

THE ENGINEERING AND MINING JOURNAL



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

VOL. XXXIX. MARCH 7. No. 10.

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

Articles, communications, reports, documents, books—all things whatsoever belonging to the Editorial Department, should be thus addressed: **MANAGING EDITOR ENGINEERING AND MINING JOURNAL, P.O. BOX 1833, New York City.**

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

SUBSCRIPTION PRICE, including postage for the United States and Canada, \$4 per annum; \$2.25 for six months; all other countries, including postage, \$5 = 20s. = 24 francs = 20 marks. All payments must be made in advance.

FILE COVERS will be sent by mail for \$1.25 or delivered at office for \$1 each.

Advertising Rates.—See page vii.

Mr. C. A. Green is our accredited representative for New York.
Mr. A. R. Brown, Jr., is our accredited representative for Boston and the Eastern States. Office, Room 1, Simmons Building, 38 Water street, Boston.
Mr. J. Viennot, 150 South Fourth street, Philadelphia, is our accredited representative for Pennsylvania, Maryland, and Delaware.
Mr. O. D. Cotton, Columbus, O., is our accredited representative for Ohio, Illinois, Missouri, Iowa, Michigan, Indiana, and the Southern States.
Mr. O. J. Frost, care Boston & Colorado Smelting Company, Argo, Colo., is our accredited representative for Denver and vicinity.

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

THE SCIENTIFIC PUBLISHING CO., Publishers.

R. P. ROTHWELL, Pres. HENRY M. GEER, Sec. and General Manager,
P.O. Box 1833. 27 Park Place, New York.

CONTENTS.

EDITORIALS:	PAGE.	COAL TRADE NOTES:	PAGE.
The Term American, and its Application.....	151	Maryland.....	160
The Good Record of the Plymouth Consolidated Gold Mining Company.....	151	Missouri.....	160
The Energy Stored in Steam and in Heated Water.....	151	New York.....	160
For "Boom" Read "Boomlet," and for "Chronic Hostility" Read "Earnest and Sincere Friendship and Advocacy".....	151	Ohio.....	160
The Profits of Gas-Making.....	152	Pennsylvania.....	160
		Wyoming.....	161
		GENERAL MINING NEWS:	
CORRESPONDENCE:		Arizona.....	161
Calumet & Hecla Mill Notes.....	152	California.....	161
Civil vs. Military Engineers.....	152	Canada.....	161
		Colorado.....	161
		Dakota.....	161
Official Statements and Reports.....	153	Georgia.....	162
Improved Double Cylinder Hoisting-Engine.....	155	Idaho.....	162
Sidney Gilchrist Thomas.....	155	Mexico.....	162
Quicksilver Reduction at New Almaden.....	156	Michigan.....	162
Wood River, Idaho, Mining Notes.....	158	Minnesota.....	162
Furnace, Mill, and Factory.....	160	Montana.....	162
Labor and Wages.....	160	Nevada.....	162
Railroad News.....	160	Utah.....	162
		FINANCIAL:	
		Gold and Silver Stocks.....	162
		Boston Copper and Silver Stocks.....	163
		BULLION MARKET.....	163
		METALS.....	163
		IRON MARKET REVIEW.....	164
NOTE:		COAL TRADE REVIEW:	
Colliers' Risks.....	158	New York.....	164
Hard-Drawn Copper Wire.....	158	Philadelphia.....	164
Convention of Electric Lighting Companies.....	158	Buffalo.....	165
		Boston.....	166
		New Orleans.....	166
		Statistics of Coal Production.....	166
		Advertisers' Index.....	xii
COAL TRADE NOTES:			
Alabama.....	160		
Canada.....	160		

DR. PERSIFOR FRAZER, in his address as delegate from the American Association to the Royal Society of Canada last May, makes a happy allusion to the noticeable circumstance that "the dictionary of the people of the United States, so fecund in expanding itself to meet the wants occasioned by new conditions of things, has but one adjective to specify the nationality of our own illustrious men, which will apply equally to those of Canada—*American*." Strictly speaking, this application includes also the citizens of Mexico and the States of Central and South America; but general usage—among us, at least—practically restricts it to the two English-speaking peoples of this hemisphere, and fairly expresses the union of these two in literature and science, as well as personal friendly intercourse. In comparison with these things, political union is a matter of less importance, except as it might affect the conditions of trade.

THE Plymouth Consolidated Gold Mining Company, extracts from whose annual report are published in another column, is a brilliant exam-

ple of a good mine under honest and efficient management. Organized June 1st, 1883, with cash on hand \$153,319.80, it has since produced \$1,714,008.65 (to January 1st, 1885), in gold; has spent \$541,158.75 in operating expenses; \$148,554.84 on construction account; has paid \$950,000 in dividends to the close of 1884; and had then cash on hand \$74,295.06. The company has paid or announced \$150,000 in dividends since January 1st of the present year. In 1884, the cost of mining was \$3.20 and milling 48 cents; cost of saving and reducing sulphurets 21 cents, making a total cost of \$3.89 per ton. The ore is low grade for a Pacific coast mine, the average yield being \$18 per ton. It would be satisfactory to know the average assay value of the ore milled and the loss in treatment, the percentage of sulphurets, etc. The management is in every way creditable and the record of the mine magnificent.

PROF. R. H. THURSTON, in his paper on Steam-Boilers as Magazines of Explosive Energy, read at the November meeting of the Mechanical Engineers, gives the amount of energy stored in the steam and in the heated water, respectively, for many different types of boilers, showing that the former is really insignificant in comparison with the latter. The common plain cylindrical boiler heads the list for latent destructive power, because it carries so large an amount of heated water for its weight. As Professor Thurston says: "Its simplicity and strength of form make it an exceedingly safe boiler, so long as it is kept in good order and properly managed; but if, through phenomenal ignorance or recklessness on the part of proprietor or attendant, the boiler is exploded, the consequences are usually exceptionally disastrous." Other forms, such as the Cornish, two-flue cylinder, plain tubular, locomotive, Scotch marine, and flue-and-return-tubular boilers, carry less destructive energy, but any one of them is a storehouse of enough to produce wide-spread disaster. The relative safety of the modern sectional boilers, water-tube boilers, etc., is due not merely to their carrying less available energy, but to "the division of their contents into small portions," and especially to "those details of construction which make it tolerably certain that any rupture shall be local." A violent explosion can only come from the general disruption of a boiler and the liberation at once of its accumulation of steam.

WE confess it did not occur to us that the recent address of the Iron and Steel Association was to be looked upon seriously as a kind of "bull" of the popes of pig-iron ordering the faithful to have "confidence in the future of values" (whatever that may mean) as the "only one element necessary to secure a revival of business prosperity." And we did smile, where some of our heaviest producers of both iron and steel, to our certain knowledge, laughed outright at the picture of these "grave and reverend seigniors" in meeting assembled, the outcome of whose concentrated wisdom was an address "congratulating the American manufacturers of iron and steel and the country generally" upon the "apparent" "prospect" of an "approaching" "end of the depression in business." It must be admitted that this does border on the ridiculous; but what apparently most troubles the supersensitive aggregated soul of the Association is our careless use of the familiar term "boom," to express the "business revival" that we supposed to be the object of the "bull." In the absence of an exact definition of the word in Webster, we may have applied too strong a term to the Association's bulletin, and its friends now utterly disclaim any desire for a "boom in the business" on the part of the iron men. In deference to this unexpected sensitiveness in the definition of words, we will attenuate our term to "boomlet."

But the little rhetorical introduction to the "address," which probably those who indited it laughed at, as did "the trade" generally, was harmless. The serious part of the address was the petition to the Senate and House of Representatives urging prompt and favorable action on "the adoption of a liberal policy in making appropriations" for just such things and those only, as would benefit one industry at the expense of others, and which from experience have been supposed by many to cover "jobs." The Association's organs can protest against wanting a "boom," and they can unjustly ascribe our remarks to "chronic hostility" to the great manufacturing interests of the country, or to "animosity to the Association," which we have never felt, or to some mysterious and to us wholly incomprehensible "personal matter." But they have not a word to say in justification of the policy that we criticised, and with the wisdom of which we could not agree.

The best friends of "the great manufacturing interests of the country" are not those who ask for "liberal appropriations" for one branch of industry at the expense of all the others, but those who seek to bring about in all legitimate ways the permanent widening of our markets and the general adoption of economy, science, and skill in manufacturing, by which we may be able to compete with our rivals in the markets of the world. The manufacturing interests of the country, including that important interest that the Iron and Steel Association claims to represent, have no more earnest and sincere friend and advocate than the

ENGINEERING AND MINING JOURNAL, and we also appreciate highly the useful work done by the Iron and Steel Association in many directions, and have nothing but good-will toward it and its officers. That it occasionally is wrong, and that the ENGINEERING AND MINING JOURNAL in differing from it is in the right, has been proved in the past, and may be again in the future, to the benefit and increased prosperity of the manufacturing interests of the country in general and the iron industry in particular.

THE PROFITS OF GAS-MAKING.

A Senate committee that has been investigating our New York City gas companies has struck on a veritable bonanza, and the pay-chute continues without sign of exhaustion. It is very refreshing in these hard times to read of regular dividends of 25 per cent, with an occasional "extra" and a large reserve fund; but our admiration is greatly increased when we find these magnificent dividends are declared on stock that is largely "water" and in some cases was all "bonus," and never represented any "cash," the working capital being something, we might almost say, in general furnished by the sale of bonds.

The following are a few of the records as published in the daily papers:

The Manhattan Gas Company was chartered in 1830, with a capital of \$500,000, \$320,000 of which was paid in, and the balance was returned in installments, presumably out of profits. In 1847, the capital was increased to \$1,000,000; in 1852, to \$2,000,000; in 1855, to \$4,000,000. The price charged for gas has pretty steadily declined from \$7 per thousand feet in 1836, to \$1.75 per thousand, the present price.

In 1874, the Manhattan Company made 377,500,000 cubic feet of gas, being at the rate of 10,352 feet per ton of coal used. The loss from leakage was 14.4 per cent; candle-power, 17.32. The cost of production, \$1.23 per 1000 feet. Selling price, \$2.50. By-products brought \$143,257. The company declared in 1875 35 per cent. For several years past, the company has produced over 1,300,000,000 feet annually. The return per ton of coal has improved to 10,844 feet; the loss from leakage still averages over 14 per cent; the candle-power has improved to about 19½; and the cost of manufacture at the meter has declined to about 66 cents and in the holder to about 50 cents per 1000 feet. The selling price for four years past has been \$2.25 per 1000 feet. The dividends, 25 per cent, with an extra 10 per cent when the company consolidated at the close of last year. The dividends for the past ten years have averaged over 21 per cent.

The New York Gas-Light Company was organized in 1823, with \$1,000,000 capital. In 1871, this was increased to \$4,000,000 by issuing four shares of new stock for one of old. "No cash was paid in." In the consolidation a few months ago, this company was put in at \$7,560,000. The works have now a daily capacity of 6,000,000 feet. The dividends paid were 20 per cent in 1875; 10 per cent in 1876 and 1877; 8 per cent in 1878; 4 per cent in 1879; 8 per cent in 1880 and 1881; 10 per cent in 1882 and 1883; 15 per cent in 1884; average for ten years, 10.3 per cent. In 1878, this company paid the Municipal Company \$300,000 for the right to make water-gas under the Tessie du Motay patents, and has since used water-gas enriched by naphtha. In 1879, there was a war with the Mutual Company (which also made a water-gas).

The Municipal Company has been paying dividends at the rate of from 15 to 20 per cent on its capital of \$3,000,000.

A few points of considerable interest have been brought out. The enormous increase of gas consumption and the more intelligent administration have reduced the cost of production in the past ten years from \$1.23 to about 45 cents per thousand feet, or a reduction of over 60 per cent. The cost to consumers in the same time was reduced 10 per cent. The dividends and the value of the property were increased.

WATER-GAS.

The companies that ten years ago denounced water-gas as highly dangerous to the public, and supported their absurd assertions by the reports of some of our well-known "professors," in order that they might defeat the introduction and competition of cheap water-gas, having in a great measure succeeded in this object, quietly themselves commenced the manufacture and distribution of the "deadly water-gas" that they had so long denounced. There are few people probably who know the progress made in the introduction of water-gas in the past ten years. Most of the Pennsylvania cities, Baltimore, New York, and several of our other large Eastern cities are now lighted to a great extent with an enriched water-gas; but the present enormous consumption will sink into insignificance when the cheap unenriched water-gas is distributed for fuel. The success of the new incandescent fuel gas-light, to which we have already made references in these columns, promises to bring about this change soon. We may then expect to see our gas, costing consumers say 50 cents per 1000 feet, used generally for fuel, and at the same time furnishing a much better light than we now have. Of all investments now before the public, gas-making appears to be the most profitable and the least liable to loss.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Calumet & Hecla Mill Notes.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: At the Calumet & Hecla stamp-mills, at Lake Linden, Mich., considerable construction and alteration of plant are still in progress.

At present, the Calumet mill is running four heads out of its equipment of five. Of these four, three are Leavitt heads and the other a Ball. One 15-inch cylinder Ball head is idle.

At the Hecla mill, the southern addition to the mill is complete and the heads and washers are nearly all in.

The Hecla mill now has seven Leavitt heads and two Ball heads. These two Ball heads will soon be replaced by an eighth Leavitt head. The mill is now running three Leavitt heads and one Ball head.

The idea, we believe, will be to have twelve Leavitt heads in all at the mills.

Assuming the capacity of the Leavitt heads, taking the average of the two and four-way discharge mortars, to be 200 tons of rock a day, we should have a capacity of 2400 of rock a day, or 62,400 per month of twenty-six days, which would give 3700 tons of mineral. Even this is a little low, as the general run of the rock is about 6½ per cent of dry mineral. But ten heads are to be used, so that taking a sixth from the above we shall have over 3000 tons of mineral a month. Considerable difficulty is had with the Leavitt sand-wheels. The Calumet wheel is the one on which the experimenting is done. All the old buckets have been taken out and replaced by plain straight Cornish ones; this has, in a measure, remedied the difficulty of discharge experienced in the original buckets, although there is still a tendency in the sand to pack in the bottoms of the buckets, and discharge when the regular top launder is passed. The latest difficulty, however, comes from the springing of the shaft.

The main shaft is about 14 feet across from pillow-block to pillow-block, and the rim of the wheel is stayed by ¼-inch rods passing two hubs near the pillow-blocks. These diagonal braces, which are exactly in position and construction like bicycle spokes, are alternately subjected to a great strain and then to a compression sufficient to buckle them by the spring of the shaft. The rods that are at any moment above the plane of the shaft are loose and rattle, and those below are tightly strained. The consequence is, that they rattle and vibrate till the nuts holding them to the rim are shattered and they become loose. Rubber bearings were tried, but were soon abandoned.

The tie-rods have all been taken out and soft steel rods forged on the tire extremities, and in addition to that, the central hub has been strengthened by transverse steel bars actuated in a ring around the axle, about two feet distant from the axle. These will tend to strengthen the hub and prevent the wheel sagging out of shape.

An evident error in construction was the use of such a long shaft or axle. If the masonry supports for the bearings had been arched in the middle, the supply launders could have been conducted through them, and thus the width of the two launders, which now enter parallel with the plane of revolution of the wheel, could have been saved and the length of the axle reduced one half.

J. P.

Civil vs. Military Engineers.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I think the time has arrived to say a few words in reference to the control that military engineers have assumed of some of the fields that legitimately belong only to the civil engineer. This encroachment has grown to be as serious as it is undesirable and unjustifiable. Take, for instance, our river and harbor works: they are considered, by West Pointers, as an inheritance belonging exclusively to their self-constituted military aristocracy—an aristocracy quite ungenerous and overbearing, and having no right to its pretensions, either on the score of education and ability or by reasons of expediency or economy.

I propose to offer some proof in support of these statements, premising that my only object is to call a more general attention from outsiders to an abuse for which there is no necessity, which produces serious harm in many ways, and which can be easily corrected.

First. As to the education of the West Point graduate. Does it fit him to take charge of the important civil works he endeavors to control? His claim is based upon numerous specious arguments summed up as follows: Especial fitness through the high character of his education, economy, and European precedent.

The education of the West Point engineer is exceedingly deficient, both in quantity and quality; and much inferior, for the purposes in question, to what is furnished, for similar purposes, by universities and colleges to civil graduates. The requirements for admission to West Point are very low—perhaps the very lowest in the country—and permit the entrance of cadets to West Point about one year less developed and one year more ignorant than the applicant to the Freshman class of our ordinary colleges. Since professional courses, as at West Point, are of four years' duration, it follows that the lieutenant of engineers has only three fourths of the total training of the civilian graduate of the same class standing. Let us now look into the quality of this fraction of his training, deducting from it, at the outset, about one year and seven tenths exclusively dedicated in West Point to military drill and routine. The operation stands thus:

Length of professional course.....	4.0 years
For insufficient entrance preparation.....	- 1.0 year
For military routine.....	- 1.7 years

Resulting available time for engineering training..... = 1.3 years

(The above information is derived, approximately, from the West Point Official Register.)

We have, therefore, about one year and three tenths left, in which the military graduate must master all the literature, arts, and sciences tributary to engineering; bearing in mind that he has been obliged to make up, inside of the class-room, one year of work that his civilian com-

petitor had mastered the year before he sought admission to college. But let us pass by, as if devoid of weight, the important advantage of greater maturity in the civilian; the effect upon his progress of broader and longer experience as a student; and the relation of these qualifications to the breadth of his mental horizon. We will only compare the abstract quality of this 13 years of engineering education (with a military bias) at West Point, with four complete years of undivided attention to engineering in our technical schools. While the competition between the technical schools keeps them up to the times in methods and results, the methods and books now in use at West Point were old, and in part discarded, when the writer was a student in Troy, twenty-eight years ago. We find in the last West Point Register, under the obsolete heading of "Natural Philosophy," that Bartlett's *Mechanics* is still the main pillar of the West Point engineering foundation. I fear, however, that very few West Pointers have found leisure, in their serious professional life, to put into working shape the generalities of Bartlett, preferring either to make original investigations, or borrow ready-made formulæ from the treacherous and large family of "Engineers' Pocket-Books." It is to be expected that if West Point has remained stationary in the work that forms the very life of the engineering profession, it must be still more backward in subsidiary studies; and so, we find Fownes's *Chemistry* retained to this day in the class-room at West Point, when the student of Johns Hopkins, Harvard, Cornell, or Yale would look upon Fownes as an interesting evolution of alchemy. The scientific isolation of West Point is further made apparent by the conservative pertinacity with which it has kept in use for a long series of years text-books upon a wide range of subjects, all written by a single author, and now far behind the times; while our best technical schools make a moderate use of text-books, for often they contain "old matter" by the time they are first put on sale.

Believing these facts and their corollaries to be incontrovertible, upon what, then, rests West Point's claim to superior technical education?

Let us now pass to the general culture of our military cadets. Much of it belongs to the primary school. The courses in language appear quite elementary, as indeed might be expected, in view of the inadequate preparation for entrance; and with such elementary work in military ethics, international and constitutional law as can be given in a crowded curriculum and as a soldier needs know for his restricted uses, the culture-giving studies of West Point come to an end.

The absence of competition with West Point, the high character that must be expected from the military officers of this great nation, and the invidious comparisons that must be drawn with officers of other nations, demand the highest possible qualifications for admission to West Point. A cadetship should not be open to the abuse of being made the reward of Congressmen to wire-pulling farmers of his district, or by presidential custom made the inheritance of military families.

Let us now investigate how the employment of military engineers affects the cost of civil construction.

A young man leaving West Point with honors is entirely unfit to be placed, with authority, in charge of construction, not infrequently over experienced civilians, and under conditions that never obtain in the case of college graduates. Probably the nation has paid thousands of dollars in waste for every dollar's worth of the usefulness of some of these officers.

A young graduate is never an engineer; but the training received by him will readily tell upon his work. If properly trained, he contributes largely to the economy and success of his charge, and grows fast into usefulness; otherwise, he is discharged and seeks other avenues for his livelihood. The West Point man can not be discharged, and is placed at once over a retinue of subordinates, thus intensifying the inevitable opportunities his inexperience will find to make blunders and cause waste, and his professional education becomes an expensive and long process. His ignorance is covered under supercilious military authority, and he becomes either a despotic nuisance in the work, or, as is more frequently the case, he leans upon his subordinates for the advice he pumps out of them in the guise of consultation; and this pumping appears afterward in his "reports" as his orders to the civilians. The latter, seldom, if ever, get due credit for their success. This military idiosyncrasy exists in all the countries in which the writer has worked under and over military men.

It is difficult to understand why the government persists in spending millions upon millions of money in our rivers through the hands of men neither technically nor practically trained for the purpose, neglecting the ability and superiority of experts trusted to do this work by the unanimous business experience of mankind.

Another argument advanced by military officers for their retention on civil works is the precedent established by other governments. We must remember that European states live in a perpetual state of either armed neutrality or open aggressiveness, and support military establishments that their traditions and necessities render incompatible with our unmilitary system of national administration. Public works in Europe are often outlets for the occupation of superfluous employés and paupers; and military men, who are among the best educated men they have for the purpose, are sometimes the administrators of their terrible necessity. But strongly as expediency and need may demand, the military characterization of European public works—and this argument is not valid in this country—I find in this very argument reasons proving that Europe does not do these things from choice, and is rapidly restricting the scope of military engineering to its legitimate field, while civil engineers are more and more placed in charge of public works, and their high social status is becoming fully recognized.

France established long ago the eminently civil school of "Engineers of Bridges and Roads," which now control all national public works, including canals and the light-house establishment. It may be proper to remark here that, while any student of the *École des Ponts et Chaussées* may enter the military schools without examination, students of the latter may not enter the civil school without advanced preliminary examinations. For years, France has used military engineers for war purposes only; and yet no nation can rival France in the perfection of her light-house arrangements, her wonderful system of internal navigation, and the remarkable monuments of skill, boldness, and elegance erected by her civil engineers.

The Ordnance Survey of England has been quoted as a successful mili-

tary precedent. Yet it contains only nineteen Royal Engineers in a roll of over eleven hundred civilians; while its military character has been sufficient to make this survey cost about six times more than the Swiss survey over much more difficult ground.

Taking into account the intensely military character of Germany and the stress laid upon the strategic importance of her rivers and roads, it is remarkable that the public works done under the "Ministry of Commerce" grow daily in importance and quantity, while the civil work under the "Ministry of War" is rapidly dwindling in importance, and no military engineer is employed in her rivers, harbors, and roads.

Spain has, it is true, a "uniformed" civil organization, of quasi-military tendency, known as the *Administracion Civil*; but the military engineers, if we except the most distant colonies, have only military business on hand. Like France, Spain maintains a national civil school (*Ingenieros del Estado*) in charge of all public works; and such work as geodetic surveys of a high grade demanding very special training is done under the Geographical Statistical Institute. If a military man of great prominence is found here, it is on account of his fitness; not on account of his military rank. And the disbursements and financial transactions of this office, as well as those of military engineers doing civil work in the colonies, are controlled by the *Administracion Civil*.

In Italy, the geodetic survey is in charge of the "Ministry of Spiritual, Educational, and Medical Affairs," although it is quite independent of it and of military dictation.

In Switzerland, this work is done by contract with civil engineers, under rigid specifications, at the usual rate of about \$16 per square mile. The military organization of England pays six times as much—18 pounds sterling—for a little better work.

The triangulation done in this country by military engineers is, as near as I can ascertain, \$18 per mile, while similar work done for the State of New York by Professor Gardiner costs only \$9.80 per square mile, and his limit of errors compares favorably with that of any European triangulation.

In view of the smallness of our standing army and the vast extent of our territory, why can not our officers be kept busy at their legitimate business, leaving the civil work in charge of civil engineers?

The creation of a suitable bureau under some one of the government departments, placed under properly educated engineers and under a strict civil service plan, would give us the best substitute for the French system; and such a bureau would be a credit to this nation, and would contribute in many ways to the material progress of the country and the advancement of constructive art.

The present semi-educated military engineer is inimical to the civil engineers in this country—first, because he tries to monopolize a field that does not belong to him; secondly, because he tyrannizes over a large number of civilian subordinates often superior to him in capacity and skill; thirdly, because he under-pays them and deprives them of legitimate promotion; fourthly, because he seldom gives them credit for the success they achieve, and which he coolly appropriates as his own; fifthly, because he contributes materially to cheapen their labor, and conspires to lower their social status; sixthly, and mainly, because he is a source of waste and professional and scientific demoralization that should exclude him from this field.

I will add that I know and admire the ability of some of our military engineers, and recognize the uniform personal worth of the corps, which, in spite of their defective present education, has produced many eminent men. The grievance I seek to remedy rests upon high ground, and is not personal. I believe the military control of our civil works is an evil fast decaying and nearly at an end. The justice of the claims of the civil engineers, the numbers, influence, unanimity of purpose, and the telling blows already inflicted, will presently place the unfair military competitor at work in his legitimate field, where his achievements will be heartily applauded by his civil brother. Very respectfully, C. U. E.

OFFICIAL STATEMENTS AND REPORTS.

Iron Silver Mining Company, Leadville, Colo.

The report of this company for the year 1884 is not as satisfactory as could have been desired. The following is the financial statement:

Surplus per last year's report.....	\$276,828.01
Total receipts in 1884.....	684,749.51
	\$961,577.52
Total expenses.....	\$755,632.12
Dividend No. 13, paid January 9th, 1884.....	100,000.00
Surplus December 31st, 1884.....	\$106,545.40

The following is a statement of the assets and liabilities, as taken from the books of the company. The mining supplies, timber and stable accounts are inventoried at their cash value:

ASSETS.	
Mining estate, mining plant, and permanent improvements.....	\$10,000,000.00
Cash.....	84,461.61
Carbonate Bank stock.....	10,000.00
Bills receivable.....	4,500.00
Mining supplies.....	2,753.41
Timber account.....	2,318.27
Stable account.....	2,512.11
LIABILITIES.	
Capital stock.....	\$10,000,000.00
Surplus.....	106,545.40
	\$10,106,545.40

There were produced during the year 40,965 tons of dry ore, of which 15,046 tons were from company work and 25,919 tons from tributaries. The mining work done was: 1900 feet of shafts, 923 feet of rises, 707 feet of winzes, 12,156 feet of drifts, and 2194 cubic fathoms of stopes.

The decline, nearly 30 per cent in the price of lead and about 6 per cent in the value of silver during the year, caused a decrease of about \$150,000 on the year's output, and caused also a reduction in the output. The Moyer shaft opened a large body of zinc lead sulphide ore, having an average aggregate value of the metals of from \$40 to \$50 per ton; but there is no market for this ore at any figure that will pay to mine it. The remedy proposed is to put up concentrating-works and separate the galena

from thirty to fifty feet wide, and from 315 to 450 feet long. The ore mills freely, and contains from one to two per cent of sulphurets. There are three shafts—the north and the south, both of which follow the vein, and the Pacific shaft, which is vertical. The latter has three compartments, two of them 5 by 4 feet and the third 5 by 3½ feet, the excavation being 16 by 7 feet, carefully timbered with 12 by 12-inch and 12 by 14-inch pieces. This shaft is equipped with superior hoisting machinery. Self-dumping automatic skips are used, hoisting three thousand pounds of rock each, with English flat wire cables. The derrick frame is 76 feet in height.

On the Pacific claim, the levels are as follows:

No. 1	is	1060	feet	below	the	surface.
" 2	"	1157	"	"	"	"
" 3	"	1237	"	"	"	"
" 4	"	1310	"	"	"	"

Level No. 5 will be opened during the coming summer. On the Empire, the levels are designated according to their depth. The lowest, denominated the 1280 level (the measurement following the north and south shafts, which incline), is about 1100 feet vertical.

The temperature of the mine is moderate.

Very little trouble is experienced from water. No pump is needed. A bucket running a few hours each day keeps the mine clear.

Our two mills have an aggregate of 120 stamps, and are located about one thousand feet apart. The Empire mill has eighty stamps, and the Pacific forty. The latter are the heavier, weighing 900 pounds each. Both mills are in excellent condition, and together are crushing about 250 tons of rock daily. Connected with the mills are forty Frue concentrators for saving sulphurets.

We believe the Pacific mill to be one of the best equipped in existence. The company's chlorination works, recently constructed, have proved a gratifying success. The carpenter, blacksmith, and other

shops have been maintained as formerly, enabling the company to make its own repairs. Every department has been conducted with economy and exactness.

All material, timber, machinery, etc., are purchased at net cash prices.

The company owns extensive water-works. In addition to the several reservoirs, there are canals as follows:

MAIN.—Twenty-five miles long, runs from the middle fork of Cossumnes River to Plymouth.

SOUTH FORK, or BRIDGEPORT.—Twenty miles long, runs from main fork of the Cossumnes to a point one mile northeast of Plymouth, where it joins the main canal.

SIMPSON.—Twenty-two miles long, runs from the south fork of the Cossumnes River to the reservoir, 2½ miles northeast of Plymouth.

DOUGLASS.—Thirty-four miles long, with lateral branches aggregating fifteen miles more, conveys water from middle fork of the Cossumnes River to Indian Digging.

TYLER.—Four miles long, runs from south fork of the Cossumnes to reservoir at Tyler's ranch.

In addition to the above, there are several branches, and also canals leading the water from Plymouth to the country below, in all about forty miles, the whole system making a total of 160 miles of canal owned by the company.

The water used for power is conveyed from the Simpson Canal Reservoir, 2½ miles, in iron pipe of eighteen inches diameter. At the Empire and Woolford shafts, a pressure of 550 feet is obtained, and at the Pacific shaft a pressure of 561 feet.

The canals are also utilized to bring to Plymouth timbers for the mine. Seven or eight thousand logs a year are used. They are large and heavy. Instead of being hauled over difficult roads at great expense, they are easily floated down the canals from the mountains, and dropped into the company's yard, almost without cost for transportation.

The improvements have cost about five hundred thousand dollars, in addition to what has been expended in development of the mine, and for operating expenses.

We have on hand a full supply of material for use as may be needed.

Our superintendent, Mr. E. L. Montgomery, has had charge of the property since December, 1879, while Mr. William Jones, the foreman, has nearly completed his decade of service. Mr. J. J. Herr has directed the affairs of the office at Plymouth for four years.

All the real estate, plant, and improvements of every kind, with material, etc., as described above, are paid for, and are owned by this company without debt or incumbrance of any kind.

The country about Plymouth is quite unlike that of most mining sections. Instead of barren rock or desert, there are fine farms, vegetable gardens, cultivated fields, and pleasant woods—making it desirable for

residence. It is in the foot-hills of the Sierra Nevada, 900 feet above the sea, comfortable in summer, and not too cold in winter.

This company is now paying larger dividends than any gold mine in North America.

The mines are looking better than at any previous period of their history.

This company now produces annually about seven and a half per cent of the gold output of California, about three and a half per cent of that of the United States, and about one and one eighth per cent of that of the world.

IMPROVED DOUBLE CYLINDER HOISTING-ENGINE.

The Morris County Machine and Iron Company, of Dover, New Jersey, represented in this city by Messrs. Graydon & Denton, 15 Cortlandt street, has brought out this new claimant for the first place among hoisting-engines. The two cylinders stand on a single bed-plate, and for compactness, simplicity, and accessibility of the working parts, this engine appears to be well designed. Among the claims of superiority made by the manufacturers are, that the moving parts are directly under the eye of the engineer; the brake-lever and throttle-valve are within his reach, and he can see past the end of the drum to the landing from which signals are made. The engines are built strong—steel cranks, steel rods, steel links, etc. The pinion for a geared drum is on the end of the crank-shaft close to the long out-bored bearing. The drum-frames are separate from the engine-bed, and what strains the drum is subject to can not affect the alignment of the engine proper; and if, as sometimes happens, the machine is no longer required for hoisting, the drum may be removed, leaving the engine free to be employed for any other purpose—a feature of value in itself.

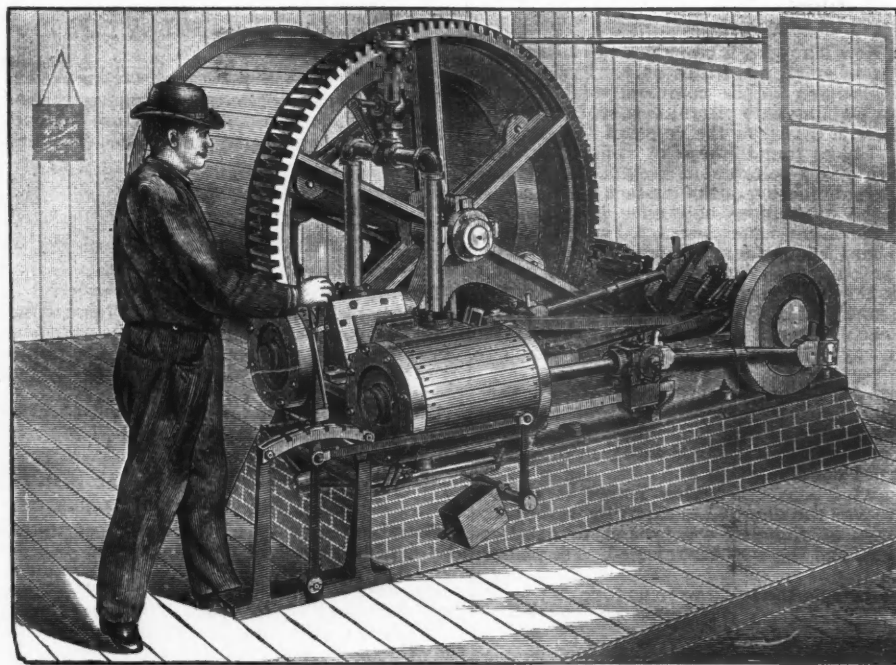
The company makes several sizes; and for fast

hoisting in cages, the drum is attached directly to the crank-shaft, and the drums are made of iron, conical and grooved for the rope; but the larger drums for ordinary heavy loads are geared as shown, and are lagged with wood.

SIDNEY GILCHRIST THOMAS.

Mr. Thomas died at Paris on Sunday, the first of February, and was buried in Passy Cemetery on the following Tuesday. He was born in London, in April, 1850. When he was born, the whole quantity of steel made in the world was less than thirty million tons. Mr. Thomas died hoping and believing that the present year would witness the production of over a million tons of basic steel alone. So absorbed was he in the work he had set himself to do that the approach of death itself could not deter him

from writing when too ill to dictate; the mass of correspondence connected with the experiments based on his ideas being very voluminous and very difficult. The outline of the history of the basic process, says *Engineering*, is soon told. "Starting the idea with his cousin, Mr. Gilchrist, the experiments at Blaenavon were rapidly brought to a success. The first paper by Messrs. Thomas and Gilchrist was offered for reading at the Paris meeting of the Iron and Steel Institute, 1878. It was placed near the top of the list, but at the last moment was removed, and before the news of the change could reach us, a part of it appeared in *Engineering*. This attracted so much attention that the paper was read at the next meeting. Trials were made at Dowlais, at Eston, at Thy-le-Château, and at Hoerde; success was then insured, and the rapid adoption of the process throughout the continent followed. In April, 1882, a second joint paper was read at the Society of Arts, and obtained the Society's medal. In the autumn of the same year, at Vienna, Mr. Thomas was presented with a most chastely designed casket, made entirely of basic steel. This graceful acknowledgment of his work was presented by Herr Baumler, on behalf of the Prager Eisenindustrie Gesellschaft. His labors meanwhile were largely directed to the erection of the Northeastern Steel-Works, Middlesborough: these were started in June, 1883, and since then, they have led the van of the basic process in England. In September of the same year, Mr. Thomas was presented by the Council of the Iron and Steel Institute with the Bessemer gold medal; and the letter he wrote to the president on that occasion, almost attributing the success of his inventions to others, is eminently characteristic of him. With excellent taste, under the circumstances of his absence, the presentation was personally made by Sir Henry Bessemer. Since that time, all endeavors to ward off the lung disease that had struck him down had failed, and long sea journeys to milder climates, and residence in Algiers, were in vain. He returned to Paris in the summer of last year, where he obtained the highest medical advice; but death overtook him. During the last fortnight, he was gradually sinking. His



IMPROVED DOUBLE CYLINDER HOISTING-ENGINE.

at all in the furnaces then used. As the *tierras* from which the adobes were made were poor ores, the expense of making them largely reduced the profit of treating these ores.

The next important improvement was the introduction of the continuous coarse-ore furnace. This furnace was first invented and built for burning lime near Berlin by the celebrated Count Rumford.* It was first introduced at Idria, Austria, by Bergrath Adolf Exeli, in 1871, and proved so effective there that its introduction at New Almaden followed in 1874. The first furnace worked so well that a second was built in 1875. These furnaces, locally known as Nos. 7 and 9, are also called "monitors," in allusion to their shape and to the fact that they are iron-clad. With the introduction of these furnaces, the economical treatment of the coarse ore was satisfactorily accomplished.

But the most serious problem yet remained. Two thirds of all the ore had still to be worked into *adobes*, whether it went through the monitors or the intermittent furnaces. The fine ores of Almaden in Spain are even yet made into *adobes*, while at Idria, Austria, this class of ores is treated in continuous reverberatory furnaces (*Fort-schaufelungsöfen*). At New Almaden, the problem has been solved in a much happier manner by the invention of the Hüttner and Scott furnace.

This must be regarded as the most important contribution to the art of quicksilver reduction that has originated at New Almaden. The inventors of this furnace are Mr. H. J. Hüttner, the well-known mechanical engineer, who devised nearly all the details of the various furnaces of this type, and Mr. R. Scott, the furnace-mason at New Almaden. To the careful and patient experiments of its inventors and of Mr. J. B. Randol, the manager of the mine, who introduced several important improvements of his own, the practical success of this furnace is due.

The general idea of this furnace is similar to that of the Hasenclever - Helbig shelf-furnace. In common with the latter, it utilizes a series of inclined shelves, placed in the opposite walls of a narrow vertical shaft, to retard the descent of a column of fine ore. But it differs from the Hasenclever type in combining a number of ore-chambers in the same structure, and in the devices for regulating the passage of the products of combustion and for effecting the discharge.

The original experimental furnace, No. 5, contained two high, long, and narrow ore-chambers, separated by pigeon-hole walls from the fire-place on one side and the vapor-chamber on the other. From each wall of the ore-chambers, projected tile-shelves, placed alternately in the opposite walls. These shelves were inclined at an angle of 45 degrees to the walls, and each shelf was therefore perpendicular to the next lower one in the opposite wall. The distance from the edge of one shelf to the face of the next below it was three inches, thus forming an aperture through which the ore could pass. This aperture I shall call, for convenience, the *shelf-slit*.

When fine ore was fed into this ore-chamber through a hopper at the top, it ran from one shelf to the next, until the column found support upon the discharge apparatus at the bottom, whereupon the whole column came to rest throughout the structure. Thus the shelves of the ore-chambers were kept covered by an irregular zigzag column of ore. The end-walls of the chamber were pierced with pigeon-holes, so that the flames might pass from the fire-place under each shelf and over the ore lying upon the shelf beneath, to a vapor-chamber on the opposite end of the ore-chamber. Thence they passed to the condensers. In the first experimental form, the flames made only one passage across the ore-chambers. The furnace, as thus constructed, roasted the ores well

enough; but the escaping vapors were still quite hot, and the consumption of fuel was considerable.

To render the furnace more economical of fuel, to confine the greatest heat to the bottom of the furnace, so as to secure the thorough roasting of the ore, and to allow the vapors to escape to the condensers just above the boiling-point of quicksilver, was the next object. All the above improvements in the working of the furnace were effected by placing arches across the vapor-chambers and over the fire-box, so that the air and fumes were compelled to make four passages across the furnace on their way to the condensers. First, the air that entered the fire-place was drawn through the roasted ore, thus absorbing its heat and removing any quicksilver vapor that it might contain. Next, the hot products of combustion passed through the nearly roasted ore, thus imparting to it a maximum temperature; and, finally, they were passed again back and forth through the colder ore in the upper half of the ore-chamber. In this way, the excess of heat was imparted to the cold ore, and the fumes left the furnace for the condensers only moderately heated above the boiling-point of quicksilver. With these changes, the furnace was found to do uniformly good work at a small expenditure of fuel and labor; and in this form, it was patented by Hüttner and Scott, October 31st, 1876.

The capacity of No. 5 was at first only 6 tons per twenty-four hours. It was afterward increased to 12 tons; but it was evident that the full economy of the new furnace could only be attained when it was erected on a larger scale. Consequently, in the same year, 1876, a larger furnace, No. 8, was erected. This was a double furnace, two furnaces similar to No. 5, but larger, being united end to end in the same structure. It was originally supposed that one of these might be repaired while the other was in use. Experience has shown the heat to be too great to allow this; and they are now always used together without inconvenience.

In 1877 and 1878, a new furnace, No. 3,* was started. While this furnace was of the same type as its predecessors, its capacity was still greater, and it differed in having three pairs of ore-chambers placed side by side, and all heated by the same fire-place. Another modification was introduced in the middle pair of ore-chambers. These were made with a 5-inch shelf-slit, and were to be used for roasting *granzita*; but it was found that the temperature best adapted for roasting *tierras* was not suited for *granzita*; and *tierras* only are now treated in all the chambers of this furnace.

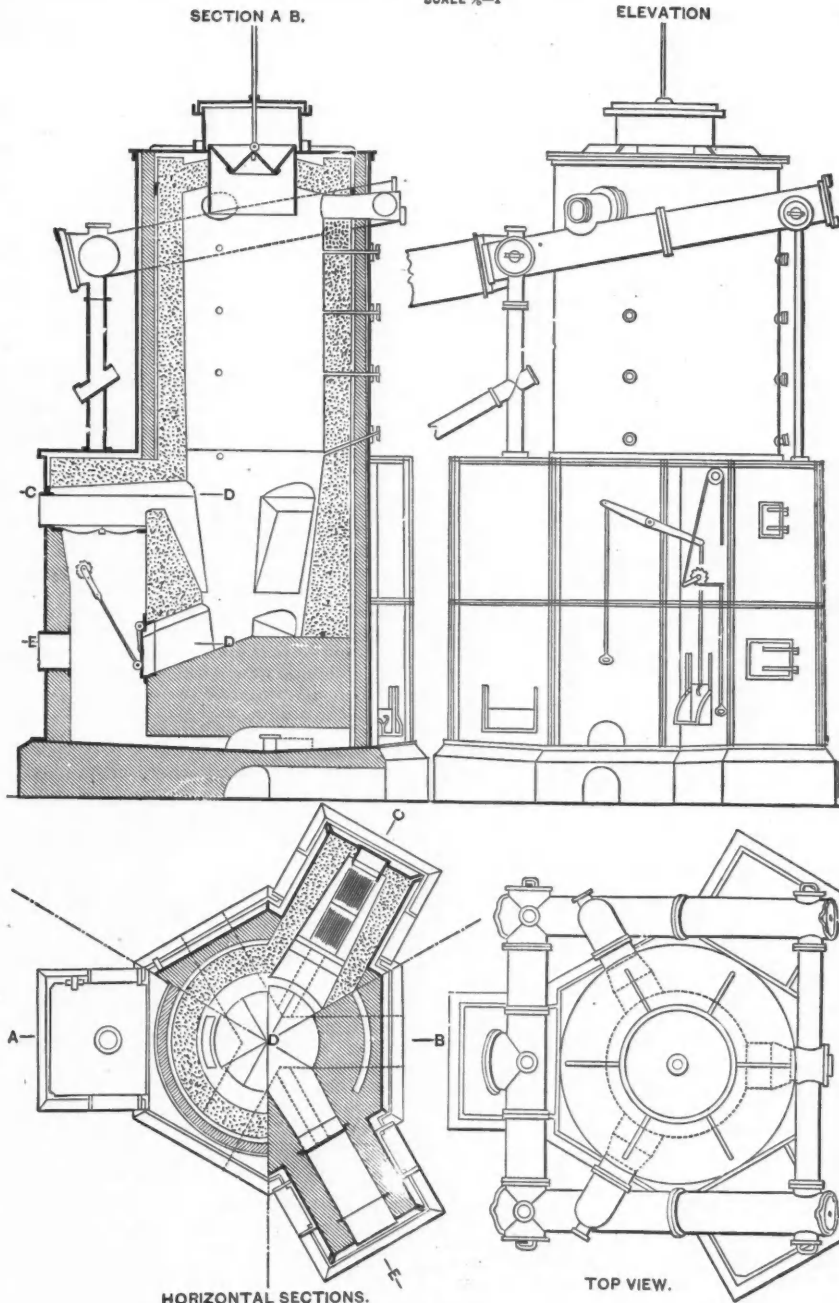
Finally, in 1879, a new furnace, No. 2, with two ore-chambers, having an 8-inch shelf-slit, was introduced for treating the *granzita* ores, intermediate between *granza* and *tierras*. The *granzita*, it will be remembered, runs from 3½-inch down to 1½-inch diameter. In 1880, a second *granzita* furnace, No. 1, was built with two pairs of ore-chambers. With the above improved furnace plant, the economical treatment of fine and medium quicksilver ores may be said to be accomplished.

In the early history of the mine, according to most accounts, the condensation of quicksilver was very imperfectly effected. Prof. W. P. Blake, in a letter to Prof. J. D. Dana,† dated February 14th, 1853, speaks of the loss of mercurial fumes escaping from the chimneys; and of "the peculiar gray coating upon their tops." An article in the *American Cyclopædia*, some ten years later, speaks of the salivation of men and animals about the works, and "the deposit of mercurial soot upon the roofs around."

During the last ten or twelve years, while improvements have been

IRON CLAD SHAFT FURNACE (CONTINUOUS)

SCALE ¼-1



* Described in Karsten's *Archiv für Mineralogie, Geognosie, Bergbau und Hüttenkunde*, 1837, pp. 645 to 702.

† *American Journal of Science*, vol. xvii., p. 438.

going on in furnace construction, constant attention has been given to the subject of condensation. The various devices that have been found most successful will be considered under the head of condensers on another occasion.

III. REDUCTION-WORKS.

SITUATION AND ARRANGEMENT.

The beautiful spot occupied by the *hacienda* or reduction-works is familiar to many California travelers. It was chosen in the early history of New Almaden. The road leading to the mine leaves the San José Valley, and, turning to the south, enters the cañon of Los Alamitos Creek. The handsome residence of the manager and the neat village of the officers and the workmen make a pleasing picture to the east of the well-shaded road. This latter is cooled by a running stream, a luxury all too rare in California summers. Just above the village, the narrow cañon widens out to an area of a dozen acres, giving barely room for the reduction-works.

The summit of Mine Hill is a mile to the west of the *hacienda* in a direct line, and thirteen hundred feet above it. A fine wagon-road, three miles in length, and a shorter tramway with self-acting inclines, serve to bring the ore from the mine to the works.

The ore-tramway from the mine enters the works at the top near the middle. It is situated at the foot of the tall bluffs behind the furnace, at a height of 60 feet above the furnace-floor. Thence, the ore is dumped into the ten chutes arranged along the sloping sides of the bluff at an angle of 40 degrees. These are arranged with bar or cast-iron screens, as before described, to separate the *tierras* from the *granzita*, and have in most cases aprons of hanging logs, to retard the descent of ore and facilitate the removal of smalls.

The *granza* and *terrero* go directly from the chutes to the furnaces; but as there is not storage capacity enough in the chutes for the *tierras* and *granzitas*, the latter are distributed by elevated tramways to the ore-sheds, arranged at convenient points in the furnace-yard. It is necessary to accumulate during the summer months a stock of these ores to last through the winter, as they would be too wet to roast if exposed to the rains. This is all the more necessary, since they already contain considerable moisture, and must usually be dried before roasting.

Near the furnaces are the bottling and weighing-rooms. These are kept under lock and key, and are in the charge of the watchmen. The quicksilver is conducted from the entire system of condensers belonging to each furnace by iron pipes that lead to boxes with goose-necks at the bottom, from which nearly constant slender streams of quicksilver flow during the regular working of the furnaces.

The metal is allowed to accumulate in large iron vats, whence it is weighed out into flasks, bottled and stowed ready for shipment. The product of each furnace is recorded separately.

After passing through the condensing system attached to the furnace in which it is produced, the smoke is conducted to brick towers. In these brick towers, auxiliary fire-places are placed, to heat the side-hill flues in case of insufficient draught. The side-hill flues lead to tall brick chimneys on each side of the creek, which serve to dissipate the products of combustion.

The spent ore or waste, locally termed "slag," is drawn from the cooling-pits of each furnace into cars, whence by tracks it is dumped into Alamitos Creek, which effectually disposes of it.

Owing to the lack of sufficient level space for stowing ore above the furnace-heads, three elevators are used to lift the *tierras* and *granzitas* from the floor of the works where they have been stored (or dried in the sun during the summer) to the top of the furnaces. Two of these are water-balance elevators, while the other is a water-pressure elevator with piston.

The furnaces, condensers, and ore-floor are roofed over; but the sides of the structures are mostly left open, to afford free ventilation for cooling the condensers and drying the ores.

Despite the necessity of making all improvements without any interruption to the regular production, the works are well and conveniently arranged, and are kept in excellent order.

In addition to the main plant above mentioned, there are soot-floors and kettles, bath-rooms for the men, the offices of the company, the carpenter and the machine-shop. The latter is furnished with between three and four horse-power by an overshot wheel, 6 feet wide and 20 feet in diameter.

(TO BE CONTINUED.)

NOTE.—In succeeding issues, we shall give ground-plan and horizontal sections and another vertical section of the *Granzita* furnace.

Colliers' Risks.—The *Colliery Guardian* says: It is popularly supposed that the occupation of a coal miner is the most dangerous of any calling. The study of statistical tables, published by foreign governments, however, seems to disprove this theory. In these tables, it appears that the risks in some other occupations are not merely equal to the miner's, but notably greater. The *Annuaire Statistique* of Belgium, issued by the Minister of the Interior, contains a striking comparison bearing on this fact. Four years of accidents in coal mines are compared with those of a like period of time on the railroads of that country, the employés only being taken account of. The period is from 1879 to 1882 inclusive. It should be borne in mind, in making this comparison, that during these years some of the most destructive of fire-damp explosions took place. In 1879, one of the accidents occasioned 121 deaths; and in 1881, another claimed sixty-eight victims. In spite of this fact, however, we learn that the number of fatal accidents among the colliers was 2.70 per 1000, while among the workmen and other employés of the railroads, the proportion was 3.56 per 1000. From these figures, it appears that a collier is exposed to considerably less risk than a railroad servant. The fact will come as a surprise to many who have been taught to regard the occupation of the miner as peculiarly dangerous. It shows that the precautions taken in the colliery are efficacious, and should be sufficient to silence those ill-informed persons who, whenever a colliery accident occurs, are ready to cry out against the management and to suggest more restrictions.

WOOD RIVER, IDAHO, MINING NOTES.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The yield of the Wood River mines for the year ended December 31st, 1884, made upon the whole a satisfactory showing. The exact statistics have not been published; but it is generally conceded that the figures stand somewhere between \$2,500,000 and \$3,000,000.

The product is mainly a high-grade argentiferous galena. The district begins with the mines near Bellevue, taking in those tributary to Hailey and Ketchum, and embracing a belt of country forty miles long by ten miles wide.

The formation generally is a blue siliceous lime, dark lime shale, with occasional protrusions of granite and porphyry. The surface of the country is mountainous, with narrow valleys and ravines cutting the formation like a checker-board, affording splendid drainage, and unequal facilities for tunneling, whether on the course of the veins or zones or cross-cutting to them.

The mines are mostly situated on the sides of the mountains, many hundreds, and sometimes thousands, of feet above the valleys; the mountain sides presenting an average declivity of 35 degrees from the horizon.

The valleys and cañons afford excellent water-power for concentrating mills, while the north side of the hills is thickly clothed with timber suitable for every purpose necessary in mining. It will be thus seen that we have here a combination of natural advantages for economical mining that is not often found. A great portion of the developments so far made have been by individual or associated individual enterprise. Incorporated companies, with moderate capitalization, have invested in some of these enterprises, and are working out their destiny, avoiding booms and dishonest stimulation. This speaks well for the country; for once its prosperity is established, it will be upon a safe and permanent basis.

It has been found profitable to work only the higher-grade ores, say those containing an excess of \$80 per ton in lead and silver. This has been owing to the cost of smelting, transportation, and miners' wages. Smelting and railroad transportation charges, however, have been reduced; mining supplies of all kinds and provisions, through active competition, are cheaper, while miners' wages alone remain unmoved.

The decrease in the value of silver and lead is seriously felt by mine-owners; and in the adjustment of values, they think it but fair that the rate of miners' wages should be reduced from \$4 a day, now prevailing, to \$3.50 or \$3 a day, which are the prices obtaining in Utah and Montana.

The Minnie Moore and Queen of the Hills, leading mines near Bellevue, whose products are mostly so-called low-grade ores, but worth in the market from \$80 to \$90 a ton, found it necessary to economize by reducing expenses, among them miners' wages. The Miners' Union interfered, caused a strike, and is preventing any one from working in those mines for less than \$4 a day. Hence the enforced idleness of those mines. The matter is now in the courts. The outcome can not be questioned—wages must come to reasonable terms, or mining operations cease.

The average of all the ores shipped from the mines runs about 125 ounces of silver and 60 per cent lead per ton. About one third is sacked clean at the mines, and two thirds shipped from the various concentrating-works; for it may be said that, without crushing and concentrating mills, mining would amount to but little in this part of Idaho.

It might be asked whether, with an average of such high-grade ores, and natural advantages for working, notwithstanding high charges for smelting, freight, and labor, there is not a very large margin for profit left.

CHARACTER OF WOOD RIVER VEINS.

To answer this fully, it is necessary that the vein phenomena of the country should be taken into account and explained. We are dealing with a class of veins or zones that, though avowedly rich in places, are extremely erratic. I know of no better region to send a mining student to than this, to learn of the geological eccentricities both of the veins and the ore-chutes or deposits in them.

After an ore-body is found, it is something to keep with it. It may shift laterally, be thrown under, above, to the rear or in front, any or all ways, by slips, faults, and cross-fissures, so that your previous work sometimes may be wasted, and new plans and new operations involving new capital become necessary. To-day, you think you have a fortune; to-morrow, you are surrounded by hard lime, with not the slightest trace of vein or ore to be seen. These occurrences puzzle prospectors, mine-owners, and superintendents alike. Did they not exist, Wood River as a mining field would stand second to but few mining districts ever opened.

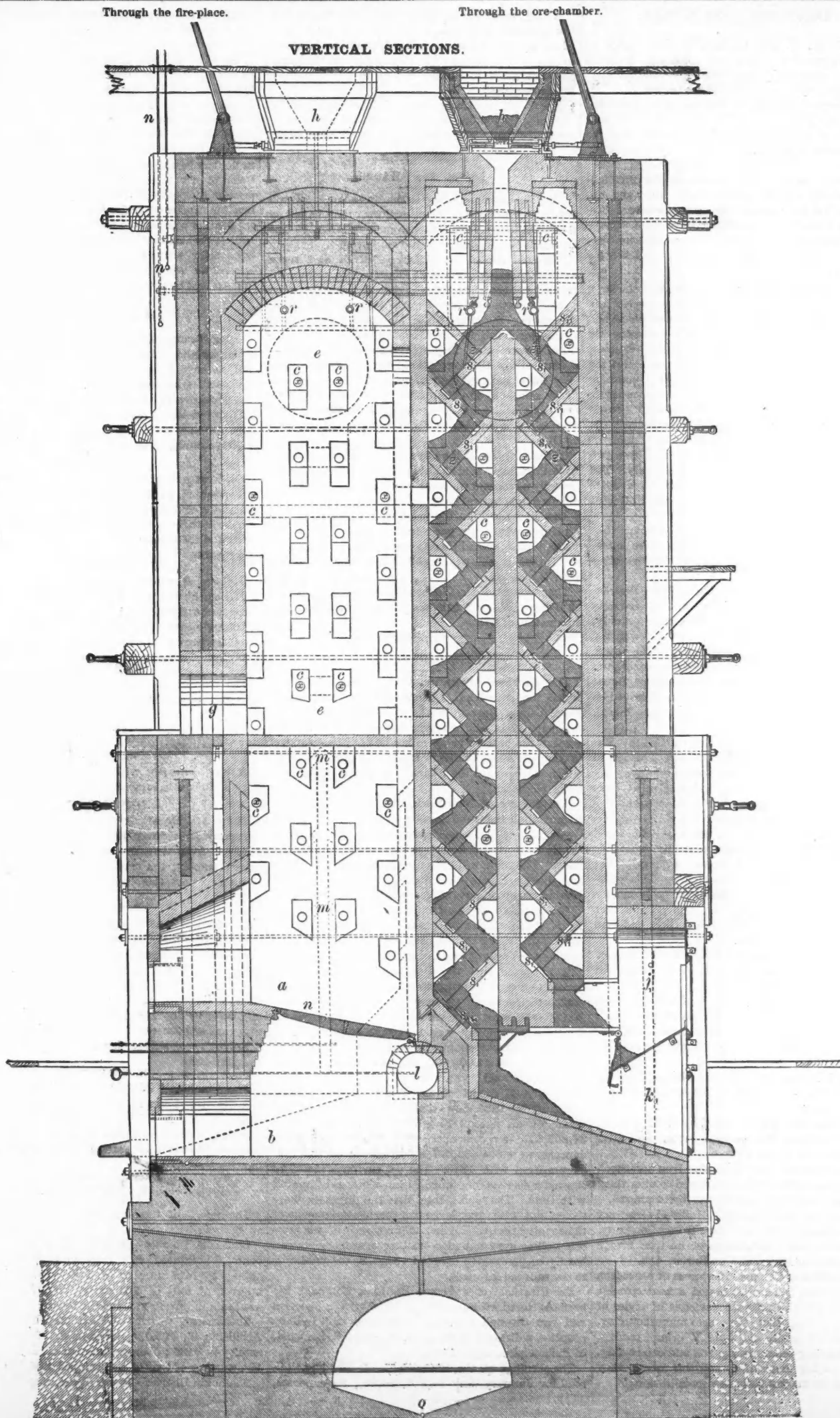
Two of the hitherto most productive mines of this section are now wrestling with a problem of this kind. They will no doubt conquer, and resume large shipments and earnings; but it upsets calculations, interferes not only with profits, but with working expenses, and keeps those in charge in perpetual study to surmount present or coming difficulties. These offset in part what would otherwise be very large profits; but it must not be inferred that mining here has not been profitable. Such is not the case. The history of the district shows a most excellent record for the amount of time and capital invested.

Only five years back, all this region was a wilderness inhabited by Indians; and since then, such satisfactory developments have been made as to attract wide attention among capitalists, as a field for profitable investment.

In my next letter, I shall refer to the most prominent mines worked.
Feb. 24. W.

Hard-Drawn Copper Wire.—It is said that hard-drawn copper telegraph wire has stood the severe tests of the winter very satisfactorily, and an extension of its use may be expected.

Convention of Electric Lighting Companies.—Representatives of various electric lighting companies of the United States and Canada met in Chicago last week to perfect an organization with the view of advancing their various interests. The convention chose permanent officers as follows: J. F. Morrison, of Baltimore, President, and W. A. Hovey, of Boston, Secretary.



FURNACE, MILL, AND FACTORY.

P. A. & W. V. Ahl, Carlisle, Pa., have made an assignment for the benefit of their creditors. Dullness in the iron market and protracted illness of members of the firm are said to have led to the failure.

H. N. Hoffstot has sold his interest in the Pittsburg Steel Casting Company to William Hainsworth, and the position of secretary having been thus vacated, the board of directors have elected William Lyon Secretary *pro tem*.

Boston capitalists recently purchased the Birmingham Fire-Brick Works, Birmingham, Ala., and are remodeling the kilns, preparing to manufacture fire-brick from a mixture of clays they have been experimenting with, claiming it will make a superior fire-brick to any that is now in the Southern market for furnace purposes.

Reports from Birmingham, Ala., state that the large mill of the Birmingham Rolling-Mill Company is running in all departments, turning out merchant and sheet-iron. The forge department, containing 22 double puddling-furnaces, two single puddling-furnaces, and one scrap-furnace, is on double turn, as is also the guide-mill. The company reports a brisk increase in orders the past two weeks, but no improvement in prices. The little Mary Pratt furnace continues to do well, averaging an output of about 45 tons daily. The Sloss furnaces are both in blast, but are not doing as well as could be desired, especially No. 2. These two furnaces average from 70 to 75 tons each daily. The fires have been again kindled. No. 1 and No. 2 Alice furnaces are in blast, and average about 140 tons daily.

Proposals will be received by the Philadelphia Gas-Works until March 12th for 1460 lengths, more or less, of twenty-inch cast-iron pipe, together with the other castings required.

The engineer of the Fourth Light-House District, Post-Office Building, Philadelphia, will receive proposals until March 13th, from iron manufacturers only, for the construction of the iron-work of a tower for a beacon light at Delaware Breakwater. The tower will be formed of cast-iron plates bolted together, and will weigh about 50 tons. Plans, specifications, forms of proposal, and other information may be obtained on application to the office of the Light-House Board, Washington, D. C.

The rolling-mill of Andrew Brothers & Co., at Hazleton, Pa., has started up on double time. The Girard blast-furnace at the same place has also resumed.

The iron-mill of Antrim, Osborne & Son, at Rose Valley, near Chester, Pa., was burned March 2d. The loss is estimated at about \$50,000.

The property known as the Patapsco Bridge and Iron-Works, situated at Canton (and partly in the city of Baltimore and partly in Baltimore County), Md., will be sold with or without machinery. This property is well suited for manufacturing purposes, marine work, storage, or for a local pier, and adjoins that recently purchased by the Baltimore & Ohio Railroad for its Philadelphia extension.

The Vulcan Boiler and Steel and Iron-Works of James McNeil & Co., at Pittsburg, Pa., were burned March 3d. Loss, \$18,000.

Welch & Griffiths, manufacturers of and dealers in saws, emery wheels, and mill supplies, and importers of French saws, Boston, Mass., have failed, with liabilities of about \$50,000, and nominal assets of \$53,550.

The Girard Furnace, at Girard, Ohio, started up March 4th. The rolling-mills at the same place have resumed operations.

Jefferson charcoal furnace, owned by J. M. & H. Y. Kaufman, of Auburn, Pa., has been put in blast after a suspension of four months.

It has been decided to put the Union Iron and Steel-Works, Chicago, in thorough repair, and to alter them so as to produce Bessemer rods by the direct process.

The St. Louis & San Francisco Railroad Company has closed a contract with the Union Bridge Company, of New York, for the construction of an iron bridge across the Arkansas River, at Van Buren, Ark.

W. G. Hyndman & Co., manufacturers of sheet-iron roofing, Cincinnati, Ohio, have issued a neat circular calling attention to the different varieties of styles of roofing and siding that they are manufacturing, among which we notice old style V crimp roofing, new style standing seam roofing, roll and cap roofing, corrugated roofing and siding, and this month they will put upon the market their new metallic shingle.

A long report has been presented to the Senate from the committee appointed to inquire into the capacity of steel-producing works in the United States, and on motion of Mr. Morgan the committee was continued, and instructed to further report to the Senate in December, 1885.

Mr. T. E. Scrymser, lessee of the rolling-mill at Laramie, Wyoming, is considering the question of erecting a foundry in connection with his other works.

LABOR AND WAGES.

The Committee on Labor in the Massachusetts Legislature is considering various petitions that have been presented to it for the establishment of courts of arbitration between employers and employed.

The coal miners of Pittsburg District, at a representative convention held at Pittsburg, Pa., March 3d, refused to accept the trade's tribunal rate of 2½ cents a bushel, awarded by Umpire Weeks, and, after denouncing the umpire for his decision, resolved to strike March 9th for three cents a bushel. The operators assert that they will not pay the advance demanded by the convention, and, if insisted upon, they will close down their mines.

The miners of the Cumberland Railroad and Coal Company at Spring Hill mines, Nova Scotia, have accepted a reduction of three cents a box on coal-cuttings.

At the meeting of the Ohio State Trades and Labor Assembly, lately held at Columbus, President Connolly strongly advocated the solid combination of all trades unions in one central body.

The Taunton Iron-Works, Taunton, Mass., started up March 2d at a five per cent reduction.

The Westmoreland Coal Company, Pa., has posted a notice that it will pay but 50 cents a ton for mining after March 1st.

The workmen in the Wabash Railroad machine-shops at Moberly, Mo., are out on a strike in consequence of a reduction of wages.

RAILROAD NEWS.

The Mexican-American Construction Company began the American & Mexican Pacific Railroad at Topolobampo Harbor, State of Sinaloa, Mexico, on February 17th, and grading is now advancing eastward at the rate of half a mile a day. It is proposed to complete ninety miles of road before March, 1886, which will open up the Fuerte Valley, one of the richest in Mexico.

A syndicate of New York, Philadelphia, and Pittsburg capitalists has purchased the charter of the Turtle Creek Valley Railroad route, which extends from Turtle Creek to Pittsburg, a distance of eighty-three miles. The route will open up a rich mineral country, and give the Rochester & Pittsburg and seaboard and Western roads an advantageous outlet from Pittsburg.

The receiver of the Louisville, Evansville & St. Louis Railroad has been granted the order by the court, authorizing the purchase of 500 tons of steel rails and the rent of two locomotives.

It is stated that the Canadian government has agreed to accept the proposition of the Canadian Pacific Railroad Company to take over its lands, some 20,000,000 acres, at a valuation of \$2 an acre, for which the company would receive \$40,000,000 in cash. This would enable the company to pay off its floating debt of \$4,000,000, and have enough left to complete the road.

The annual report of the Pennsylvania Railroad Company for 1884 shows that the gross earnings from traffic on all lines were \$97,849,875, a decrease of \$7,803,657, as compared with 1883. The gross expenses were \$64,434,317, a decrease of \$4,482,739, as compared with 1883. The net earnings therefore showed a decrease of \$3,320,918 in 1884, as compared with 1883. The report states that the directors share the opinion with other large transportation interests of the country that the further maintenance of the present pooling system under existing arrangements can hardly be productive of good either to the public or to the railroad interests.

The Clearfield & Jefferson Railroad Company has been chartered with a capital of \$1,000,000. The road will run through Clearfield, Jefferson, and Indiana counties, a distance of 82 miles. Charles F. Berwind, of Philadelphia, is president.

The earnings of the Philadelphia & Reading Railroad for January were \$1,846,363.25; the expenses,

excluding rentals and interest, \$1,242,965.92; and the net earnings, \$603,400.33, against \$759,132.83 for the corresponding month last year. The gross receipts of the Coal and Iron Company were \$844,789.12; the expenses, excluding interest, \$905,634.26, being a net loss of \$60,845.14, against a loss of \$91,666.40 for January, 1884. The net earnings of both companies for the fiscal year to date were \$1,414,012, against \$1,446,913 for the corresponding period of last year.

Judge Hallett, in the United States Court of Colorado, has rendered an important decision defining the status of car trusts. The decision was rendered on a petition that interest should be paid on the company's bonds next after operating expenses had been paid. This application was resisted by holders of car trusts. Judge Hallett decided that car trusts, principal and interest, were prior securities, and must be paid out of the income, the same as wages and labor, ranking prior to even first mortgage bonds.

COAL TRADE NOTES.

A terrific explosion occurred in the Usworth colliery at Sunderland, England, March 3d. The explosion is said to have been caused by fire-damp. Thirty-six dead bodies have already been recovered from the ruins, and a volunteer force is still engaged in seeking for more victims. At the time of the explosion, there were 150 men in the mine. These were all imprisoned by the jamming of the cageway.

ALABAMA.

The Pratt mines, six miles from Birmingham, are in full operation, putting out from 2400 to 2600 tons of coal daily, and are also making quite a large amount of coke in their ovens at the mines, furnishing the Mary Pratt and the Oxmoor furnaces and also shipping to other points.

CANADA.

PROVINCE OF MANITOBA.

The machinery for the petroleum wells of the Winnipeg & Northwest Petroleum Company is on its way to the wells, which are about 140 miles from Gleichen. Facilities have been provided for boring to a depth of 2800 feet.

MARYLAND.

The case of the Maryland Coal Company vs. the George's Creek Consolidated Coal Company, of Baltimore, will be taken up in the May term of court. The suit is over the ownership of a strip of land in the town of Lonaconing.

MISSOURI.

A coal company, with a capital of \$300,000, has been organized to operate coal mines at Minden.

NEW YORK.

The suit of Robert Collins against the Standard Oil Company to recover \$20,000 damages for injuries received from defective machinery while in the company's employ, the trial of which had begun in the Supreme Court, this city, was settled March 3d for \$1000.

OHIO.

The parties that bought the coal properties of the Ohio Central Coal Company on the 17th of February are making arrangements to reorganize. Holders of undeposited bonds, if they desire to be recognized in the reorganization of these properties, must deposit such bonds with the Central Trust Company in this city on or before March 10th, together with two per cent cash assessment.

Rainey's coal-works, Martin's Ferry, are now running full-time.

NATURAL GAS.

The Cincinnati Warehouse and Malting Company has discovered gas in a well bored for water to the depth of 256 feet, but abandoned. The gas has a pressure of 25 feet to the inch, and the company is preparing to use it for heating kilns and ultimately for lighting the building.

PENNSYLVANIA.

ANTHRACITE.

The reports of the Mine Inspectors for January are as follows:

Pottsville District—Samuel Gay, inspector: Accidents, 6; injured, 6. Total number of employes, 4320; average number of days employed, 162-5; number of tons of coal mined, 99,527-17. No fatal accidents in this district for the month.

Shenandoah District—Robert Mauchlin, inspector: Accidents, 9; killed, 1; injured, 8. Total number of employes, 9436; average number of days employed, 12; number of tons of coal shipped, 204,170-03.

Shamokin District—James Ryan, inspector: Acci-

dents, 12; killed, 3; injured, 9. Total number of employes, 9896; average number of days employed, 14; number of tons of coal mined, 233,980.10.

The Indian Ridge Colliery, operated by the Philadelphia & Reading Railroad Company, at Shenandoah, Pa., resumed operations March 2d, after ten weeks' idleness.

Work has been resumed in the collieries of S. S. Bickel & Co., and Issac May & Co., at Centralia.

COKE.

The Consolidated Gas-Coal Company, of Frostburg, Md., has purchased the farm of Robert Duncan, near Dawson, and expects to erect ovens and develop the coal in the near future.

The new coke plant of J. W. Moore, at Mount Pleasant, will be called the Mammoth Works.

The Waverley Coal Company has resumed work at Smithton, and it is said that some of its coke-ovens will be fired soon.

NATURAL GAS.

The Fuel-Gas Company has struck its eighth well.

Judge Hazen has refused to grant a special preliminary injunction against the use of natural gas. The application was made by the town council of Butler and argued at New Castle several weeks ago. The judge cited the recent decision of Judge Stowe as a precedent. The gas mains are leaking badly, endangering life and property, and a majority of the citizens are indignant because the injunction was not granted.

The court at Pittsburg has appointed a commission to examine into the condition of the Penn and Fuel-Gas companies' pipe lines, now in use or intended to be used by them for the purpose of transporting natural gas within the city of Pittsburg, the manner of their use, present or prospective (including the degree of pressure thereon), and the danger of explosion or other public injury incident to or likely to arise from the use of said pipes for transporting and supplying gas to consumers. The commission is directed to make a report within sixty days.

The first meeting of the commission appointed to take testimony as to the causes of the recent gas explosions in Lawrenceville was held March 2d. W. D. Hartupee, General Manager of the Consolidated Penn Fuel and Fuel-Gas Companies, was the only witness examined. He said the gas companies have taken various precautions to prevent further explosions. New valves have been put in, and the whole system of piping has been thoroughly examined and improved, and terra-cotta waste-pipes have been put in to carry off escaping gas. It is the intention of the company to lay its present high-pressure mains along the river-bank as soon as the work can be done; engineers were already locating the line; and as soon as the change is made, the present high-pressure mains will be converted into low-pressure mains.

WYOMING.

The organization of a coal company, in which the consumers of coal will be permitted to take stock, is contemplated at Laramie. The object of this company is to get coal from the coal-banks in township 18, range 77, about twenty-five miles in a northwesterly direction from Laramie, south of Dutton Creek, a tributary of Cooper Lake. Large coal-banks have been open here for the past ten years, and the coal has been mined and used since then. It is thought that this coal can be mined and delivered at Laramie a \$4 for ton.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY—TOMBSTONE DISTRICT.

CONTENTION.—It is not likely that much will be done prior to the completion of the pumps. The mill is running constantly on the immense tailings-dump that has accumulated there.

EMERALD.—Shipments to mill are at the rate of 800 tons a month. The two shafts, 250 feet apart, are connected on the ledge both on the 150 and 250-foot level, while the north drift is down 350 feet and sinking progressing.

GRAND CENTRAL.—The pumps will probably be ready to begin sinking about the first of June. All the ore shipped now to mill is taken from above the 500-foot level and mostly from the 400 level and above.

HEAD CENTER.—The daily shipments amount to thirty-two tons to the mill. The main shaft is down 200 feet, with drifting on ore progressing on the 100 and 200-foot, on which latter there are now upward of 500 feet of work.

LUCK SURE.—Chloriders have been at work on the

lower level of the lower ledge for some time, and have recently opened out a showing of superior grade of hard carbonate, with formation crevices from ledge indicative of opening into a chimney.

MAMIE.—Preparations for putting the mine in proper shape for work are progressing.

STATE OF MAINE.—Workings now down over 500 feet, work going on under lease with continued output of limited quantity of exceedingly high-grade ore.

STONEWALL.—A daily shipment is made to the Tombstone Mining and Milling Company's Millville smelter of manganese ore.

TOMBSTONE.—Smelter and both mills at Millville are running constantly on ore from West Side and Stonewall principally. It is stated that in the lower workings of the West Side and from the ledge a chamber of high-grade ore has been opened.

PINAL COUNTY.

VEKOL.—Steady shipments of high-grade ore from this mine are made to Kansas City. The 10-stamp mill erected to work the second-class ore on the dumps is idle, owing to the want of water.

CALIFORNIA.

CALAVERAS COUNTY.

CALAVERAS WATER AND MINING COMPANY.—A judgment of \$17,019 has been entered in this city against the company by J. H. Southwick.

NEVADA COUNTY.

NEVADA & ORIGINAL EMPIRE.—The litigation between the Nevada Gold and Silver Mining Company and the Original Empire Mining Company has been settled to the satisfaction of the parties concerned. Also the suits between the Original Empire and David Watt and James Bennalack have been satisfactorily settled.

PLUMAS COUNTY.

ENGLES.—Arrangements are nearly completed for the erection during the coming summer of a 30-ton water-jacket furnace at the Engles copper claim. The ledge is fifty feet wide, and it is believed to be a good quality of ore.

SIERRA COUNTY.

BALD MOUNTAIN.—Rich gravel has recently been struck in the new level of this drift mine, at Forest City.

PIONEER GOLD MINING COMPANY.—A long and elaborate decision has been rendered by Judges Sawyer and Sabin, of San Francisco, in the case of the Pioneer Gold Mining Company vs. Benjamin F. Baker. The suit was brought in 1883 in the Superior Court of Sierra County, to establish a right to redeem the Pioneer mine, situated in that county, under an alleged mortgage said to have been created and effected by virtue of certain contracts and sales. Baker was the original owner of the mine, and sold the same to the plaintiffs in consideration of \$112,500 cash, and the remainder, making up the whole amount, \$255,000, was to be paid from the profits of the mine. These notes formed the alleged mortgage; but as the mine failed to yield as well as expected, they were unpaid, and Baker, who acted as superintendent, took it upon himself to hold possession of the mine. This caused the action at law. In the decision, which is an interlocutory one, the right of the plaintiffs to the mine is upheld, and their right to work the same conceded. It was therefore ordered that a preliminary decree be entered in favor of plaintiffs, and the case be referred to the standing master in chancery of the court between the parties, to report the same to the court.

CANADA.

PROVINCE OF QUEBEC.

MARLOW SILVER MINE.—The mine has not yet passed the prospecting stage. There are four good veins, ranging from 10 to 20 inches thick, carrying from 15 ounces up to 260 ounces of silver per ton. Large samples are taken out for working tests.

COLORADO.

ARAPAHOE COUNTY.

STANTON ENGINEERING COMPANY.—The incorporators are Roger W. Woodbury, Robert B. Stanton, Edwin H. Kellogg, Sherman G. Sackett, and Edward W. French. The objects are to carry on the business of engineering and of milling, concentrating, and smelting ores, and of buying and selling concentrating and other like machinery. The capital stock is \$25,000. The operations will be carried on in Arapahoe County, with the principal business office in Denver.

CLEAR CREEK COUNTY.

The Board of Trustees of Empire will, it is stated,

give any individual or corporation sixty town lots, if it will build water-works in the town of Empire.

SNOW-DRIFT.—Nearly all the available ground has been leased.

HINSDALE COUNTY.

CROOKE MINING AND SMELTING COMPANY, LIMITED.—Reuben Rickard, the English manager, has been called to London for the purpose of arranging matters.

LAKE COUNTY.

The Leadville Herald has the following:

COLONEL SELLERS.—Fifty tons of ore a day are produced under contracts with Pueblo, Kansas City, and Leadville smelters. A drift has been opened into a carbonate body, and a shipment of fifty tons made that netted over two thousand dollars. The pumps in No. 2 shaft are doing all the work required of them.

DENVER CITY.—Iron ore of fair grade is shipped.

LEADVILLE ANNEX.—The object of this company is to sink a shaft within the city limits or the suburbs to a depth of one thousand feet if necessary, to demonstrate the fact that the ore-bodies continue from Fryer and Carbonate hills underneath the city. The capitalization of the company is ten million dollars, divided into one million shares of ten dollars par value each. The incorporators are Homer Pennock, J. S. Fritz, C. C. Davis, E. C. Guilbault, W. S. Pemberty, A. V. Hunter, and J. W. Wallace. The period of existence is to be twenty years. The necessary preliminaries will be completed as rapidly as possible, and work will be commenced as soon as this is done.

LEADVILLE.—The recent strike shows ore of high grade. It was struck at a depth of seventy feet.

MORNING AND EVENING STAR.—All the ground on these properties for lease has been secured by various parties, and will be actively worked.

ROBERT E. LEE.—Shipments of iron and ore are increasing.

PARK COUNTY.

SOVEREIGN.—The erection of a mining plant, with capacity for treating at least 100 tons a day, will soon begin. Immediately following this, it is probable that operations will begin at the placer grounds.

PITKIN COUNTY.

SMUGGLER.—The lessees who have the lease upon the upper or northern end of the Smuggler are now in 190 feet from the mouth of the old tunnel on the Arkansas ground, and have made about 95 feet on the Smuggler ground in the drift where they are working.

VALLEJO.—The erection of a tramway, running from the mine to the sampling-works, will soon begin. The distance is about 2300 feet. The trestles will be twenty feet in height and about forty feet apart. The buckets will be about thirty feet apart, and when one is loading at the mine, one will be emptied at or near the sampling-works. The machinery will be furnished by the Colorado National Tube-Works of Denver.

SAGUACHE COUNTY.

U. S. MINING AND MILLING COMPANY.—The smelter at Parkville has begun operations, and has been running successfully. The treatment that has been inaugurated by Professor West, late of the Golden Smelting Company, consists in roasting the ores as a preliminary measure, and then smelting into a matte without the aid of lead or any fluxing except what iron and spar is contained in the raw state.

SAN JUAN COUNTY.

MYSTERY.—This mining, milling, and tunnel company has been incorporated with a capital stock of \$1,000,000. Operations will be carried on in San Juan County, with the principal business office in Gladstone.

SUMMIT COUNTY.

ROBINSON CONSOLIDATED.—The recent discoveries will no doubt justify the lessee in the thorough exploration-work he has mapped out.

ROBINSON CONSOLIDATED.—At the annual meeting held in this city March 3d, the following officers were elected: Thomas I. Richman, John Jay White, A. J. Robinson, James Russell White, M. W. Morris, T. Webster, H. E. Woods. At the first meeting of the new Board of Trustees, the following officers were elected: President, Thomas I. Richman; Vice-President, John Jay White; Secretary, F. C. Poucher.

DAKOTA.

LAWRENCE COUNTY.

FATHER DE SMET.—The superintendent reports, for the week ended February 22d, ore extracted from first, second, and third levels, 1905 tons. Ore milled, 1955 tons.

GEORGIA.

OGLETHORPE COUNTY.

The suit in trover and conversion by Col. James K. Scofield against J. B. Moorhead to recover the value of the machinery, tools, etc., of a gold mine in this county, before Judge Hare, in Court of Common Pleas, No. 2, Philadelphia, Pa., February 27th, resulted in a verdict for the plaintiff. Mr. Moorhead had sold the property to Colonel Scofield for \$10,000, to be paid for partly in cash and the remainder (\$8000) in notes. Cash payments amounting to \$2500 were made, and Colonel Scofield's own notes were given without an indorser and accepted by Mr. Moorhead. Colonel Scofield claimed that, under the contract, the title to the personal property vested in him, and that the defendant had no right to seize the machinery and sell it as he did. The answer to this was, that the contract between the parties provided that the notes that Colonel Scofield was to give were "notes with approved security;" that he was unable to give security, but offered the defendant a mortgage on the property, which was declined; that in lieu thereof, Mr. Moorhead was to hold the title to the property as security for the payment of the notes; and that, as Colonel Scofield paid only \$500 of the \$8000 in notes, the defendant had a perfect right to enter and treat the goods as his own, and deal with them as such. In the dealings between the parties, the defendant had waived the right of forfeiture of the contract, and extended the time of payment, and the question of fact that the judge left to the jury was, whether Colonel Scofield was entitled to more time or not. He bought the property in September, 1881, and Mr. Moorhead sold the personal property to another in April, 1883, for \$1825. The jury returned a verdict for the plaintiff for \$10,000, allowing a credit of \$8000 for the notes. The verdict was recorded as a verdict of \$2000 for the plaintiff.

IDAHO.

The trouble with the Miners' Union in Wood River continues.

QUEEN OF THE HILLS.—It is stated that the company intends to take a large force of non-union miners into Wood River, who will work for less than \$4 a day, and who will be numerically strong enough to withstand the union in its assaults.

MEXICO.

We have received the following from Prof. William P. Blake, under date of Guaymas, January 20th:

The event of chief interest in mining circles of recent date in Sonora, Mexico, is the sale of the Trinidad silver mines to a prominent banking house for London account. These mines are said to have been worked for the past forty years, most of the time by Mathias Alsua, and the product sent to Guaymas. The sale includes the Bronces silver mines and a large part of the coal-field at Barrancas, and about five leagues of splendid productive land. The consideration to be paid is \$1,500,000, in equal monthly payments of \$50,000 each. The expenses of the sale, amounting to \$38,000, and the first installment of \$50,000 have already been paid. The gross value of the ore now standing above water-level is reported as not less than \$12,000,000. There are not less than thirteen miles of drifts. The rock is said to be hard and the veins narrow but rich. The ore has been worked hitherto in a 20-stamp mill, but it is the intention of the company, according to reports, to erect three mills, each of 100 stamps, for this and the Bronces mine. El Trinidad lies on the west side of the Sierra Madre, near the head-waters of the Rio Mayo. The mines are most conveniently reached from Ortiz station on the Sonora Railroad, from which point it is proposed to build a branch railroad to the mines. It is said that a large part of the machinery has already been ordered and is on the way. A party, including a representative of the Union Iron-Works of San Francisco, and Mr. Carr, the well-known freighter of Arizona, came here from Tombstone a few days ago and have gone to the mines by way of Ortiz. At the rate of payment named, it will require 2½ years to complete the transaction. The examinations and reports on the property are said to have been made by two different parties of mining engineers from England. The negotiation was concluded in November and December, 1884. Mr. Alexander M. Womble is the superintendent.

MICHIGAN.

The House has fixed March 18th as the date for the consideration of the bill to allow the minority of shareholders in all joint-stock companies organized under

the laws of Michigan to elect a number of the directors, which number is to be based upon the proportion that the minority bears to the majority of shareholders. This measure was passed by the Legislature two years ago, but was not approved by the governor. It is strongly antagonized by the upper peninsula mining corporations, which allege that the motive for it is a desire of dissatisfied shareholders to influence the management of corporations to the disadvantage of the majority of owners.

It is said that the Legislature will be called upon to consider a bill making some radical changes in the relations between the lessees and lessors of mineral properties. The most important of these, perhaps, is that relating to royalties. The bill proposes to fix maximum royalties on ore, etc. It is open to considerable objection on this score, as well as in other respects.

A bill has been introduced in the Senate for the establishment of a mining school in the Upper Peninsula.

The bill introduced by Senator Stephenson placing a specific tax upon minerals produced in this State is, it is said, of much importance to the Upper Peninsula. It makes no change in the tax imposed on iron and copper, hence the first impression would be that it in nowise affects our mining industries. This impression will disappear when we state that, under the law as it now stands, all other minerals mined in Michigan, including gold and silver, are subject to a specific tax of "four per cent of their average yield and value." The bill does not name the tax to be imposed on the precious metals, this being left to the Legislature to fix and determine. The bill was drafted by Hon. William P. Healy, of Marquette.

IRON MINES.

IRON CLIFFS.—Senator Hubbell has asked, on behalf of the State, for a rehearing, in the Supreme Court, in the test case on the tax law, entitled the State vs. The Iron Cliffs Company.

IRON RIVER.—The owners and stockholders entered into agreements at Youngstown that will warrant a good summer's work.

NORTHWESTERN.—The mine is pumping out, and is preparing for active running work to begin on the opening of the shipping season.

MINNESOTA.

ONEOTA.—The mine is now entirely owned by A. E. Sears, James Malloch, John Turcott, and S. L. Smith, and the shares are all withdrawn from the market. Operations have again begun, and the shaft is sunk to a depth of nearly sixty feet. The present owners will put in a large stamp-machine and an engine with sufficient power to run it and also hoist the ore that is mined to the surface. Negotiations are making with the Chicago Smelting-Works, by which they will handle all the ore.

MONTANA.

BEAVERHEAD COUNTY.

HECLA CONSOLIDATED.—The production for January was as follows: 32,72 ounces of gold; 50,642.30 ounces of silver; 447,337 pounds of lead; and 27,177 pounds of copper.

MADISON COUNTY.

MILL CREEK MINING, MILLING, AND SMELTING COMPANY.—The company has been organized under the laws of Utah with a capital stock of \$500,000, divided into 100,000 shares, of which 26,000 shares are set apart as treasury stock. The property of the company consists of the mining claims in Mill Creek Mining District. The principal place of business is Salt Lake City.

SILVER BOW COUNTY.

CHAMPION.—Ore is produced regularly and is shipped to the Moulton for reduction.

HOPE.—The owners are negotiating for a bond of \$60,000. The ore contains sulphurets of silver, argenticiferous gray copper, and mspickel, with hornblende and calc-spar on the foot-wall. The ore is free milling and contains rich bodies of silver glance.

SNOW DRIFT & SILVER LICK.—These claims adjoining the Margaret Ann lode on the north and west have been bonded to a California company for \$45,000. The Snow Drift vein contains peroxide of manganese, with black sulphurets and chlorides of silver. The ore is free milling above water-level. The Silver Lick ore contains manganese, pyrites of iron, sulphurets, and flecks of ruby silver.

NEVADA.

CHURCHILL COUNTY.

The Cottonwood nickel and cobalt mines in Cottonwood Cañon are attracting the attention of French

capitalists. The mines in that section, owned by George Lovelock, are bonded to San Francisco men, who are negotiating with Frenchmen for their purchase. One of these mines has been worked somewhat extensively, and some 65 tons of the ore sent to San Francisco sold there for high prices.

ESMERALDA COUNTY.

A company has been formed in London for the purchase of the property known as the White Mountain Water-Works, at Candelaria, and the mill and mill-site there known as the Princess mill and mill-site, and for other purposes. The principal object is to supply the town of Candelaria and the Columbus Mining District with water, to be conveyed from the White Mountains in pipes. The capital is to be \$1,000,000 in 200,000 shares of \$5 each.

EUREKA COUNTY.

RICHMOND CONSOLIDATED.—Owing to the bad condition of the roads, the mine and furnaces closed February 25th. Operations will be resumed about May 1st. Custom ores will be received at the furnaces.

STOREY COUNTY—COMSTOCK LODGE.

HALE & NORCROSS.—Recent developments, it is said, show that the prospects are better than for years.

UTAH.

BEAVER COUNTY.

COMET.—Ample capital has been raised in Paris to develop the property.

HORN-SILVER.—According to the Frisco Times, one hundred men have been discharged. The mine is said to be in such a condition since the recent cave that not more than a score of men can be employed to advantage for some time to come.

SUMMIT COUNTY.

ONTARIO.—Every thing is moving on in its accustomed steady way, and large quantities of ore are produced.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, March 6.

At last, we are able to report a decided improvement in the mining market. Transactions in stocks that have not been dealt in for weeks are recorded, and the sales this week show an increase of 50,951 shares, as compared with the sales of the previous week. The total sales amounted to 101,723 shares. Prices have been firm, with higher tendencies.

The official announcement was to-day made that the vote on consolidation of the New York Petroleum Exchange with the Mining and National Board was unanimously in the affirmative.

Iron Silver, which has been dormant for weeks, appears again on the list, with sales of 2950 shares; the price advanced from 75c. @ \$1.15. The reports made this year show that the company is in good condition and had cash on hand January 1st \$84,461.61, and February 1st \$115,334.77. In another column, we publish extracts from the company's annual report.

Little Chief has been active at from 22 @ 25c., with sales of 3900 shares. Robinson Consolidated shows a larger business at from 40 @ 50c. Affairs at the mine are said to be more encouraging. Dunkin sold at from 23 @ 25c. Amie, at from 3 @ 5c. Bassick, at from \$3 @ \$3.25. Leadville, at 35c.

The business and the prices of Standard Consolidated have advanced. The new management, it is said, has reduced the salaries and expenses at the different offices, and is placing the affairs of the company in good condition. The sales amounted to 5095 shares, ranging from 85c. @ \$1.20. Consolidated Pacific has also shown a larger business at from 90c. @ \$1. with sales of 8250 shares. Bodie Consolidated and Bulwer have been quiet; the price of the former ranging from \$2.20 @ \$2.75, and that of the latter from 28 @ 35c. Plymouth Consolidated ranged from \$15.88 @ \$16.38, with sales of 1860 shares. A record of the work done by this company during the past year will be found in another column.

In the Nevada stocks, a small boom has again struck Sutro Tunnel; the price has been firm at from 12 @ 15c., but the transactions have amounted to 26,300 shares. Consolidated California & Virginia has followed; the prices, however, fluctuated greatly, showing a downward tendency; the sales were 13,090 shares, at from 39 @ 65c., closing at 39c. Hale & Norcross has been quiet; the assessment of fifty cents brought the stock down from \$6 to \$5, 950 shares changing hands. Eureka Consolidated sold at from \$2.40 @ \$3; sales, 1700 shares. Chollar ranged from \$2 @ \$2.50; sales,

950 shares. The dealings in the other stocks show no interesting features.

Horn-Silver has been stronger, and has recovered from the low price of last week ; 2103 shares changed hands at from \$1.70@2.10, closing at \$2. A small lot of Ontario was sold at \$17.50.

Alce shows larger sales at from \$2@2.05. One lot of 25 shares of Father de Smet sold at \$6. Caledonia, 100 shares, at \$1.15. Silver King holds its own at from \$3.95@4. Rappahannock has been active, with sales of 4900 shares, at from 6@10c. Central Arizona, at from 18@22c.

A complete summary of the market will be found elsewhere.

MEETINGS.

The annual meetings of the following companies for the election of trustees and the transaction of business will be held at the times mentioned :

Midas Petroleum and Improvement Company, office of George Woods, No. 116 Market street, Pittsburg, Pa., March 11th, at ten o'clock A.M.

Midland Mining Company, No. 234 South Fourth street, Philadelphia, Pa., March 17th, at twelve o'clock M.

Rockhill Iron and Coal Company, No. 320 Walnut street, Philadelphia, Pa., March 17th, at half-past eleven o'clock A.M.

DIVIDENDS.

Bonanza King Consolidated Mining and Milling Company, of California, has declared a dividend of \$10,000, or ten cents a share, payable on and after February 27th.

Plymouth Consolidated Mining Company, of California, has declared dividend No. 22, of \$50,000, payable on and after March 5th.

DIVIDENDS PAID BY MINING COMPANIES DURING THE MONTH OF FEBRUARY AND FROM JANUARY 1ST, 1885.

Table with columns: NAME OF COMPANY., Location of mines., Paid during month of February., Since January 1st, 1885.

S., Silver ; L., Lead ; G., Gold ; C., Copper.

ASSESSMENTS.

Table with columns: COMPANIES., No., States., Amount per share., Delinquent in office., Day of Sale.

*Has been published before. The date of delinquency of the above assessment and the sale day have been postponed until date given.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows for the week :

The market this week was firm, in sympathy with the advancing figures of the stock market, but to-day it broke to the neighborhood of 79 till the last half-hour, when it broke to 78, and closed weak under heavy selling. Certificates are rather plentier than of late, and the feeling of traders is generally more bearish than when the price was five cents higher. The demand for refined is light, and the well news, while not definite, is indicative of a possible surprise somewhere to the east of Thorn Creek. The possibilities of a "gusher" there operate on the fears of the trade and cause weakness.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange :

Table with columns: Opening., Highest., Lowest., Closing., Sales.

SAN FRANCISCO MINING STOCK QUOTATIONS. Daily Range of Prices for the Week.

Table with columns: NAME OF COMPANY., Feb. 27., Feb. 28., March 2., March 3., March 4., March 5.

Boston Copper and Silver stocks.

BOSTON, March 5. There is but little improvement to note in the condition of the market for mining stocks the past week. The volume of business continues light, and there is not much doing outside of the dividend-paying mines, and orders to buy these are very limited. In copper stocks, there was a little more doing in Calumet & Hecla at a decline of \$2@4 a share from the closing price of last week. The opening price was \$155, and about 100 shares changed hands at this figure ; but later, a small lot sold at \$153, closing, however, to-day firmer at \$155 bid, and none offered under \$158. Quincy has ruled dull at a decline of 50c., all the sales being at \$29.50, as against \$30 last week. Franklin sold at \$6.50, same as before, and a small lot of Osceola at \$9.

BULLION MARKET.

NEW YORK, Friday Evening, March 6.

The adjournment of Congress without action toward limiting or suspending the coinage of the standard dollar has not had the effect to appreciate the price of silver, as might have been reasonably anticipated.

Table with columns: DATE., London., N. Y., DATE., London., N. Y.

United States Mint at Philadelphia.—The coinage of the mint in the month of February was 6,678,060 pieces of the value of \$1,481,700. There were 23,340 eagles, 52,720 half-eagles, 900,000 silver dollars, 692,000 five-cent pieces, and 5,010,000 cents.

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 remained 4 per cent. During the week, the bank gained £356,316 bullion ; but the proportion of its reserve to its liabilities was reduced from 46 1/2 to 46 1/8, against 38 1/2 per cent at this date last year. March 5th, the bank gained £38,000 bullion on balance. The weekly statement of the Bank of France shows a loss of 625,000 francs gold and a gain of 4,525,000 francs silver.

BULLION PRODUCTION FOR 1885.

Table with columns: MINES., States., Month of January., Year from Jan. 1st, 1885.

* Official. G., gold ; S., silver ; L., lead ; C., copper. Silver valued by the different companies from \$1 @ \$1.29 per ounce : gold, \$20.67. † Net. ‡ Not including value of lead and copper.

METALS.

NEW YORK, Friday Evening, March 6.

Copper.—The statistical tables that we published last week have created a good deal of discussion, and cable answers have been received from London stating the Mansfeld stock at 2000 tons, say 4,500,000 pounds, instead of 33,000,000, as reported by Mr. Raunheim. This gentleman is at present absent from the city, but his informant is in as good a position as any one outside of the Mansfeld directors to know the facts, and we are inclined to think his figures are very near the truth.

The sensation of the week was the decline to-day in London (as cabled to the Metal Exchange) of Chili Bars to £46 17s. 6d., the lowest price on record, and one that must make even the rich Calumet & Hecla repent of its rash and unbusiness-like contract. If this price continues, our manufacturerers will get their Lake copper at 10 cents, or cheaper than any of the inferior brands in the market. It will be strange if our manufacturers do not take full advantage of this anomalous condition of affairs. We may therefore expect to see the demand here increasing the consumption while these prices rule. At present the pool has difficulty in making deliveries. Best Selected in London to-day was £52, being unaffected by the fall in Chili Bars.

Messrs. Ledoux & Ricketts, of 10 Cedar street, New York, have issued a circular giving the production and consumption of copper. They consider that, as copper values have sunk to starvation level, there must follow a curtailment of production, and that this, coupled with the increased consumption that low prices are stimu-

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Table with columns for 'NAME AND LOCATION OF COMPANY', 'HIGHEST AND LOWEST PRICES PER SHARE AT WHICH SALES WERE MADE', and 'SALES'. It lists various mining companies and their stock prices from Feb. 28 to March 6, 1885.

Tables giving dividends and assessments will be printed the first week of each month. Dividend shares sold, 52,573. Non-dividend shares sold, 49,150.

The regions are hard at work, and it is believed that they will work full-time toward the latter end of the month. At the same time, there are disquieting rumors concerning the rates at which some large contracts are placed. The Reading and Lehigh Valley tolls are now both \$1.60 to this city. The line trade shows prospects of improvement. Advices from outside markets are various. From Boston comes the word that, when every thing was frozen up, people were anxious to contract for season requirements. A good many buyers have been visited since the advent of softer weather, and they did not care to buy until late in March, as they thought their stocks would last, illustrating the old-time lines, "The devil was sick, the devil a monk would be; the devil got well, the devil a monk was he." The secret of this delay is found to be a belief in a general break in freight rates. To-day, rates are \$1.50, and two or three vessels are under charter preparing to start. One started yesterday, and vessels are called for at a dozen offices. There is, after all, a good deal of coal wanted, but it does not represent the full volume. If freights drop to \$1.15@1.20, there will be a lively business in coal. Vessel-owners are not anxious to take the risks just at this time. The harbor is uncomfortably full of ice. Advices to-day from Western markets are unimportant, except that stocks are lower. According to the resolution passed at the meeting of the Western anthracite interests at New York, on the 26th ult., a committee of five, Messrs. Slee, Sayre, Holden, Richards, and Albright, met here this afternoon at the Hotel Lafayette, and formulated certain plans for the better management of the Western anthracite interests.

To-day's settlement and formulation of plans will open an active trade in Western markets, where there has been an enormous consumption, especially for household uses. That outlet will help to harden prices in more sluggish Eastern markets. Southern orders are under way, and a large amount of business will be done in South Atlantic ports. Everywhere, there are expressions of improving prospects and greater confidence.

The bituminous trade is in a lethargic condition, except for those who enjoy special rates. Nothing is likely to be accomplished of a satisfactory nature in the legislative department of the Pennsylvania Rail-

road at Harrisburg, or, strictly speaking, its annex. The merchants and manufacturers have gone before committees there, with long tables of figures and facts demonstrating the extent of the wrong done, directly and indirectly, by discrimination; but the crying evil is not abated. The pool rates, \$2.70 for Baltimore, \$2.80 for Philadelphia, \$3.25 for New York, and \$3.50 for Boston, allow about 80 cents a ton when freight charges are taken out, according to the terms entered into, provided coal is sold at certain "made" prices. Out of 80 cents, come 40 cents to the miner, from 12 to 15 cents royalty, loss, inside and outside labor, interest, and loss from depreciation. In short, the pool rates are made like the cup of Tantalus. No honest business can be conducted on an 80-cent margin. No large legitimate bituminous contracts are made, but large private contracts by favored parties, it is believed, have been made, which will be announced later on—at the right time. The Clearfield operators have become accustomed to hanging by their eyelids. The usual amount of coal is mined and shipped.

In the Clearfield region, there are mines opened at large expense, and which could be made to run from 500 to 1000 tons a day, which are idle. There are many operators running to prevent deterioration of plant, to hold on to miners, and to take their chances of better days. Last week's Clearfield shipment were 64,132 tons, against 45,027 tons for the same week last year. So far this season, 463,896 tons have been shipped, against 433,319 tons, an increase this year of 30,579 tons.

The impossibility of obtaining uniform rates will it is to be hoped, not be one of this year's coal trade evils, although it is believed that coal has been sold in large blocks below pool figures. The coal commissioner will have it in his power to prevent the doing of injustice to the smaller and individual operators.

Buffalo, March 5.

[From our Special Correspondent.]

At the last meeting of the Joint Western Anthracite Coal Committee, it was determined that no change in prices should be made in New York State and at Western points during March. The sub-committee will meet at Philadelphia this week to arrange a programme for the coming season's business, to be reported at the next general meeting for approval. Probably your

local correspondent may obtain particulars in time for your issue of the 7th instant—if such leak out. It is not worth while to give the impressions prevailing among the trade here as to the plan to be recommended.

There was a large attendance of the coal men at the Merchants' Exchange last Monday. The meeting was interesting, and the result was a recommendation to the trustees asking that Messrs. T. Guilford Smith, Andrew Langdon, H. A. Nobles, F. A. Bell, and J. J. McWilliams be the coal committee for the current year. It was also decided that all members interested in the coal trade, whether miners, shippers, dealers, etc., should meet daily to interchange views, contract for vessels, and "promote the welfare of the craft" generally. Thus far the plan has worked well, a large number of coal men putting in an appearance about noon and mingling with the grain, lumber, commission, and railroad men and merchants of all the various branches of commerce represented on 'Change. As the season advances, it is expected that what now is a pleasant duty will prove to be a beneficial necessity.

Shippers' and carriers' views regarding lake freight rates for the coming season differ widely, and very little contract chartering has been done in consequence. In coal, as far as can be learned, not a single engagement has been made. It is reported that an ore contract from Escanaba to Cleveland was arranged at \$1.05, and another at 95 cents; the latter figures are doubted. The slim prospects of an early opening of navigation may be judged from the fact that the ice extends nearly over the entire surface of Lake Erie, and for miles from shore here it is fully twenty-four inches thick. A look over Lake Erie from elevated points is suggestive of the Arctic regions, lacking the icebergs.

There is nothing new in the local trade for coal and coke. The charity organizations and benevolent societies are providing our unemployed workmen with work until spring opens, thus relieving them from the stigma of "pauperism."

Coal stealing from cars has been very prevalent here this winter: many men and women have been fined, and the evil in some degree thus abated.

Three tons of coal are said to be saved each trip from Buffalo to Syracuse by the use of the new smoke-consumer that has been invented by Superintendent Buchanan, of the New York Central Railroad.

