Tenn., has made an assignment to H. Clay Evans. The unsecured liabilities are \$17,617.25; unincumbered assets, \$20,040.83. This is the largest car-wheel works in the South. Mr. Evans will continue the business for the company for nine months and then dispose of the property.

The Harrington & King Perforating Company has taken possession of its new shops, Nos. 224 and 226 North Union street, Chicago, Ill. It now has largely increased facilities for the prompt execution of orders.

An explosion occurred at the Penn Mills, near Albion, Pa., on the 19th inst., injuring several men and causing a loss of several thousand dollars.

The manufacture of "Taggers" iron from waste material by the Columbia Rolling-Mill Company seems to be making progress. The company organized with a capital of \$500,000, divided into 100,000 shares at \$5 each. One factory is already running, and negotiations are on foot for an additional building in Jersey City.

The Mahoning Valley Iron Company, Andrews Brothers & Co., and the Youngstown Rolling-Mill Company, of Youngstown, Ohio, have secured an option to lease the Vulcan Steel-Works, near St. Louis.

The Tanite Company, Stroudsburg, Pa., reports a steady demand for its emery wheels and grinding machinery. It is about to bring out some new grinding tools that will be of interest to machinists.

The Lane & Woodworth Patent Glass Roofing Company, of Youngstown, Ohio, has made an assignment to Disney Rogers. The company was organized in 1881 to manufacture glass roofs. The works have not been in operation for a year. The liabilities are \$9000.

The receiver of the Gallia furnace lands sold at public sale at Ironton, Ohio, last week, about 1000 acres of the 5500 for \$5885.02. All the lands sold were outlying tracts. The furnace tract of 1000 acres received no bid. There are still about 4500 acres unsold. The first mortgage holder, John T. Wilson, has a claim of about \$30,000, and he proposes to sell it together if possible.

**LABOR AND WAGES.**

A dispatch from Stafford, England, says that an order has been issued to reduce the wages of nail workers from 12 to 20 per cent. A strike is threatened that will involve a large number of persons.

The arbitrators have failed to adjust the difficulties between Congressman Scott and his 700 employés at the Pennsylvania colliery, and on June 23d the strike was resumed. The miners demand December wages, while Mr. Scott offers 10 per cent less.

According to reports dated June 22d, the force of miners, at Pocahontas coal mines, Va., is largely

reduced, because vessels can not be secured at Norfolk to transport the output.

The miners at Soddy coal mines, Tenn., who struck two weeks ago, resumed June 22d at the reduction. The price agreed on is sixty cents a ton, and the sliding-scale is accepted for the adjustment of wages. A three years' contract has been signed.

The Coal Miners' Association will hold its first National Convention at Indianapolis on July 6th.

The strikes and lock-outs at the Highland, Jeddo, and Beaver Meadow collieries, Pennsylvania, are over, and the miners who have not been blacklisted or quit the place for good are returning to work.

**TRANSPORTATION NOTES.**

A new and important railroad line is under consideration by New York capitalists. It will extend from Bristol, Tenn., to Mount Airy, N. C., and thence to Danville, Va., connecting the East Tennessee, Virginia & Georgia and the Norfolk & Western roads with the Cape Fear & Yadkin Valley and the Richmond & Danville. A line from Danville to Claremont, on the James River, is now building. When complete, this line will be over 100 miles shorter than any existing route from Cincinnati to the Atlantic seaboard.

The statement of the business of all the lines of the Pennsylvania Railroad Company east of Pittsburg and Erie for May, 1885, as compared with the same month in 1884, shows a decrease in net earnings of \$284,199.

Advices are, that the Denver, Grand River & Aspen Railroad Company has decided upon a route for the proposed road to Aspen, Colo. The new road will begin from the terminus of the Denver & Rio Grande track at Red Cliff, and run down to Glenwood Springs, and thence up the valley to Aspen.

**COAL TRADE NOTES.**

**ENGLAND.**

The latest dispatches state that one hundred and forty persons were killed by the explosions in the Pendlebury colliery, near Manchester, June 18th.

By an explosion on the 20th inst., in the Burley Pit, at Apedale, North Staffordshire, ten persons were killed.

**NEW MEXICO.**

The Gallup Coal Company is working what is known as the McMillan mine. It is estimated that the output this year will reach 75,000 tons. The cost of coal to the consumer depends upon the distance of the haul. At the mines, the price is about \$2.25.

**OHIO.**

By the falling of the roof in a coal mine near Richmond, on the 20th inst., two men were killed and one fatally injured.

**PENNSYLVANIA.**

**ANTHRACITE.**

According to Mine Inspectors' Clerk Rahn's report, there were, in May, in Mr. Gay's district, 10 accidents, none fatal; in Mr. Mauchline's district, 6 accidents, 2 fatal; and in Mr. Ryan's district, 23 accidents, 9 fatal. There were 31,499 persons employed in the three districts, an average of 17 plus days, and there were shipped 782,952,107 tons of coal.

The coal-breaker of Messrs. R. Penn Smith & Co., at Lehigh, below Mauch Chunk, was destroyed by fire on the 21st inst. Besides the breaker and trestling, the office, engine-house, and forty Lehigh Valley coal cars, twenty of them loaded, were burned. The fire spread rapidly, and burned all the Lehigh Valley's telegraph wires, and came near to destroying the Lehigh & Susquehanna railroad bridge that spans the Lehigh. The breaker has been in operation fifteen months. The loss is estimated at \$40,000.

Since the Messrs. Heaton surrendered the Cuyler colliery to the Philadelphia & Reading Coal and Iron Company, no other work than pumping out water at the east and west slopes has been done. The water in the west slope has been lowered to within five feet of the bottom.

A tunnel was begun this week at Beechwood. It is to be driven from the Big Vein to the Primrose, and must be finished before the work of making an outlet can be pushed forward.

The coroner's jury investigating the recent explosion in the Susquehanna Coal Company's slope at West Nanticoke, by which three men were killed, has agreed upon a verdict that the deaths were caused by the carelessness of one of the victims, Fallgofski.

Breaker No. 6, at Lansford, Carbon County, belonging to the Lehigh Coal and Navigation Company, was destroyed by fire on the 20th inst. The loss is \$80,000. The fire is believed to have originated from a spark thrown by a passing locomotive during the absence of the employés.

A fire broke out in the fan-way of the North Ashland colliery, at Ashland, on the 21st inst. The flames crept up to the surface, destroying the fan-house and setting fire to a vein of coal. The fire originated in the engine-house, and is supposed to have been caused by a spark from the lamp of a miner. The mine has been flooded. This will cause a suspension of work for six months, and possibly a year.

**BITUMINOUS.**

It is rumored that a syndicate of New York and Philadelphia capitalists has secured leases of the extensive coal-field between Ligonier and the Pennsylvania road. The tract covers about 8000 acres of an 8-foot vein.

Nearly all the mines in the first pool closed on the 20th inst. Most of the other pools will probably follow this week.

The Youngstown & Chicago Coal Company has resumed operations in the mine of Haseltine, Jacobs & Co., on Thomas Run, near Pittsburg, and expects to ship coal regularly to Chicago.

**COKE.**

The coke producers held an important meeting at Pittsburg on the 20th inst., at which encouraging reports were submitted, stating that the iron-workers' strike had not affected the trade. The price for July was fixed at \$1.20 a ton.

The Atlas Coke Company, at Dunbar, has shut down on account of fire-damp.

**GAS AND PETROLEUM NOTES.**

Exports of refined, crude, and naphtha from the following ports, January 1st to June 20th:

	1885.	1884.
	Gallons.	Gallons.
From Boston.....	3,496,121	2,575,412
Philadelphia.....	61,617,716	33,259,383
Baltimore.....	4,734,721	5,350,224
New York.....	167,686,101	168,509,453
Total exports.....	237,534,659	209,694,472

**PENNSYLVANIA.**

The Manufacturers' Natural Gas Company has been formed at Canonsburg, with a capital stock of \$500,000. Four wells are already contracted for. Preparations will shortly be made to run a pipe line, possibly a double one, to Pittsburg, where the gas will be used for manufacturing purposes.

The natural gas companies at Pittsburg are now branching out for the business houses, and several mains on the large thoroughfares are already projected. The Carpenter Company will soon lay a line along Second avenue.

It is stated that by the 1st of July every iron mill in Pittsburg and vicinity, with one exception, will be using natural gas as a fuel.

The Alleghany Water Committee intends, if possible, to set aside the coal contracts at the works, and introduce natural gas. It is said that the city would save about \$9000 a year by using the gas.

**GENERAL MINING NEWS.**

**ARIZONA.**

**CONGER MINING AND MILLING COMPANY.**—The mines and other property belonging to this company have been leased to David Rauk and others, of Canton, Ohio, for one year. The consideration paid for the lease by Mr. Rauk and his colleagues is the surrender of claims amounting to \$10,000 which they hold against the company. Operations are to begin immediately.

**GRAHAM COUNTY.**

**COLORADO & ARIZONA SAMPLING AND MINING COMPANY.**—Articles of incorporation have been filed in the office of the Secretary of State of Colorado. The capital stock is \$50,000. The business of the company will be carried on at Pima, Arizona, with the principal office in Denver. The directors for the first year are C. L. Webb, Peter Winne, James H. Brown, James F. Matthews, George G. Darrow, Charles F. Cobb, and Frank Dillingham.

**CALIFORNIA.**

**MONO COUNTY—BODIE DISTRICT.**

Reports for week ended June 15th:

**BODIE CONSOLIDATED.**—In the east drift on the 700 level, a streak of quartz about 8 inches in width was

struck that gives an average assay of \$10. The water has been taken out of the 800 level, in order to repair the pump. Twenty-three men are employed.

**BODIE TUNNEL.**—The mill is undergoing repairs preparatory to starting up, which will occur about the 1st proximo. Arrangements are making for the resumption of work on the mine.

**STANDARD CONSOLIDATED.**—Work goes on as usual; 310 tons of ore were shipped to the mill.

PATTISON DISTRICT.

**SUMMERS CONSOLIDATED.**—The first bar of bullion from the Summers Consolidated mine was received at San Francisco on the 16th inst. It is valued at \$1468.

NEVADA COUNTY.

**LOAMI GOLD AND SILVER MINING COMPANY.**—Articles of incorporation have been filed. The object of the company is to carry on mining in Nevada County. Principal place of business, Grass Valley. Directors: D. B. Marwick, Paul S. Sears, George W. Stephenson, D. W. Allen, H. L. Kinney. Capital stock, \$150,000.

COLORADO.

CHAFFEE COUNTY.

**SILENT FRIEND.**—A. T. Hathaway, who has a bond on this mine of Monarch, has shipped a hundred-ton lot of ore to Leadville.

**SILVER DALE.**—The sale of 1,000,000 francs' worth of this company's stock to French capitalists is reported. The property consists of barren veins and a town-site near Winfield. The mining editor of the Leadville *Herald* states that he inspected the Silver Dale some time ago, and speaks from personal knowledge when he says the property is not worth a tinker's dam.

**URANUS.**—A car-load of ore was recently shipped to Chanute & Holden, Leadville, the average value of which was 100 ounces. The ore is a sulphuret, and improves steadily as development proceeds. The present workings are a tunnel twenty-five feet, a shaft fifty feet from the tunnel level, and a drift 160 feet below the bottom of the shaft.

CLEAR CREEK COUNTY.

The old Campbell smelter at Idaho Springs, now known as the Matthews & Webb, had been in operation two days on the 20th inst., with every prospect of success. The Matthews & Webb smelter is the first of several projected and now building to go into operation. The frame-work to inclose the Frank Osbiston smelter has been raised, and part of the iron roofing has been put on.

**COLORADO CENTRAL.**—A larger plant is erecting that will enable the company to better utilize the water-power, and will double the present production of the mine.

**LITTLE ALICE.**—This company's placer mines at Silver City are now worked by a pool of lessees.

**MAINE, PHOENIX & SCOTIA.**—For the year ended June 1st, 1885, 229 tons of ore, valued at \$15,798.88, have been shipped. Only development-work has been going forward. Work in the shaft will begin about July 1st.

**SEVEN THIRTY.**—Thirteen drifts are running, and large reserves of rich ground opened and held for future stoping. Eleven of the drifts are in mineral. A car-load of ore, recently shipped to the Omaha & Grant smelter, at Denver, carried 166 ounces silver and 35 per cent lead.

**STEVENS.**—Mr. H. M. Griffin recently purchased the whole of the stock and bonds of this company. Mr. Griffin has for some time owned the Northeastern Stevens, and will in future work the two properties as one. It now comprises nine patented adjoining claims, and six mill-sites, covering some 50 acres of surface, and extending 3000 feet along the main vein. The shafts, tunnels, and drifts are already very extensive, and there is considerable ore in sight.

**SWEET HOME.**—The mine is developing by a large force of miners. The ore is worked by a Hendrie & Bolthoff stamp mill, the capacity of which is increasing from 10 to 20 stamps.

CUSTER COUNTY.

**BASSICK.**—Several judgments were taken against the Bassick Mining Company on the 18th inst., and a report of the referees in the lien cases was to be filed and judgments in these cases rendered. It is rumored that Mr. James H. Kurtz has been appointed receiver. Mr. Kurtz has been foreman of the mine for some time.

**TERRIBLE.**—Messrs. Grant, Eddy & James are said to have purchased this mine and mill.

GILPIN COUNTY.

**DENVER GOLD COMPANY, LIMITED.**—In order to carry out developments in the north lode in the direction of the Camp Grove claim, the stockholders are asked to subscribe \$25,000. This amount can be raised on debentures, the terms of issue being as before, namely, interest at 10 per cent per annum, with 10 per cent premium when paid off, and 200 fully paid-up shares for every \$250 debenture subscribed. The issue would be subject only to the priority of the issue of debentures already made. The mill and plant on the mine are said to be ample security for a much larger sum than the present amount of debentures, namely, \$25,000. During the past year, there has been a falling off in the value of the ore.

**GERMAN CONSOLIDATED.**—Various improvements have been made in and around the mill, which will soon be started up on ore from the Bates-Hunter mine.

**GILPIN COUNTY.**—The property of this company has been leased to a pool, who will put in a Cornish pump and begin sinking the main shaft.

**GUNNELL.**—An important strike has been made in the lower workings. The Grand Army shaft is down over 800 feet.

**KING MINE.**—This company, which is a reorganization of the King Gold and Silver Mining Company, will erect new machinery over the main shaft, for the purpose of keeping the water down. When these improvements are in working order, sinking the new shaft to a farther depth of 200 feet will begin.

HINSDALE COUNTY.

**CROOKE MINING AND SMELTING COMPANY.**—A committee of investigation is to be formed for the purpose of inquiring into the affairs of the company.

LAKE COUNTY.

The Leadville *Herald* reports the following:

**ADAMS.**—It is stated that the company will soon let a contract for the treatment of about ten thousand tons of high-grade lead ore.

**AMERICAN.**—The desulphurizing or reverberatory furnace at this company's smelter has been completed for some time past, but has not yet been brought into use.

**EVENING STAR.**—The company is filling a contract with the Durango smelter for 500 tons of argentiferous iron ore, to be used as a fluxing material.

**HIBERNIA CONSOLIDATED.**—Some shipments of fair ore have been made during the past month.

**LITTLE SLIVER.**—Arrangements are making for the sinking of a new shaft. The shaft, it is expected, will have to be put down about 400 feet, and will unquestionably encounter considerable water. Anticipating a strong flow of water, it will be made sufficiently large to accommodate all the pumps that may possibly be required to keep the mine dry.

**MAID OF ERIN AND THE HENRIETT.**—The ore of these mines has been contracted for by the Pueblo Smelting and Refining Company for the next six months.

**MORNING STAR.**—The Nevins shaft has disclosed a two-foot body of fine ore. The shaft and neighboring ground are worked under a lease. The mineral found returns thirty ounces in silver to the ton and thirty-seven per cent in lead, and is found in the upper contact.

**TENDERFOOT.**—This mine, on Little Ella Hill, is producing some fine lead carbonate ore. The developments in the mine disclose an ore-chute crossing the claim diagonally, near the western end. The ore-chute is opened for about sixty feet, showing a thickness of from two to four feet and a width of from eight to twenty feet. The northeastern end of the workings discloses the chute to within a few feet of the Cleveland lode. The ore extracted and sold carried a fair amount of silver and more than the average quantity of lead and gold.

**HOMESTAKE.**—The mine is looking well, and the middle tunnel shows a six-inch streak of high-grade ore. Much fine-grade ore in the mine is inaccessible on account of water, and an effort will be made to tap the ore-chute from the lower or cross-cut tunnel.

**HUMBOLDT.**—A strike of four feet of fine lead ore has been made in this property, situated on the north side of Iron Hill, near the Adlaide. The mineral was encountered in the upper contact, at a depth of about 200 feet from the surface. Shipments have begun.

**IRON SILVER.**—Many of the leases on this company's property expire on July 1st. Several of the expiring leases have already been renewed, and others that have been faithfully worked are to be extended.

**LEADVILLE CONSOLIDATED.**—A new discovery has been made on the south side of the Carbonate mine incline, on the third level, which shows 300-ounce ore.

**WOLFE TONE.**—The La Plata smelter has secured the output of this mine for the next few months.

LA PLATA COUNTY.

**SAN JUAN & NEW YORK SMELTER.**—The large furnace was blown in on the 17th inst. This furnace has a capacity of forty tons a day, and ore has begun moving rapidly. Ore is received from Silverton, and it is probable that these shipments will reach from sixty to one hundred tons daily hereafter. By July 1st the other furnace will blow in, and two or three more roasters will be started.

PITKIN COUNTY.

The cases of Washington owners vs. Durant owners, and the case of Durant owners against the Emma and Aspen owners, on petition for injunction and receivership, have been postponed to June 29th, when they will probably be re-postponed until after the fourth of July, when they can be heard at Aspen.

The Hewitt sampling-mill, at Aspen, is running on ore from the Aspen and Emma mines.

The Aspen *Sun* comes to the front with the startling news that a company will be formed with a capital stock of not less than \$50,000,000, for the purpose of consolidating and working Aspen mines; among them, the Star Consolidated, Vallejo, Emma, Aspen, and Durant. It is stated that several gentlemen connected with this enterprise are making a thorough examination of the properties in question. "Millions" are apparently very easily to be found, and it is astonishing that an extra \$50,000,000 has not been added to the capital stock.

SAN JUAN COUNTY.

The sale is reported of the Montezuma tunnel and mill-site, the Ajax lode and tunnel, Little Dora lode, and eleven twelfths of the Victoria mine and mill-site, to St. Louis men. One thousand dollars were paid down, \$13,500 must be paid on or before August 10th, 1885, and the balance of \$135,000 will be due December 1st, 1885.

SUMMIT COUNTY.

The Wiswell ore-pulverizer and electric amalgamator, now used at some mines at Breckenridge, is meeting with great favor.

**FELICIA GRACE.**—A receiver has been appointed for this mine, situated at Robinson. It has been in litigation for some time. Mr. White, late manager of the Iron Silver mine, was selected to administer the affairs of the litigants pending a settlement of the controversy.

**ROBINSON CONSOLIDATED.**—Mr. Moore, the manager, has settled the claim of Parker, the former manager of the mine, of \$40,000, by the payment of \$1,000.

DAKOTA.

LAWRENCE COUNTY.

**FATHER DE SMET.**—The following official letter has been received from the superintendent: Herewith find express company's receipt for bar No. 209, containing 1311.93 ounces of gold, the result of the clean-up of the mill for the final run in May, making a total of 2290.28 ounces for the month's production. The general outlook at the mine continues favorable. A good class is produced from all the large stopes in the Eureka and Golden Gate open cuts; and, unless we are bothered too much by the heavy rains, a good average yield will be made this month. East cross-cut, fourth level, shows considerable ledge matter, and at times looks very encouraging; but we have not succeeded in getting any thing definite yet, although we feel hopeful as to the final result. A report dated June 15th shows ore extracted from first, second, and third levels, 2150 tons. Ore milled, 2150 tons. East cross-cut, fourth level, advanced 13 feet on company account. Total length, 152 feet stoped.

IDAHO.

**CAMAS No. 2.**—The first clean-up has been made. The result was about 16½ pounds of amalgam, from which about five pounds of crude bullion 600 fine were obtained, worth about \$12 an ounce, \$168 a pound, or about \$840 altogether. The mill started up on the 31st ult. The cost of mining and milling is placed at about \$4 a ton. It is expected, as soon as ten more stamps have been added, the expense will be reduced to \$2.75 a ton.

ILLINOIS.

**WARM SPRINGS.**—This mining company, of Chicago, has been incorporated for the purpose of purchasing, developing, and operating gold and silver



mines; capital stock, \$350,000; incorporators, Thaddeus C. Pound, Everett B. Sanders, and B. Gascoigne.

**MEXICO.**

The owners of the Guadalupe mines have increased their output from 3½ to 11 tons, and have bought the furnace at Salinas belonging to San Rosario, which will, when put up, greatly increase the product. San Rosario will put the money received from the furnace into the development of the mine and the finishing of the tunnel.

**MICHIGAN.**

The formal organization of the Upper Peninsula Mining School is now complete. The following well-known gentlemen have been appointed a board of control of the Institute: Mr. J. N. Wright, Calumet, and Mr. T. L. Chadbourne, Houghton, for the term of six years; Mr. A. Kidder, Marquette, and Mr. C. H. Cady, Menominee County, for a term of four years; and Mr. John Senter, Keweenaw County, and Mr. John H. Forster, Ingham County, for a term of two years.

**COPPER MINES.**

**CALUMET & HECLA.**—It is stated that the company will increase its stamping facilities.

**TAMARACK.**—The shaft has attained a depth of 2265 feet.

**GOLD MINES.**

**ROPES.**—An assessment will probably be levied soon, to further equip the mine with milling machinery. The results obtained thus far are encouraging.

**IRON MINES.**

The following statement, published by the Marquette Mining Journal, shows the amount of iron ore and pig-iron shipped from the lake ports of that district for the season, up to and including Wednesday, June 17th:

	Gross tons.
Marquette	130,631
Pig-iron	575
L'Anse	6,703
St. Ignace	19,950
Pig-iron	330
Escanaba, Marquette District	101,046
Menominee District	159,623

**SOUTH JACKSON.**—The water is pumping from this mine, adjoining the McComber. The ore is of a soft manganiferous quality, not so high in metallic iron as the Jackson hematite, but works well in the furnace.

**MONTANA.**

**DEER LODGE COUNTY.**

**GRANITE MOUNTAIN.**—A letter was received from the superintendent, on the 20th inst., at the company's office at St. Louis, Mo., stating that cross-cutting the vein at No. 5 had been finished. The borings from a drill-hole across it yielded on assay 180 ounces of silver, with but little traces of gold. There is a portion of the vein about 22·10 feet wide, which averaged 421 ounces of silver. From this 22·10 feet, there were taken several samples from streaks and bands with most satisfactory results. The above information caused a boom in the stock, which went from \$2 to \$12. This company was organized about three years ago, with 400,000 shares and a capital stock of \$10,000,000. The stock is entirely owned by St. Louis parties, and was purchased as low as 18 cents a share. It has been advancing steadily. A year and a half ago, it was purchased at \$1 a share. Up to date, the company has paid \$180,000 in dividends, and produced up to May 31st of this year, bullion valued at \$423,044.

**SILVER BOW COUNTY.**

**BUTTE SMELTING COMPANY.**—Ground has been broken at Butte for the foundation of the new smelter for custom work, of a capacity of 100 tons a day, which is to be erected at a point south of the depot. The machinery for the smelter will be on the ground by the first day of July.

**COLORADO.**—The smelter is running to its full capacity. It is contemplated soon to add another calcining-furnace.

**MONTANA COPPER.**—Another furnace will be erected soon. The shaft of the Colusa is sinking to a depth of 800 feet.

**PARROT.**—This company is mining and treating over 300 tons of ore a day.

**NEVADA.**

**ELKO COUNTY.**

**SAN PEDRO & CAÑON DEL AGUA.**—The placers of this company have been leased to the Golden City Placer Company. These placers cover 2000 acres of San Pedro's 40,000 acres, and do not include the copper ore, gold quartz, silver or lead ores, nor the village nor the mills. The lease is continuous, and

subject to forfeiture if work is suspended for more than sixty days at any one time. The lessees are privileged to work the placers by hydraulic process on condition that they perfect the company's unfinished pipe line. They secure no easement in the land. They give to the new San Pedro Company 10 per cent of the gross products, less one tenth the expenses of agents and laborers, the same not to exceed \$3000 a year. The San Pedro Company is to have an agent to see that there is a proper division of the product.

**SILVER KING.**—The lease and bond of Murphy & Co. on this mine, in Bald Mountain District, has been sold to Bliss & Co., of Colorado. The latter company will immediately put a force on to continue the shaft to a depth of 500 feet. About \$25,000 in all will be paid for the property.

**WELLS.**—The furnace of this company, at Jasper, started up on May 27th, and has been running very satisfactorily. The grade of the bullion is about 400 ounce silver.

**EUREKA COUNTY.**

**EUREKA CONSOLIDATED.**—For the week ended June 13th, Superintendent F. Robbins reports: There were 125 car-loads of ore hoisted from tributers. The ore in Williams's pitch is opening out well, going southeast, where we have been squaring out for timbers. In going west, it has pinched a little. I have nothing new to report of Bennett's pitch, nor shall I have until they again begin prospecting. We have an improvement in Fitzpatrick's pitch. On the third K.K., near the Phoenix line, there seems to be an abundance of low-grade ore, but unfortunately it is the undesirable quartz. During the week, we have produced 640 bars of bullion, about 35 tons of an average value of about \$332 a ton. A telegram reports the seventh shipment of 400 bars bullion on the 20th inst.

**LYON COUNTY.**

According to the Carson Tribune, Mr. Stevens, the present melter and refiner of the Mint, is in correspondence with parties in San Francisco with the view of erecting a 20-ton smelter, and applying the Endicott patent for the reduction of rebellious ores. The location of this enterprise is upon the line of the Carson & Colorado Railroad, with headquarters at Carson City.

**STOREY COUNTY.**

The abstract from the quarterly assessment-roll just published shows that the ore product of the mines of Storey County for the quarter ended March 31st, 1885, was 57,031 tons, yielding bullion valued at \$801,574.33. This shows an increase over the previous quarter of nearly 10,000 tons of ore, and a bullion increase of \$148,218.20.

**COMSTOCK LODGE.**

**ANDES.**—There is a probability of the resumption of work on the 500 level. No work has been done below the surface since the fire in the Old Central tunnel last fall.

**BALTIMORE CONSOLIDATED.**—The tributers have suspended operations on account of the unsafe condition of the shaft, which is continually caving from the surface down to the 250 level. The tributers say there is plenty of good ore in the mine from the 250 level down to the 1000, and that they can make more than wages in getting it out, but that they can not afford to repair the shaft, and as Mr. Strother, the owner of the property, refused to put it in order, they were forced to suspend operations.

**CONSOLIDATED CALIFORNIA & VIRGINIA.**—During the week ended June 13th, there were extracted 795 tons of ore and shipped to the Morgan mill 788 tons and 1350 pounds. The average assay value of the ore milled, as by battery samples, was \$17.44 a ton. There were extracted 662 tons of ore under the Jones contract, and shipped to the Eureka mill 726 tons and 965 pounds. The average assay value of the ore milled during the week, as by battery samples, was \$10.54 a ton. The net value of the bullion produced from 4220 tons of ore recently worked was \$54,702.32.

**HALE & NORCROSS.**—According to reports of the 18th inst., good progress has been made in sinking the winze on the ore-body from the floor of the south drift from west cross-cut No. 2 on the 3000 level. The north drift skirting the vein from west cross-cut No. 1 is rapidly approaching the main incline winze station, and is cutting through good ore. The connection between the main northwest drift on the 2400 level and the top of the vertical winze will largely increase the air supply and greatly improve the ventilation in the openings on the 3000 level, thereby enabling the man-

agement to prosecute more vigorously the development of the ore-body. The company is talking of renting the old California mill of 80 stamps, with a crushing capacity of 300 tons in twenty-four hours.

**JUSTICE.**—It is rumored that work will soon be resumed in the south end of this mine, where there is said to be a large deposit of low-grade ore on the upper levels that has been left undisturbed since 1877, when the mine was producing from 600 to 700 tons of ore a day under the Schultz management.

**NEW YORK.**

The graphite mine at Ticonderoga, owned by the Joseph Dixon Crucible Company of New Jersey, will produce, it is said, 500,000 pounds this year. The company is working a vein of graphitic schist, 15 feet, and carrying only from 8 to 15 per cent of graphite. This is crushed and concentrated by a wet process, in which the tailings are the useful product.

**SOUTH AMERICA.**

**CHILI.**

At a meeting of a committee of nitrate producers, held at Iquique, June 13th, it was resolved to suspend the production of nitrate for the month of December.

**VENEZUELA.**

The Parliament has passed a complete code of mining laws.

**EL CALLAO.**—The production for May amounted to 7000 ounces of gold. The properties of this company are perfectly assured and guaranteed by the new code of mining laws.

**UTAH.**

**BEAVER COUNTY.**

**HORN-SILVER.**—There are between twenty and thirty men at work on contracts in the mine. The new shaft has reached a depth of 900 feet, almost 200 feet deeper than the old shaft, and is still sinking. There is a large body of good ore between the eighth and ninth levels, but the air is so bad it can not be worked out at present. The two levels are to be connected by a winze, which will give better air and permit stoping. It is not known when shipments will be resumed.

**JUAB COUNTY.**

**GLADSTONE.**—The company has been incorporated with a capital of \$10,000,000. It owns and proposes to operate the following mining claims, located in Tintic Mining District: Gladstone, Jackman, Michigan, Argenta, Magna Charta, and Little Gold mines.

BULLION PRODUCTION FOR 1885—SPECIAL OFFICIAL REPORTS.

MINES.	States.	Month of May.	Year from Jan. 1st, 1885.
Adams, s. L.	Colo.	30,000	176,103
Alice, g. s.	Mont.	100,284	446,679
Belmont	Nev.	—	10,003
Boston & Montana, g.	Mont.	43,172	182,796
Christy, s.	Utah	—	82,623
Chrysolite, s.	Colo.	4,326	17,465
Colorado Central, s.	Colo.	19,157	91,990
Consolidated Bobtail, g.	Colo.	—	24,316
Deadwood-Terra, g.	Dak.	43,443	177,291
Derbec Blue Gravel, g. s.	Cal.	17,186	67,243
Essex, g. s.	N. S.	—	6,474
Eureka Consolidated, s. L.	Nev.	—	10,266
Father de Smet, g.	Dak.	16,292	143,054
Freeland, g. s. c.	Colo.	—	120,613
Grand Prize, s.	Nev.	—	25,150
Granite Mountain, s.	N. S.	95,516	423,044
Head Center & Tranquility	Ariz.	—	3,695
Hecla Consolidated, g. s. L. C.	Mont.	*81,806	*339,640
Helena, g. s. L. C.	Mont.	99,440	451,000
Homestake, g.	Dak.	103,411	489,976
Hope, s.	Mont.	15,485	66,628
Iron Silver, s. L.	Colo.	—	251,167
Kentuck, s.	Nev.	†460	1,838
Lexington, g. s.	Mont.	98,384	360,212
Montana, Limited, s.	Mont.	—	274,973
Moulton, s. g.	Mont.	60,256	310,792
Mount Diablo, s.	Nev.	—	149,312
Navajo, s.	Nev.	—	82,894
New Hoover Hill, g. s.	N. C.	—	23,141
New Pittsburg, s.	Colo.	—	9,594
North Belle Isle, s.	Nev.	—	2,118
Ontario, s.	Utah	122,154	901,259
Oxford, g.	N. S.	—	1,905
Plymouth Consolidated, g.	Cal.	81,927	410,951
Rooks, g.	Vt.	—	28,383
south Yuba, g.	Cal.	—	1,168
Standard Consolidated, g.	Cal.	—	62,116
Stormont, s.	Utah	—	53,379
Tombstone, g. s. L.	Ariz.	*55,598	290,804
Total			6,400,454

G., gold; S., silver; L., lead; C., copper. Silver valued by the different companies from \$1@\$.129 per ounce; gold, \$20.07. \*Not including value of lead and copper. †Royalty. ‡Net. — No shipments during month mentioned.

## MARKETS.

NEW YORK, Friday Evening, June 26.

## Silver.

DATE.	London.		N. Y.		DATE.	London.		N. Y.	
	Pence.		Cents.			Pence.		Cts.	
June 20	49 3-16	106 $\frac{3}{4}$	June 24	49 3-16	106 $\frac{3}{4}$				
22	49 3-16	106 $\frac{3}{4}$	25	49 3-16	106 $\frac{3}{4}$				
23	49 3-16	106 $\frac{3}{4}$	26	49 3-16	106 $\frac{3}{4}$				

The market abroad has been steady and without variation since our last postings, but sterling exchange has been fluctuating and, on the whole, lower, making the silver market unsteady and weak.

The Treasury Department on the 24th inst. purchased 295,000 ounces of silver for delivery at the Philadelphia Mint. It is believed that no action will be taken on the point recently raised by Treasurer Jordan, that there is no authority for these purchases before the meeting of Congress, when it may be made the subject of a special communication from the Secretary of the Treasury to the Committee on Appropriations.

Israel Lawton has been appointed Superintendent of the United States Mint at San Francisco.

**Foreign Bank Statements.**—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate of discount, and it remains at 2 per cent. During the week, the bank gained £76,961 bullion; and the proportion of its reserve to its liabilities was reduced from 52 $\frac{1}{2}$  to 52, against 46 $\frac{1}{2}$  per cent at this date last year. June 25th, the bank lost £50,000 bullion on balance. The weekly statement of the Bank of France shows gains of 8,124,000 francs gold and 2,241,000 francs silver.

**Copper.**—Copper is momentarily neglected, as most manufacturers are cleaning up. Lake is offered at 11 $\frac{1}{2}$ c. Electrolytic, 11c. @ 11 20c. Baltimore, 10 $\frac{1}{2}$ c. asked, 10-30c. bid; Orford, 10 $\frac{1}{2}$ c. asked, 10-20c. bid. Arizona ingot held at 11c. without large sales.

Chili Bars in London fluctuated during the week as follows: £44 10s. on 20th; £44 7s. 6d. on 22d; £44 5s. on 23d.; £44 5s. on 24th and 25th; £44 7s. 6d. on 26th. Best Selected has declined from £49 to £48.

**Tin.**—Tin been 21 $\frac{1}{2}$ c. for spot Straits all the week, closing at 21 $\frac{1}{2}$ c. with few transactions; for July, there are buyers at 20 $\frac{1}{2}$ c., sellers at 20 $\frac{1}{2}$ c.; for August and September, at 19 $\frac{1}{2}$ c. and 19 $\frac{1}{2}$ c., but with no disposition to operate to any extent by either. In London, spot is £93 15s., and futures £89 12s. 6d. to £90.

**Lead.**—Speculation continues, and the price reached 3-90. for 100 tons; the closing quotation is 3 $\frac{1}{8}$ c.

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

Since our last report, sales of both soft and hard lead have been more free, and several hundred tons have been purchased at 3-70c. Prices are advancing, principally because large holders decline to sell; but refined lead is scarce and in fair demand, especially favored brands, as Aurora Pueblo. Sales for the week sum up over 400 tons at 3-70c.

**Spelter.**—The market is dull and prices have been lower. We quote for Domestic 4-10@4-15c., and for Foreign, 4-60@4-70c. [In London, Silesian was quoted at £13 7s. 6d.]

**Sheet-Zinc.**—The price remains unchanged at from 4-90@5c. for Domestic.

**Antimony.**—We quote here 9c. for Hallett's. The price in London remains unchanged at £38. Cookson's is a shade firmer, which is probably due to the fact that one party has bought up all the spot and is holding it for higher prices. It is quoted at 9 $\frac{1}{2}$ @10c.

**Nickel.** In small lots, we quote at 70@72c. for Domestic (Wharton's) or Foreign.

**Bismuth.**—Worth from \$2@2.25 a pound.

**Aluminium.**—\$8@9 per pound; 10 per cent Aluminium Bronze Ingots, \$1 a pound; Aluminium Silver, 75c. an ounce.

Messrs. Ladenburg, Thalmann & Co., of this city, have renewed their special partnership contract (\$400,000) to December 30th, 1890, with Mr. Gerson von Bleichröder, financial adviser of Prince Bismarck, and head of the banking house of S. Bleichröder, of Berlin, Germany.

## IRON MARKET REVIEW.

NEW YORK, Friday Evening, June 26.

**American Pig.**—There is nothing of special interest to note. A few sales have been made, but figures have not been stated. We quote standard brands Lehigh No. 1, \$17.75@18.50; No. 2, \$16.50@17.50; Gray Forge, \$15.25@16.

**Scotch Pig.**—Business remains dull. Prices in Glasgow have declined slightly, and to-day are quoted as follows: Coltness, 48s. 3d.; Langloan, 47s. 6d.; Summerlee, 47s.; Gartsherrie, 47s.; Glen-garnock, 46s. 6d.; and Eglinton, 41s.

**Rolled Iron.**—We have no large orders to report this week, but still there is a good demand for beams.

**Bar Iron.**—Dullness is the prevailing feature. We quote 1-45@1-50c. for Common; 1-70@2c. for Refined; and \$68@70 for Swedish.

**Plates.**—Our quotations this week are as follows: Tank Iron, 2c.; Refined, 2 $\frac{1}{4}$ @2 $\frac{3}{4}$ c.; Steel Plates, Tank, Ship, etc., 2 $\frac{3}{4}$ @3c., according to quality; Shell Plates, 3 $\frac{1}{2}$ @4c.

**Steel Rails.**—The market appears to be in a better condition. Pittsburg advices report the purchase of 30,000 there. Quotations here are nominally at \$27, at the mills.

**Old Rails.**—A few small sales are recorded, but outside of that, the market remains dull and quotations unchanged at from \$16.50@17.

**Scrap.**—We quote at from \$18@18.50.

**Philadelphia.** June 26.

[From our Special Correspondent.]

**Pig-Iron.**—The actual transactions in crude iron since the writing of my last report show that buyers are more willing to place orders for fall delivery. Some few transactions have been closed for Lehigh irons for delivery in August and September. Stocks on hand are a little troublesome, and brokers report it no easy task to work them off at their own terms. One leading broker found a market for between two and three thousand tons of forge irons at concessions of 25 cents from old figures. The prices taken for No. 1 Foundry were \$17.50, and for Forge \$15.25. Plenty of inferior irons are offered and taken at about \$17 and \$17.50 for No. 1, and \$14.50@15 for Forge. The probabilities are, that some of the larger consumers will place their orders for the fall early in July. A number of furnaces, it is reported, will blow in shortly, but nothing very definite has been determined upon. Three or four of the best situated companies have refused offers made, preferring to stock up rather than sell. This amounts practically to a restriction for the time being. They say that an advance is more likely than a decline. Buyers do not think so, and a trade report is no place for the reasons pro and con. It is true that some buyers of forge iron are ready to place fall contracts, if they can buy at their own terms, which are \$15 for iron that is held firmly at \$15.50. There will be no drop in coal by any voluntary action of the companies, and certainly no drop in freight rates; but the iron-makers of Eastern Pennsylvania firmly believe that they will secure more favorable rates both in coal and freights. There are causes at work to bring about a reduction as soon as some railroad construction in progress is completed, but that result is far off.

**Foreign Irons.**—Bessemer is not selling, and is quoted at \$18@19. Spiegeleisen is under inquiry, and \$24.50 is the price named.

**Muck-Bars.**—Seven hundred tons sold this week at \$27.

**Manufactured Iron.**—Small sales of medium iron are made at \$1.55@1.60. A good deal of common iron has been sold at \$1.40@1.50 in mills in the country. Only pressing requirements are filled, and mill-owners say the buyers are waiting until after the turn of the half-year. The market is weak. After all, there will be very little curtailment this summer on account of repairing.

**Nails.**—A better feeling is reported by the nail-makers, and car-lots are moving quite freely. This activity is due to some shading that has been going on from the \$2.20 card rate.

**Plate Iron.**—Three or four mills received quite a number of small orders this week at 1-90@2c. for Plate. Some business has been received from two or three locomotive-works. Some car-works are in the market for moderate supplies to fill orders just received. It is said that there will be a good deal of car-work done this fall, and some improvements will

take place in the locomotive-works. The ship-yards, it is said, will be more active between the demand for repairs and for new crafts.

**Sheet-Iron.**—The mills are working along quietly, filling orders in small lots at about card rates.

**Wrought Pipes.**—No important orders have been received this week, but there are inquiries that will lead to important business in July.

**Steel Rails.**—Orders for between 7000 and 8000 tons have been received this last week, in small lots, by the different Pennsylvania mills. There are orders for some large lots, but buyers are not urgent, and insist on prices that makers are not willing to accept.

**Old Rails.**—Several inquiries are in hand to-day for old rails, but no sales of any amount have taken place. Buyers in the interior are willing to pay \$16.75 or \$17, but can find no sellers at these figures.

**Scrap.**—Scrap is plenty and cheap, but not selling; no change in prices.

**Pittsburg.** June 26.

The following dispatches were received at the Metal Exchange to-day:

The pig-iron market is firmer, with a slight advance and more inquiry. The bottom has been reached, and the outlook for the future is improving. All the mills that have orders are running; the others will start as soon as circumstances will admit. Henry B. Stone, Assistant Manager of the Chicago, Burlington & Quincy Railroad, is here to contract with the Edgar Thomson Company for 1000 tons of rails to be furnished immediately. This order will be followed by another inside of two months for 20,000 tons more, all the rails to be 56 pound section. The Edgar Thomson Works are running double turn, and making each day 500 tons of rails, with enough orders to run the rest of the year. Graff, Bennett & Co., trustees, are paying their creditors the interest on the paper issued under the settlement of June, 1883, and the extension granted this year. The following are the sales for the week:

100 tons Gray Forge, all ore.	.....	@ \$16.75 4 mos.
100 " Neutral Forge	.....	" 15.00 "
1000 " Gray Forge, native ore	.....	" 14.50 "
300 " " " "	.....	" 14.50 cash.
200 " " " "	.....	" 14.75 4 mos.
100 " Foundry No. 1	.....	" 16.50 "
100 " " " "	.....	" 16.00 "
50 " Gray Forge, all ore	.....	" 15.50 cash.
50 " Cold Blast (Charcoal)	.....	" 26.50 4 mos.

## COAL TRADE REVIEW.

NEW YORK, Friday Evening, June 26.

## Anthracite.

There has been considerable talk of a better feeling in the coal trade. Among a few of a sanguine turn of mind, who grasp at the least straw, there is a better feeling; but among those that are prepared to take things as they come, a by no means encouraging view is taken.

The only sizes that appear to be in good demand are egg and broken, and this demand is only maintained at low prices. These coals are not in their usual supply, owing to their being crushed into smaller sizes, due to the great difference in the market prices of these and stove and chestnut coals. This crushing, however, must have the ultimate effect of more nearly equalizing prices, as broken and egg will become in such short supply as to advance prices, or stove and chestnut will become so abundant as to reduce their prices.

Stocks at the end of May showed an increase of over 100,000 tons. It is believed that they will be still further increased at the end of this month; and at the end of July, under an allotment of 2,800,000 tons for that month, it is believed that they will be very large. It is generally conceded that the demand will be exceedingly small until the middle of July, and there is a grave question whether the latter half of the month will be much better.

The companies claim to be standing very close to net circular prices. With the general buyer, this may be so; but there is very strong evidence that at least one of them is permitting favored commission houses to sell its coal at long concessions. This, of course, the company denies to others, and hence we do not avail ourselves of its usual willingness to give information. In the face of the strength in prices, there is a good deal of side-door selling by the companies at as low prices as are made by individuals, and we may say that we still hear of as low prices as have yet prevailed. If a large trade is to be done in anthracite



coal during the last half of the year, it is very evident that but a very insignificant portion of it will be from contracts already made and orders now on the books.

The Philadelphia market has been considerably disturbed over several contracts at prices much below circular. The Lehigh Coal and Navigation Company's contract to supply the county jail at \$3.97 per ton is said to show a cut of 65 cents on broken and egg and 80 cents on stove. The Mint contract at \$4.28 is also said to be very low. The retail dealers are meeting the *Record's* \$5 coal.

The Reading Company claims to be sending as little coal as possible to the New York and Western markets, owing to their highly demoralized condition and the unprofitable prices prevailing. It claims, however, that it could handle much more coal than is allotted to it, and is not willing to join a movement to curtail production to meet the views of those who can not sell their coal.

Mining at the collieries has been generally suspended until next month. The Schuylkill Exchange announces that the collieries of its district will run full-time in July.

We quote average selling prices of hard and free-burning coals as follows, f. o. b. New York shipping ports:

	Selling prices.	Circular rates.
Broken and Egg	\$3.10@3.35	\$3.40@3.65
Stove	3.70@ 3.85	4.00@ 5.00
Chestnut	3.10@ 3.40	3.65@ 4.00
Pea	2.00@ 2.50	2 65@ 2.45

Buckwheat has sold as low as \$1.65.

**Bituminous.**

There is nothing worthy of notice doing in this coal. Prices range from \$2.65@3.10, with some coals of superior quality selling in small lots at \$3.25. Clearfield and Cumberland shipments show a marked falling off. Freight are easier and vessels in more liberal supply.

From Baltimore to Boston, \$1.15 is quoted, and to the Sound \$1.05. From Philadelphia to Boston, \$1@ \$1.05 is quoted, and to the Sound 90c.

The Maryland Coal Company was the largest producer last week in the Cumberland region.

**Philadelphia.** June 26.

[From our Special Correspondent.]

The recent city contracts show good Lehigh coal for the County Prison to be worth \$3.97; for the Mint, \$4.28; for the public schools, \$4.48. A good deal of coal is retailed at \$5. There are rumors of further cutting to secure some large contracts that are offered. Any advance made will be in nominal quotations only, as the tendency in selling prices is decidedly in the other direction. There are several inquiries for large lots. Buyers are looking for lower prices. Stocks at Port Richmond are not increasing. There is still a good deal of coal in cars waiting for delivery. Local manufacturing demand is dull. The dealers say there are prospects of effecting large sales during July. The July tonnage will be 2,800,000 tons. The aggregate of the half-year's business shows up much better than dealers and shippers were disposed to admit a month ago. It is probable that heavy shipments may be made both East and West next month. In bituminous coal, a very sharp competition is going on, and shippers West report an accumulation of stocks at distributing points.

**Buffalo.** June 25.

[From our Special Correspondent.]

This letter will be short, for the reason that the features of the trade in coal are unchanged. Business is extremely dull—in fact, dead. The depression in manufactures and trade generally is severely felt. No wholesale orders of any consequence are coming in, parties awaiting the course of events, as it is impossible with any degree of certainty to foretell the future.

Our local Anthracite Coal Association keeps the trade well in hand. There are a few members that require discipline, however. The schedule of prices of June 4th is adhered to pretty generally. Extreme measures will doubtless be taken to-day to bring several backsliders to time by the enforcement of the penalties prescribed in articles of agreement.

The adjourned meeting of the Western Anthracite Association to fix July rates will be held here at the Merchants' Exchange next Tuesday, June 30th.

Our soft-coal men complain of dull times, unsatisfactory prices, and gloomy prospects. New mines are developing, their owners seeking Buffalo for a market; and to aid the introduction, sales are made on "strictly private terms," which are sufficiently low to

unsettle the trade generally. More manufacturers doubtless would, if times were better, make Buffalo their abiding place, by reason of its cheap fuel, besides its favorable location for distribution to all points; but the uncertainty and despondency prevailing preclude carrying out the idea at present.

Advertisements have appeared for bids for coal, quantity not stated, of the grate, stove, egg, and chestnut sizes, for the use of our school department. Bids must be sent in before June 29th. The coal is to be delivered in the bins of the various school-houses in quantities to suit.

The bids for the supplying of the 3100 tons of anthracite coal for the penitentiary, almshouse, and jail were as follows:

Ellis Webster—

For the almshouse, 1700 tons.	
Grate, per ton	\$3.50
Chestnut, per ton	4.00

For penitentiary, 900, and jail, 500 tons.	
Grate, per ton	\$3.75
Chestnut, per ton	4.00

H. S. Metz—

For the almshouse.	
Grate	\$3.90
Chestnut	4.20

Mark Packard—

For the almshouse and jail.	
Grate	\$4.25
Chestnut	4.60

The bids of F. H. Good year, Fayette Reed; Lee, Smith & Moore, Thomas Loomis, W. E. Carroll, Palen & Burns, and Albright & Smith were grate, \$4.25, chestnut \$4.60, for all places. There is trouble again. If Webster gets the contract, where will he procure the coal?

The coal shipments by lake from Buffalo, June 18th to 24th, both days inclusive, were 42,000 tons; namely, 25,100 to Chicago, 8350 to Milwaukee, 1920 to Duluth, 700 to Manitowoc, 940 to Sandusky, 1300 to East Saginaw, 5000 to Superior City, and 490 to Toledo.

Freights are unchanged; vessel agents unsuccessfully attempted to advance rates; the tonnage offered is very small; plenty of coal on hand; the strike of the laborers on the docks at Chicago probably made shippers less anxious than they otherwise would have been to send coal forward; market closes firm with vessel owners anticipating an advance in rates in a few days. Many line propellers and consorts will not take coal at present rates, preferring to tie up. The Anchor, Union, and Western companies are said to have decided not to carry any more coal at less than 75 cents to Chicago and Milwaukee; they control 18 of the largest craft. So you see that there is a sharp contest between the coal men and vessel owners. The question now arises, "Who will come out ahead? Shippers to-day do not budge a fraction; carriers are equally determined. No charters reported for any points up to noon. A representative of a large company says: If I can not ship from Buffalo, I will from a Lake Ontario port, and that will settle the matter."

The freight engagements were at the following rates: 65c. to Chicago, 60c. to Milwaukee, 40c. to Duluth and Superior City, 50c. to Marquette, 75c. to Manitowoc, 25c. to Toledo and East Saginaw, and 20c. to Sandusky.

The shipments of coal by canal for the week include 1 load to Palmyra at 55c. net, captain to pay 10c. unloading; 2 loads to Syracuse, 60c. gross, captain to pay 12½c. unloading. The nominal quotations to Albany were 95c. net, and to New York, \$1.10 net, captain to pay unloading.

I learn that the coal for the Rochester schools, 2000 tons, delivered in bins, will be supplied by Mr. A. G. Yates, of that city, at \$3.53 for Grate, \$3.58 for Egg, \$3.88 for Stove, and \$3.73 for Chestnut, per 2000 pounds.

Trade in Toronto, Canada, is very quiet. "Contracts have been made at 50 cents off Oswego circular prices," says an anthracite dealer who has just returned from the Dominion.

The receipts of coal at Duluth for the week ended June 20th, were 16,422 tons. From June 1st to 20th inclusive, 5277 tons of coal were received at Washburn, L. S.

**Boston.** June 24.

[From our Special Correspondent.]

Trade in anthracite has been fair this week. There is some holding off for a return to the low freights of a month or six weeks ago, but those rates were extraordinarily low, and it is very doubtful whether they are again reached. The demand for lumber and ice freights is now increasing right along, and we hardly

see where lower freights are to come from, unless the number of colliers is to be increased. It may be that some of the vessels that have been tied up waiting for improvement in rates have tired of it, and will soon be seeking charters. Otherwise, a reduction seems improbable. There is a little better demand for coal, but it looks as though orders would be put off as late as possible, and then a rush of business follow. Stocks have accumulated somewhat at tide-water, but the week of restriction will help matters. Prices have eased off a little at tide-water, but just to what extent is hard to say, as the demand is so light. Individual coal is selling irregularly at from 10 to 15 cents below net prices for company coal, according to the coal and the size of order. Company coal is nominally unchanged.

The small buyers of bituminous are sending along their orders all the while. No large contracts remain to be harvested. The disposition to wait for even lower prices for bituminous is still strong, but whether or not such hopes will be realized is a matter of grave doubt. The pool seems to be still in existence and making itself felt, although to a much less extent than at the opening of the season. F. o. b. prices continue nominally \$2.25@2.35 at Baltimore and Philadelphia respectively. There is nothing new in coke or gas-coal. Culm is selling at the very low price of \$2.30 delivered, and gas-coal at \$4.10@4.15 delivered.

The freight market is unchanged. The arrivals, previously noted as very large, have dropped off to more moderate proportions. We quote:

New York, 85@95c.; Philadelphia, \$1.10@1.15; Baltimore, \$1.20@1.25; Newport News, \$1.15@1.20; Richmond, \$1.20@1.25; Cape Breton, \$1.50@1.75.

There is a quiet retail trade, so far as actual orders are concerned, though there are more inquiries. Consumers are in no hurry to stock up. Several contracts for broken, say from 200 to 400 tons, have been lately awarded at prices ranging from \$4.40 to \$4.60, delivered. This is very low, but nevertheless a much better price for the dealer than was made on the city contracts. We quote:

White ash, furnace and egg	\$4.75@5.00
" " stove and nut	5.25@ 5.50
Shamokin, egg	6.00
" " stove	6.25
Lorberry, egg and stove	6.50@ 7.00
Franklin, egg and stove	7.25@ 7.75
Lehigh, furnace, egg, and stove	5.25@ 5.50
" " nut	5.50@ 5.75

We quote wharf prices as follows: Stove, \$4.75; Broken and Egg, \$4@4.50.

**Chicago.** June 24.

[From our Special Correspondent.]

The coal business here has been very quiet, scarcely any thing doing, and shippers and dealers are all at sea as to prices, and alike wondering what the near future will bring forth. During the railroad war in April, certain jobbers at Mississippi and Missouri River points bought coal in Chicago at \$5 (Stove and Nut), and shipped it to the Mississippi for \$1 and to the Missouri for \$2 a ton. They are the only early buyers, and they do not see why they should pay present circular prices when they bought all-rail coal in April for \$5. The dealers through the West firmly believe that they will be able to buy for \$5 or less before September, and hence are playing a waiting game. The event of last week was the bid for the Water-Works coal (15,000 tons grate) by W. C. Wyman & Co., for \$5.05 delivered through the year, and guaranteeing 8-70 efficiency. Allowing 50 cents cartage and 25 cents commission to Wyman & Co., it is easy to see that the shipper does not get quite circular price, \$5.25. The receipts of anthracite coal by lake have decreased this year as compared with 1884, while the rail receipts have increased.

Receipts of anthracite coal by lake in 1884, from May 1st to June 10th, were 165,426 tons; 1885, May 1st to June 10th, 124,904 tons; a decrease of 40,522 tons. Receipts of anthracite by rail, from May 1st to June 10th, 1884, were 29,720 tons; from May 1st to June 10th, 1885, were 41,102 tons; an increase of 11,382 tons. The stock on hand May 1st, 1885, 122,145 tons; the stock on hand May 1st, 1884, 60,268 tons; an increase this year of 61,877 tons, making a total increase of 32,737 tons to June 10th.

The shipments in the mean time increased 12,599 tons over 1884, leaving the net increase of stock on hand 20,138 tons. Things do not look very lovely.

June 25.

I am glad to report the coal trade in the West in fine



DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES (No., Par value), ASSESSMENTS (Total levied to date, Date amount per share of last), DIVIDENDS (Total paid to date, Date and amount per share of last). Rows 1-131.

Table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES (No., Par Value), ASSESSMENTS (Total levied to date, Date and amount per share of last). Rows 1-131.

G. Gold. S. Silver. L. Lead. C. Copper. \* Non-assessable. † This company, as the Western, up to December 16th, 1881, paid \$1,400,000. ‡ Non-assessable for three years. § The Deadwood has previously paid \$275,000 in eleven dividends, and the Terra \$75,000. ¶ Total number of shares, 530,000; 53,000 shares have never been issued, and are still held by the company.





COAL STOCKS.

Quotations of New York stocks are based on the equivalent of \$100. Philadelphia prices are quoted so much per share.

NAME OF COMPANY.	Per value of shares.	Quotations of New York stocks are based on the equivalent of \$100. Philadelphia prices are quoted so much per share.												Sales from June 20th to June 26th inclusive.			
		June 20.		June 22.		June 23.		June 24.		June 25.		June 26.					
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.				
Barclay Coal.....	50																
Cameron Coal.....	10																130
Col. C & I.....	100			11 3/4	11												16
Ches. & O. RR.....	100							4									
Consol. Coal.....	100																
Cumb. C. & I.....	100																
Del. & H. C.....	100	80 1/4	79 3/8	80 1/8	78 3/4	79 1/4	78 1/2	79 1/4	78 3/4	79 1/4	77 3/4	79	77 3/4			5,489	
D. L. & W. RR.....	50	102 3/8	101 5/8	103 3/8	101 5/8	102 3/4	101 5/8	102 1/2	100 3/4	102 3/4	101 5/8	101 5/8	101			200,317	
Elk Lick Coal Co.....	50			41 1/2	41 1/2			41 1/2		41 1/2						726	
Lehigh C. & N.†.....	50			57 1/4				57 1/4		57 1/4						292	
Lehigh Valley RR.†.....	50																
L. & W. C. & I Co.....	100																
Maryland Coal.....	100																
Montank Coal.....	100			123	122 3/4	123										42	
Morris & Essex.....	50																
New Central Coal.....	180																
N. J. C. RR.....	100	41 1/2	39 1/2	41 1/2	39 1/2	40 1/2	39 1/2	41 1/2	39 1/2	41 1/2	39 1/2	40 1/2	39 1/2			81,009	
N. Y. & S. Coal.....	50																
Penn. Coal.....	50																
Penn. RR.†.....	50			48 3/4	48 1/4	48 1/4	48	48 1/4	48 1/4	47 3/4	47 3/4	47 3/4	47 3/4			8,357	
Ph. & R. RR.†.....	50	14 3/4	14	15 1/4	14 3/4	14 3/4	14	15	14 3/4	15 1/2	15 1/2	14 3/4	14 3/4			12,700	
Spring Mountain.....	50																
Westmoreland Coal.†.....	50																

\* Of the sales of this stock, 3935 shares were in Philadelphia and 8765 in New York. Total sales, 309,078.  
† The quotations for these stocks are not percentage, but actual price.

lot of 10 shares of Ontario sold at \$25. Stormont was quoted at from 10@11c., with sales of 600 shares. Silver King has been firm at \$5. Alice, at from \$1.95@1.85.

The transactions during the week show a decrease of 9098 shares as compared with those of the preceding week. The total transactions amounted to only 44,731 shares. A complete summary of the market will be found elsewhere.

Coal Stocks.

Although the week opened promisingly for the stock market, a reaction set in, and to-night there is a strong feeling of distrust and uncertainty. Delaware & Hudson has been very quiet, selling down to \$77 1/2 to-day, and closing at \$78 bid. Delaware, Lackawanna & Western has had a moderate business at \$101@103 3/8, closing at \$101 1/2. The company declared its usual 2 per cent dividend to-day. This is looked upon as forcing the situation for the purpose of supporting the price of the stock until certain insiders can unload their holdings. Jersey Central has been very active and exceedingly strong on rumors of a favorable contract to be made with the Baltimore & Ohio Railroad, and upon the passage of the bill permitting that road to enter the city of Philadelphia. The stock sold up to \$41 1/2, but closed to-day at \$39 3/4 bid. Reading, although quiet, has been more active and stronger than usual. It sold up to \$15 1/2 in this market, but closed at \$14 1/2 bid.

The Philadelphia market shows slight losses for the week, but otherwise the dealings do not call for special comment.

Dividends.

Cape Copper Mining Company, Limited, of South Africa, has declared a dividend of 10s. a share, free of income tax, payable at London, England, on the 24th inst.

Freeland Mining Company, of Colorado, has declared a dividend (No. 3) of \$20,000, payable on July 1st.

Lang Valley Coal Company gives notice that \$5000 of the company's bonds have been drawn for payment and cancellation, and will be paid off with interest on July 1st at the office of Harvey Shaw, treasurer, Philadelphia, Pa.

Ontario Silver Mining Company, of Utah, has declared a dividend (No. 108) of \$75,000, payable on the 30th inst. Total dividends to date, \$6,500,000.

The receivers of the Philadelphia & Reading Railroad give notice that they will pay on the 29th instant the interest to June 20th, 1885, on the four per cent receivers' certificates issued for supplies and materials furnished prior to June 2d, 1884.

Pipe Line Certificates.

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

	Opening.	Highest.	Lowest.	Closing.	Sales.
June 20	\$0.83 3/4	\$0.83 3/8	\$0.82 3/4	\$0.83 3/4	6,568,000
22	.82 1/2	.82 3/8	.81 3/4	.82 1/2	3,773,000
23	.81 1/2	.81 3/8	.81 1/4	.81 3/4	3,932,000
24	.83 3/8	.83 3/8	.83 3/8	.83 3/4	9,631,000
25	.85 1/4	.87 3/8	.85	.87 1/2	9,218,000
26	.87 1/2	.88 3/8	.86 3/4	.87 1/2	7,827,000
Total sales					40,949,000

ASSESSMENTS.

COMPANY.	No.	When levied.	Delinquent in office.	Day of sale.	Amount.
Alta, Nev.....	32	Apr. 30	June 4	June 24	.25
Aultman, Cal.....	2	June 15	July 2	Aug. 10	.01
Baker Divide, Cal.....	9	May 12	June 15	July 6	.25
Best & Belcher, Nev.....	32	June 2	July 7	July 28	.50
Caledonia, Dak.....	16	May 28	July 10	Aug. 5	.15
Champion, Cal.....	19	April 23	June 1	June 30	.08
Chillar, Nev.....	16	May 18	June 24	July 15	.50
Con. Imperial, Nev.....	22	May 10	June 23	July 15	.10
Eintracht Gravel, Cal.....	18	May 26	June 30	July 18	.05
Empire, Cal.....	3	May 15	June 16	July 14	.10
Gold Cañon, Cal.....	1	June 15	July 18	Aug. 4	.02 1/2
Golden Fleece, Cal.....	1	April 18	June 8	June 27	\$.20
Gould & Curry, Nev.....	50	June 1	July 8	July 29	.40
Hale & Norcross, Nev.....	85	May 6	June 9	June 29	.50
Hanover, Mich.....	4	April 19	April 19	July 9	.10
Homeward Bou'd., Cal.....	4	June 12	July 20	Aug. 11	.25
Iowa, Nev.....	17	April 29	June 6	June 27	.05
Mono, Cal.....	22	June 17	July 22	Aug. 11	.50
Navajo, Nev.....	11	May 25	June 29	July 20	.25
New Basil Con., Cal.....	7	April 23	June	June 27	.05
Pay Day, Cal.....	3	June 2	July 14	Aug. 10	.02
Peerless, Ariz.....	4	May 18	June 23	July 17	.30
Potosi, Nev.....	18	May 13	June 19	July 10	.30
Sierra Nevada, Nev.....	82	June 9	July 15	Aug. 4	.25
St. Lawrence, Nev.....	2	May 5	July 1	July 20	.50
Wallis Con., Cal.....	2	May 2	June 7	July 13	.....

\* Had been delinquent. Earlier date postponed until time mentioned.

Boston Copper and Silver Stocks.

[From our Special Correspondent.]

BOSTON, June 25.

There has been but little doing in copper stocks the past week, a sort of summer dullness having settled on the market. Prices, however, have been very firm, and an advance in the leading stocks is recorded. The ingot market is rather dull, and the price has shaded off a little, which has a tendency to lead buyers to hold up, and indirectly this affects the market for the copper shares. Calumet & Hecla, on sales of 69 shares, advanced from \$174 1/2@176, with later sales of a small lot at \$175. Quincy advanced from \$35 1/4@36 1/4 for a lot of 4 shares, selling later at \$36 for a 40-share lot. Franklin sold at \$8 for 100 shares; subsequently, at \$7 ex dividend (\$1 a share), the latest sales being at \$6 1/2. The total for the week is 200 shares. A lot of 15 shares of Atlantic sold at \$6 1/2, same as last sale. Allouez advanced from 50@60c., on a sale of 250 shares. The sales for the week aggregate 578 shares. It was rumored on the street this week that the Tamarack shaft had struck the Calumet & Hecla vein, and the stock, which has not been placed on the active list at the Board, was in active demand, and as high as \$40 was bid for it without bringing it out. The report was not confirmed, but the indications are very favorable, and the holders of the stock feel confident that their money has been well invested.

In silver stocks, there is a little doing, and quotations are irregular. Catalpa has been rather weak, and sold down to 17 1/2c. (400 shares).

At the Mining Exchange, Bowman Silver sold at 10c., assessment paid, a large block coming out at

that price yesterday—about 5000 shares. Dunkin, steady at 18@20c. "Cusi," \$1.22 1/2 bid, and offered at \$1.32 1/2. Consolidated Pacific, dull and neglected at 25c. bid, 35c. asked. Empire, 7@10c.

3 P.M.—At the afternoon Board, the market was dull—in fact, nothing doing. A sale of 200 shares of Catalpa at 20c. was all the business in mining stocks recorded.

Closing prices: Calumet & Hecla, \$170 bid, \$175 asked. Quincy, \$36 bid. Franklin, \$5 3/4 bid, \$6 3/4 asked. Atlantic, \$6 1/2 bid. Bowman, 10c. bid, 12c. asked. Catalpa, 17c. bid, 20c. asked.

FREIGHTS.

Coastwise Freights.

Per ton of 2240 lbs.

Representing the latest actual charters to June 25th:

To	From Philadelphia	From Baltimore.	From New York shipping ports.
Alexandria.....			
Annapolis.....			
Albany.....			
Baltimore.....			
Bangor.....			
Bath, Me.....			.90
Beverly.....			.90
Boston, Mass.....			.85@.90
Bristol.....			
Bridgeport, Conn.....			.50
Brooklyn.....			
Buffalo, N. Y.....			
Cambridge, Mass.....			.90 1/2
Cambridgeport.....			.90 1/2
Charleston, S. C.....			
Charlestown.....			
Chelsea.....			.90
City Point.....			
Com. Pt., Mass.....			.90
E. Boston.....			
East Cambridge.....			.90
E. Greenwich, R. I.....			
Fall River.....			.70
Galveston.....			
Gardiner, Me.....			
Georgetown, D. C.....			
Gloucester.....			
Halifax.....			
Hartford.....			
Hackensack.....			
Hudson.....			
Lynn.....			
Marblehead.....			
Medford.....			
Millville, N. J.....			
Milton.....			
Newark, N. J.....			.75
New Bedford.....			
Newburyport.....			
New Haven.....			.50
New London.....			.70
New Orleans.....			
New-Berne.....			
Newport.....			
New York.....			
Norfolk, Va.....			
Norwich.....			
Norwalk, Conn.....			
Pawtucket.....			
Philadelphia.....			
Portland, Me.....			
Portsmouth, Va.....			
Portsmouth, N. H.....			.95@1.00
Providence.....			.70
Quincy Point.....			
Richmond, Va.....			
Rockland, Me.....			
Rockport.....			
Roxbury, Mass.....			
Saco.....			
Sag Harbor.....			
Salem, Mass.....			.90
Saugus.....			
Savannah.....			
Somerset.....			
Staten Island.....			
Trenton.....			
Troy.....			
Wareham.....			
Washington.....			
Weymouth.....			
Williamsbg, N. Y.....			
Wilmington, Del.....			
Wilmington, N. C.....			
St. Thomas, W. I.....			
Key West, Fla.....			

\* And discharging. † And discharging and to towing. ‡ 3 Per bridge extra. § Alongside. ¶ And towing up and down. †† And towing. \*\* Below bridge.

SAN FRANCISCO, June 10, 1885.

THE FATHER DE SMET CONSOLIDATED GOLD MINING COMPANY has declared Dividend No. 46, of TWENTY CENTS per share, payable on 30th inst., at the office of Laidlaw & Co., 14 Wall Street, New York. Transfers close on 20th inst.

H. DEAS, Secretary.

CIVIL, MECHANICAL, AND MINING ENGINEERING at the Rensselaer Polytechnic Institute, Troy, N. Y. The oldest engineering school in America. Next term begins September 16th. The Register for 1885 contains a list of the graduates for the past 61 years, with their positions; also course of study, requirements, expenses, etc. Address

DAVID M. GREENE, Director.



# MARYLAND COAL COMPANY,

MINERS AND SHIPPERS OF

## George's Creek Cumberland Coal OF THE BEST QUALITY.

Shipments from Baltimore, or over Improved Railway Chute from Georgetown, D. C., in Superior Order.

OFFICES, NO. 104 BROADWAY, NEW YORK.

### San Francisco Mining Stock Quotations. Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS.					
	June 19.	June 20.	June 22.	June 23.	June 24.	June 25.
Albion.....						
Alpha.....						
Alta.....	.60	.60	.60	.55	.55	.60
Argenta.....						
Bechtel.....						
Belcher.....	1.12½	1.25		1.25	1.25	
Belle Isle.....						
Best & Belcher.....	2.75	2.87½	2.62½	2.50	2.50	2.50
Bodie.....	1.12½	1.50	1.50	1.37½	1.37½	1.50
Bullion.....						
Bulwer.....						
Chollar.....	2.37½	2.50	2.50	2.25	2.50	2.37½
Con. Pacific.....						
Con. Cal. & Va.....	2.25	2.37½	2.25	2.00	2.12½	2.12½
Crown Point.....	1.25	1.37½	1.62½			1.37½
Day.....						
Elko Cons.....						
Eureka Cons.....						
Exchequer.....						
Gould & Curry.....	1.75	1.87½	1.75	1.50	1.62½	1.62½
Grand Prize.....						
Hale & Norcross.....	7.75	9.12½	9.62½	9.37½	9.87½	10.00
Independence.....						
Martin White.....						
Mexican.....	1.12½	1.37½	1.25	1.25	1.25	1.25
Mono.....						
Mount Diablo.....	3.75			3.00		
Navajo.....	.85		.85	.90	.95	1.25
Northern Belle.....						
North Belle Isle.....						
Ophir.....	1.62½	1.75	1.62½	1.50	1.50	1.50
Overman.....						
Potosi.....	1.12½	1.25	1.25	1.12½	1.25	1.12½
Savage.....	4.25	4.50	4.50	4.25	4.50	4.37½
Scorpion.....						
Sierra Nevada.....	1.50	1.50	1.50	1.37½	1.37½	1.37½
Silver King.....						
Tip-Top.....						
Union Cons.....	1.25	1.37½	1.37½	1.25	1.25	1.25
Utah.....	2.75			2.62½		
Wales Cons.....						
Yellow Jacket.....		2.50	2.50		2.50	2.25

## MAPS.

**ARIZONA AND NEW MEXICO.**—This map shows all the Township Surveys, Private Land Claims, Post-Offices, and Settlements. It also exhibits the Explorations of other Government and Private Expeditions, including the facts developed by the Surveys for the Routes of Projected Railroads, etc., 1881. Scale, one inch to thirty-three miles. Colored, 24x17 inches. Pocket form, \$1.

**COLORADO.**—Cannon's Map of the Mineral Belt of Colorado. Taken from the Records of the Surveyor-General's Office, and other reliable Official Sources. Showing, in colors, the Mineral Belt, Gold Districts, Silver Districts, Coal Districts, County Lines, and Boundaries of Land Districts. There are also given the Capital, County Seats, Township Lines, Railroads, and Projected Railroads. Scale, 1 inch = 10 miles. Size, 26x30 inches. Pocket form, \$1.50; as a wall-map, \$2.

**COLORADO.**—Topographical and Township Map of the State. Compiled from U. S. Government Surveys and other authentic sources, by Louis Nell, Civil Engineer. By means of symbols, the following mass of facts is graphically shown: Railroads in operation; Railroads chartered or in progress; Wagon-roads; Wagon-roads proposed; Trails; Drainage dry during the greater part of the season; County-seats; Post-offices; Villages; Townships subdivided; Townships surveyed in outlines; Contour-lines, with vertical intervals of 1000 feet; Altitudes in feet above sea level, by barometer observations and by spirit-levels; Private grants; Military reservations; Indian reservations ceded to the U. S. Government; Arable land, with irrigation. Tables of Areas of Counties; Astronomical Positions; Arable Land. Scale, 1 inch = 10 5/8 miles. Size, 31x40 inches. Pocket form. \$1.50 on thick paper.

**IDAHO.**—The Wood River Region of Central Idaho, giving the first correct Geography of that recently explored and remarkable Belt of Discoveries of Gold and Silver Mines on the tributary streams of the WOOD and LITTLE WOOD Rivers, on the Upper Waters of the SALMON RIVER, among the SAWTOOTH MOUNTAINS, and on the Forks of the BOISE RIVER; embracing the Mount Estes and Custer Mines on the north and the Oregon Short Line Railroad on the south. Prepared by Frank J. Scott. Scale, 5 miles to the inch. Size, 15 x 26 inches. In paper pocket. Price, \$1.

**MEXICO.**—Map of Mexico. Showing Railroads, Broad Gauge and Narrow-Gauge, Constructed; and Railroads Broad-Gauge and Narrow-Gauge, Proposed. This very large and finely-engraved Map, constructed originally by the government for official purposes, contains all the information obtainable by it, and shows minutely the towns and villages of the entire country. Scale: 26 6/16 Mexican Leagues to the degree, and 69 1/16 English Miles to the degree; also, Kilometrical Scale, 1881. Size, 53x41 inches. Printed in colors. Pocket form, \$5.

**NEW SECTIONAL AND MINERAL MAP OF UTAH.**—Pocket form. Compiled from the latest U. S. Government Surveys and other authentic sources, exhibiting the Sections, Fractional Sections, Counties, Cities, Towns, Settlements, MINING DISTRICTS, Railroads, and other internal improvements. Scale, one inch to eight miles. Colored, 1884. \$3.75.

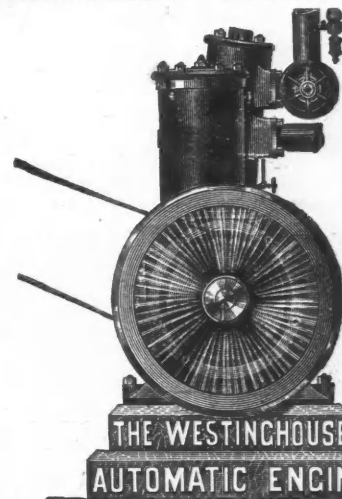
**SAN JUAN MINING REGION (COLO.).**—Kibbe's Geographical and Geological Map of the San Juan Mining Region, 1881. Shows county lines, wagon-roads, stage routes, trails, railroads, cities and towns with post-offices, camps with post-offices, reduction-works, mountain peaks, continental divide. Also (by colors), eruptive rocks, Carboniferous, Cretaceous, Jura Trias. Elevations above sea-level. Scale, one half inch to the mile. 22 x 27 inches. Includes, on same sheet, a reduced Map of the State of Colorado. Printed in colors, with board covers. \$1.50.

**SAN JUAN MINING REGION (COLO.).**—Stockder's Map of San Juan Mining Region, compiled from U. S. Surveys and other Authentic Sources, 1881. Shows county boundaries, district boundaries, wagon-roads, trails over mountain passes from river basin to river basin, continental divide, timber-line (11,000 to 11,500 feet above sea-level), etc. Scale, 1 inch to the mile, or 1 = 63,360. 28 x 38 inches. Pocket form, stiff paper cover, \$1.50; or as a wall map, \$1.50.

**COLORADO.**—Topographical and Township Map of Part of the State, exhibiting the San Juan, Gunnison, and California Mining Regions. By Louis Nell. Substantially same as above. Post-offices, March 1st 1880. Scale, 1 inch = 9 miles, 1-570,240. Plain sheets for wall, 90 cents.

**THE SCIENTIFIC PUBLISHING CO.,**  
27 Park Place, New York.

P. O. Box 1833.



### 1500 ENGINES NOW IN USE.

Our capacity being now equal to 100 engines per month, we shall hereafter keep in stock for immediate shipment all sizes from 4 to 200 H. P.

Send for Illustrated Circular and Reference List.

**The Westinghouse Machine Company,**  
PITTSBURG, PA.

SALES DEPARTMENT CONDUCTED BY

- WESTINGHOUSE, CHURCH, KERR & CO.,**  
17 Cortlandt Street, New York.
- FAIRBANKS, MOESE & CO.,**  
Chicago, Cincinnati, Cleveland, Louisville, and St. Paul.
- FAIRBANKS & CO.,**  
St. Louis, Indianapolis, and Denver.
- PARKE & LACY,**  
San Francisco and Portland, Or.
- PARKE, LACY & CO.,**  
Salt Lake City, Utah, and Butte, Mont.
- D. A. TOMPKINS & CO.,**  
Charlotte, N. C.
- KEATING IMPLEMENT & MACHINE CO.,**  
Dallas, Tex.
- ROBERT MIDDLETON,**  
Mobile, Ala.
- H. DUDLEY COLEMAN,**  
9 Perdido Street, New Orleans, La.
- IMRAY & CO.,**  
Sydney and Melbourne, Australia.
- R. ROGERS,**  
43 Rue Laftite, Paris.

### ROTHWELL'S GREAT MAP OF THE WYOMING VALLEY.

This, the most elaborate and accurate topographical map ever made in this country, outside of the Coast Survey, covers an area of TWO HUNDRED SQUARE MILES and the work upon it cost over \$12,000. It represents a coal-field which produced in 1884 over 13,000,000 tons of Anthracite. The Map was constructed altogether from original surveys. Every Road, Colliery, Building, or land or property line existing at the time is accurately located. The surface configuration is shown by CONTOUR LINES, TEN FEET APART, VERTICALLY; and the elevation of every point above sea-level is given.

But a small edition of this Map was printed, and the plates were then destroyed. A few copies are for sale.

Price: On thick, heavy paper..... \$25  
On bond paper, for mounting..... 25

The six sheets can be mounted separately, or on a single roll 15 feet long by 42 inches wide. Scale, 1000 feet to the inch.

Address,  
**THE SCIENTIFIC PUBLISHING CO.,**  
27 Park Place, P. O. Box 1833,  
New York City.

## BOOKS ON COAL.

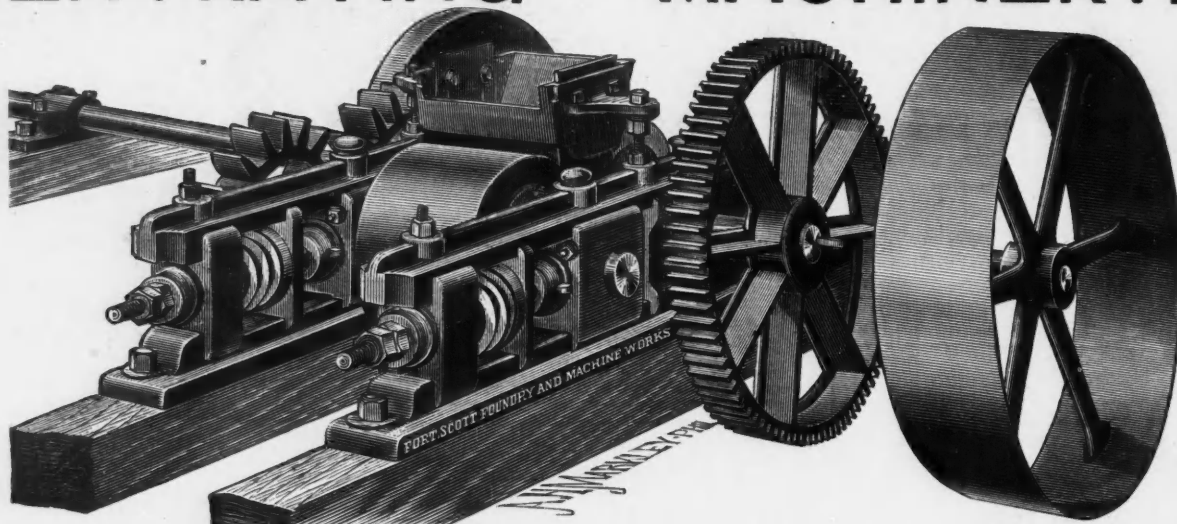
Rare Books and Books on Coal, Coal Mining, Metallurgy, and Engineering are made a special feature; but books of all kinds will be furnished, post-paid, at publishers' prices.

Remittances to be made to the SCIENTIFIC PUBLISHING COMPANY, 27 Park Place (P. O. Box 1833), New York.

- ANDRE, GEORGE G.** A Practical Treatise on Coal Mining. 2 vols. royal 8vo, cloth. Lond. 1878. \$28.
- ATKINSON, J. J.** A Practical Treatise on the Gases met with in Coal Mines. 16mo, boards. N. Y. 1875. 50 cents.
- ATKINSON, J. J.** Friction of Air in Mines. 12mo, boards. N. Y. 1879. 50 cents.
- ATKINSON, J. J.** A Practical Treatise on Mining Machinery. 2 vols. 4to, cloth. Lond. 1878. \$28.
- BAGOT, A.** Accidents in Mines, the Cause and Prevention. 12mo, cloth. Lond. 1878. \$2.
- BAILES, W.** The Student's Guide to the Principles of Coal and Metal Mining. Vol I. (only). 8vo, half morocco. Lond. 1879. \$8.
- BELL, I. LOWTHIAN, F.R.S.** Notes of a Visit to Coal and Iron Mines and Iron-Works in the United States. 8vo, paper. Lond. 1875. \$1.
- BOYD, R. N.** Coal Mines Inspection, its History and Results. 8vo, cloth. Lond. 1879. \$6.40.
- COAL.** Its History and Uses. Edited by Professor Thorp. 8vo, cloth. Lond. 1878. \$3.50.
- COLLINS, J. H., F.G.S.** Principles of Coal Mining. With 139 illustrations. 12mo. Lond. 1876. 50 cents.
- FAIRLEY, W.** The Theory and Practice of Ventilating Coal Mines. 12mo, boards. N. Y. 1882. 50 cents.
- GALLOWAY, ROBERT L.** History of Coal Mining in Great Britain. 12mo, cloth. Lond. 1882. \$2.
- GRESLEY, WILLIAM STUKELEY, Assoc. Mem. Inst. Civil Engineers.** A Glossary of Terms used in Mining. Profusely illustrated with Wood-Cuts and Diagrams. Lond. 1883. Crown 8vo, xii + 296 pages. \$2.
- GOODYEAR, W. A.** The Coal Mines of the Western Coast of the United States. 12mo, cloth. \$2.50.

# CONCENTRATING MACHINERY.

Improved Blake Crushers, Cornish Rollers for Coarse Fine or Crushing, Revolving Sizing Screens, Hydraulic Classifiers, Most Improved Jig Machines, Rittinger Percussion Tables, Round Tables and Silice Jigs, Elevator and Conveyer for Ore, Stamps for Wet and Dry Crushing, Furnaces for Lead, Silver, and Copper; Roasting Furnaces, Cornish Pumps, Engines, and Boilers.

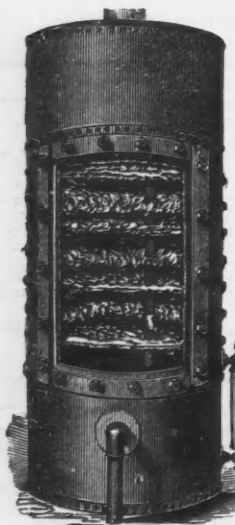


**Concentrating of Low Grade Ore a Specialty.** We furnish complete Concentration Works for the treatment of any capacity from 25 tons per day and upward. Can furnish experienced men to put them up and in operation. Upon receipt of an average sample of ore and statement of capacity wanted, we will be pleased to forward estimate and particulars, or, if desired, will send our Mining Engineer to examine location, etc. Address  
 A. W. WALBURN, Proprietor.  
 F. J. NUTZ, Superintendent.  
 F. De STWOLINSKI, Mining Engineer.

**FORT SCOTT FOUNDRY AND MACHINE WORKS, Fort Scott, Kansas, U. S. A.**

**LINK BELTING MACHINERY Co.**  
 Chicago  
 Manufacturers of  
**IMPROVED**  
**ELEVATORS**  
**CONVEYORS**  
 FOR HANDLING  
**COAL**  
**COKE**  
**ORES**  
**BROKEN STONE**  
**SAND ETC**  
 LINK BELTING WILL NOT SLIP OR CLOG

## STILLWELL'S PATENT LIME-EXTRACTING HEATER AND FILTER



COMBINED IS THE ONLY LIME-EXTRACTING HEATER THAT WILL Prevent Scale in Steam BOILERS, Removing all Impurities from the water before it enters the boiler. Thoroughly tested; over 3000 of them in daily use. This cut is a fac-simile of the appearance of a No. 5 Heater at work on ordinary lime-water when the door was removed after the Heater had been running two weeks.

Illustrated Catalogue.  
**Stillwell & Bierce**  
**Mfg Co.,**  
**DAYTON, OHIO.**



## The E. Howard Watch and Clock Company's STEM-WINDING AND SETTING WATCHES,

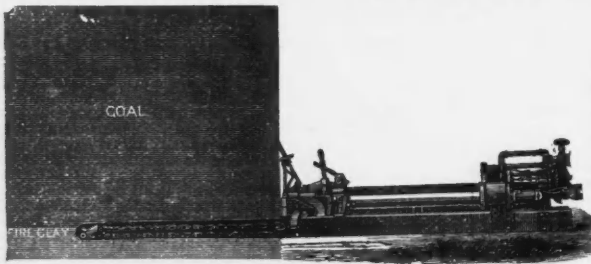
SECOND TO NONE IN THE WORLD FOR Accurate Time, Beauty & Durability, AND HAVE OUR PATENT STEEL WINDING-BARREL which prevents any damage to pivots or wheels by the common accident of the breaking of the main-spring. SEND FOR CIRCULAR.

No. 114 Tremont St., Boston, Mass.  
 No. 29 Maiden Lane, New York.  
 CLOCKS FOR CHURCHES, PUBLIC BUILDINGS, RAILROADS, BANKS, OFFICE, SCHOOL, AND HOUSE USE.



CLOCKS.

## THE LECC MINING MACHINE.



Now in use in the mines of Ohio, Illinois, Colorado, Kentucky, Alabama, West Virginia, and Pennsylvania. Two men with one machine will undercut 60 to 100 square yards of floor in 10 hours, reducing the cost of mining 50 to 60 per cent. Mine, County, and State rights for sale. Correspondence solicited.

**ROLLER CHAIN BELTING CO., Columbus, O.,**  
 Manufacturer and Sole Proprietor. Also Manufacturer of DETACHABLE ROLLER CHAIN BELTING.

**"LIGHTNING" SPEED INDICATOR.**  
 Registers up to 1000; will stand 10,000 rotations per minute. Spindle has Rubber Tip (patent applied for), to prevent slipping, and also to break electric light current when used on dynamo. Has silver-plated dial and glass crystal, excluding dust. Spindle, 1/2", 1", 2", or 3", as ordered. Sent by mail or \$2.50. Discount to dealers.  
 J. C. WALLACE, General Agent,  
 2 No. La Salle St., Chicago, Ill.

**THE SMELTING OF COPPER**  
**SWANSEA DISTRICT OF SOUTH WALES.**  
 From the Time of Elizabeth to the Present Day. By COLONEL GRANT-FRANCIS, F.S.A., author of "Swansea Charters," etc. Second Edition. Beautifully illustrated. London, 1881. Demy 8vo. 193 pages. Half bronze roan, with malachite insides and gilt top. Price \$4. Quarto, large paper, half bronze roan, etc., \$6. Among the illustrations are a number of reproductions of scarce engravings. Address  
 THE SCIENTIFIC PUBLISHING CO.,  
 P.O. Box 1843, 27 Park Place, New York City.

**C. G. HUSSEY & CO.**  
**COPPER AND BRASS**  
**ROLLING-MILLS.**  
 All sizes and shapes of Sheet and Bar Copper and Brass  
**ALSO**  
**CRUCIBLES,**  
 For Steel, Copper, Brass, Etc.  
**PITTSBURGH, PA.**  
**ASSAYERS' SUPPLIES.**  
 (Established 1848.)  
 Balances and Weights, Furnaces, Scorifiers, Cupels, Crucibles, Tongs, etc.  
**A LARGE STOCK. Also,**  
**CHEMICAL APPARATUS OF ALL KINDS.**  
 Trial orders solicited. E. B. BENJAMIN,  
 6 Barclay and 12 Vesey Sts., New York.





3