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THERE is a demand for some practical economic method for producing on a large scale an aqueous solution of sulphurous oxide that will retain under ordinary conditions at least 7 per cent of sulphurous oxide.

THE electric light has now been in use at a considerable number of mines in Europe long enough to demonstrate its value, and as a result we find its use extending rapidly. At many of the French, German, and Belgian collieries, the electric light is used on the surface, and at the landing stages at the foot and head of the shafts. At the Marles Collieries, Pas-de-Calais, France, both arc and incandescent lamps are in use, and the telephone connects the several surface works. Signals from the "pit-eye," or foot of shafts, are given by means of a magnetized needle on a dial, where the words "hoist," "lower," "stop," "faster," "slower," are shown. The revolutions of the ventilator are also recorded by electricity, and so satisfactorily does the whole system work, and so

greatly does it facilitate the operations, that it is said the output is increased 10 per cent with the same expenditure of labor.

In Upper Bavaria, electric lighting has for some time been applied at the surface. For this purpose, there are in Miesbach one arc lamp and fifty incandescent lamps; in Hausham, 140 Edison incandescent lamps; and in Penzberg, eight arc lamps.

In this country, a number of mines and mills have adopted the electric light with great advantage, and its use, and with it the use of electric signals and telephones, promise a vast market for electrical appliances. Electro-metallurgy is also making substantial progress in this country; in fact, we have at Newark the largest electro-metallurgical works in the world, and for a single customer, the Parrot Copper Company, they are now producing from 200,000 to 300,000 pounds of electrolytic copper a month.

There are no more promising fields in this country for manufacturers of electrical appliances than those of mining and metallurgy, and these are already attracting much attention.

LEADVILLE smelters are feeling the pressure of close margins, and are seeking assistance from the railroads in the form of lower freights on fuel, ore, and bullion. Thus far, the roads have not made the desired concession, and the furnaces now threaten to blow out, unless they promptly secure it.

Leadville smelters have many difficulties to contend with, and the future does not appear bright for them, even with the lower freights that are absolutely necessary to enable them to exist, and which the railroads will certainly be acting wisely to concede at once.

Pueblo and Denver, with their greater variety of ores, and cheaper fuel and labor, have such decided advantages that it has long been merely a question of time when the competition must cease and the struggle be abandoned.

The Denver, Pueblo, St. Louis, and other works that required the ferruginous ores of Leadville to flux their "dry" and rich ores from other districts, forced the price to a point where the Leadville smelters, limited to this single source of supply, were obliged to pay more than the ore was worth. Only the excellent furnace work and strict economy that for some years have characterized most of the Leadville works have enabled them to postpone the evil day that seems to be approaching.

If the rivalry of the comparatively distant points, Denver and Pueblo, has proved so disastrous, what may be expected should the new camp of Aspen secure the projected railroads that would connect it with Leadville, the Gunnison country, Salt Lake, and other mining districts, and establish smelting-works at the magnificent Aspen coal-beds, which have been shown to produce an excellent metallurgical fuel? Leadville ores would prove a desirable mixture for the barytic gangue of some of the Aspen mines, and there would be a "down grade" from several of the mining districts to the fertile Aspen plane (7400 feet above the sea), where this abundance of cheap and excellent coal is supplemented by water-power.

These are suggestive facts, and must show the railroads as well as the furnaces the absolute necessity for a substantial reduction in such items as are within their control, if this great and important industry is to be maintained.

THE extremely close prices at which nearly every article of manufacture has to be sold, and the probability that low prices and small margins will be the rule hereafter in industries whose productive capacity is in excess of the normal consumption of the market, are stimulating economy and causing prudent and intelligent manufacturers to lessen the cost of production by every possible means.

As one notable example of this intelligent economy, we have cited the manufacture of ammonia from the nitrogen of minerals, as a by-product in the production of paraffine, and its possible application also in the production of water-gas.

This method of utilizing a waste product has been extended to blast-furnaces, and it is said the recovery of residuals from furnace gases will effect a saving worthy of the attention of our iron-masters. Messrs. ROBERT HEATH & SONS, at their Norton Works in Staffordshire, are putting in the plant, which consists, according to our English exchanges, of a condenser, somewhat similar to a gas-works condenser, of 200 wrought-iron tubes 40 feet long, fixed vertically, with water flowing down the outside of each pipe. These pipes are fixed in 10 rows of 20 each, and are arranged with valves at the end of each row, so that any row can be shut off and cleaned. The gases are drawn from the furnaces and forced through the apparatus by four exhausters, each one arranged to be shut off by valves when required. After leaving the exhausters, the gases pass through four washers specially designed for the object in view. The gas then goes forward through four scrubbers of large diameter, 100 feet in height. These scrubbers form a square, and are connected with each other so as to present a substantial structure against wind pressure. They are filled with material exposing a large surface, specially arranged for the pur-

pose, and there is a separate pump to each scrubber. These pumps maintain a constant flow of ammoniacal liquor through each scrubber, except the last; and through this, a stream of pure water is flushed, to absorb the last traces of ammonia. These scrubbers are also all arranged with valves, so that any one can be put out of action, and in the apparatus throughout, precautions have been taken against accident from explosion by having escape-valves fixed so that any sudden rush of gas would find easy exit. The apparatus also embraces stills for the manufacture of sulphate of ammonia, etc. One of the objects of the patentee is, that in recovering the residuals there shall be no waste of gas or any deterioration of its heating power, as all the gases from the furnaces are utilized for raising steam for the blast-engines, forges, and pits owned by Messrs. HEATH.

The utilization of waste products in a profitable manner is the triumph of the intelligent manager, and attention being directed to this particular source of economy, no doubt our ingenious and practical people will find many useful applications of the principle.

Wherever coal or wood is burned, there are in the escaping products of combustion the elements from which valuable materials may be produced, and in not a few cases the conditions are such as will allow of their utilization with profit.

CORRESPONDENCE.

[We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested. All letters should be addressed to the MANAGING EDITOR. We do not hold ourselves responsible for the opinions expressed by our correspondents.]

Civil vs. Military Engineers.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: This discussion of the relative ability and the value of services of the military and civil engineers has interested me very much. I am glad to see the "military fellows" battled for by so able a champion as "Spectator," for I hope my experience has been exceptional. Your editorial note in the JOURNAL for April 11th is what calls me out. I have in my mind an instance that is just to the point. On the improvement of a Western river, an examination and survey were ordered, and the only West Pointer it has been my fortune to meet doing field-work was sent to conduct the work. His progress was so slow that the work was divided, and an assistant engineer, a graduate from Troy with four or five years' practical experience, was given the most difficult part. I was a member of the force on the latter work, and know the figures. On our triangulation, it was frequently necessary to chop out our line, while the other party had clear work. Our party had two less men. We located thirty-eight miles of shore line, measured one base, and took 12,000 soundings. Our map covered two sheets. The other party had measured their bases and taken some soundings before we began work. While we were working, they located seven miles of shore line and took 9000 soundings. Their map covered one sheet. Our work cost less than half as much as theirs, and was conceded to be fully as accurate. And yet our chief died in the same rank he then occupied, while the other went up.

I may be an interested party. At the time above mentioned, I served two years as rod-man, and within the last year spent seven months on an examination and survey. I always feel sorry for an able civilian assistant. Even "Spectator" could not see a very bright side to his life, and no one ever saw one detail a man to hold an umbrella over him and his instrument as a protection from the sun. TRANSIT.

MOVEMENT OF BONDED METALS—PORT OF NEW YORK, APRIL, 1885.

METALS.	Imports.	Warehoused.	Withdrawn.	Exports.	Stocks.
	April, 1885.	April, 1885.	April, 1885.	April, 1885.	May 1, 1885.
Pig-iron.....	3,570 tons.	200 tons.	.....	50 tons.	3,532 tons.
Iron ore.....	1,252 "	.....	.....	.....	.....
Spiegel iron.....	4,080 "	212 tons.	211 tons.	.....	685 tons.
Old rails.....	.....	.....	225 "	.....	1,110 "
Scrap iron.....	.....	.....	.....	.....	705 "
Scrap steel.....	159 tons.	.....	.....	.....	396 "
Steel blooms.....	317 "	.....	.....	.....	14 "
New steel rails.....	.....	.....	.....	134 tons.	42 "
New iron rails.....	.....	.....	.....	10 "	.....
Steel wire rods.....	5,305 tons.	393 tons.	482 tons.	.....	5,549 "
Iron wire rods.....	280 "	.....	.....	.....	426 "
Swedish iron.....	970 "	.....	94 tons.	.....	1,304 "
Tin plates.....	156,349 bxs.	18,473 bxs.	8,196 bxs.	150 bxs.	50,759 bxs.
Slab and ingot tin.....	649 tons.	.....	.....	.....	.....
Ingot copper, matte, etc.	800 "	.....	.....	2,216,741 lbs.	.....
Copper (old).....	1,456 lbs.	1,456 lbs.	.....	10,273 "	67,479 lbs.
Brass (old).....	2,000 "	.....	.....	13,019 "	8 tons.
Pig-lead.....	342 tons.	.....	224,000 lbs.	34,433 "	308,729 lbs.
Lead (old).....	.....	.....	.....	1 ton.	.....
Spelter.....	35 tons.	55,624 lbs.	55,624 lbs.	.....	.....
Sheet zinc.....	.....	.....	.....	17,023 lbs.	28,073 lbs.
Scrap zinc.....	715 lbs.	.....	.....	.....	18,400 "
Reg. antimony.....	289 cks.	75 cks.	73 cks.	.....	141 cks.
Nickel.....	7,363 lbs.	.....	208 lbs.	.....	5,882 lbs.

Resignation of Joseph Nimmo, Jr.—Joseph Nimmo, Jr., for several years Chief of the Bureau of Statistics, has resigned at the request of Secretary Manning, his resignation to take effect on the appointment and qualification of his successor.

OFFICIAL STATEMENTS AND REPORTS.

Central Mining Company, Michigan.

The production of mineral was 1031⁵⁹⁵/₂₀₀₀ tons, and the quantity smelted was 949¹⁶⁸⁵/₂₀₀₀ tons, which yielded about 76 per cent, or 1,446,747 pounds of refined copper.

The following is a summary of the year's business:

Production.		
Copper sold.....	1,014,979 lbs. at 12 ²⁷ / ₁₀₀ cents.....	\$124,584.13
Copper on hand, sold.....	343,057 lbs. at 10 ¹⁰⁰ / ₁₀₀ cents.....	36,673.07
Copper on hand, unsold.....	88,711 lbs., valued at 10 ⁶⁰ / ₁₀₀ cents....	9,435.36
	1,446,747 lbs., average 11 ⁷⁸ / ₁₀₀ cents....	\$170,692.56
Silver.....		485.25
		\$171,177.81
Mineral at mine, December 31st, 1883, 57 ²⁸⁰ / ₂₀₀₀ tons (70 per cent), valued at \$160 per ton.....		\$9,198.40
Mineral at mine, December 31st, 1884, 139 ²⁰⁰ / ₂₀₀₀ tons (82 per cent), valued at \$145 per ton.....		20,155.00
Increase in value of mineral at mine.....		10,956.60
Net value of product of 1884.....		\$182,134.41
Add interest received.....		4,709.00
		\$186,843.41
Costs.		
Central mine, payments for labor, supplies, etc.....		\$121,724.43
Add decrease in available assets at mine.....		30,830.88
Working expenses at mine.....		\$152,555.31
Smelting, freight, and all other expenses, as per balance-sheet.....		31,556.18
Net operating expenses.....		184,111.49
Showing a profit of.....		\$2,731.92
Received balance due on sale of timber.....		30,000.00
Making an increase of assets of.....		\$32,731.92
The surplus from 1883, after disposal of copper on hand and payment of dividend, was.....		209,351.11
Making the net surplus December 31st, 1884.....		\$242,083.03

As shown in detail in the statement of assets and liabilities, and out of which a dividend of \$1.50 a share (\$30,000) was paid to stockholders February 7th, 1885.

The product of the mine—reduced to ingot copper—was nearly 25 per cent larger than that of the previous year, while the expenses were somewhat less. This result indicates a manifest improvement in the richness of the vein (which seems to continue up to this date), but the decline in the market value of copper to the lowest point ever known has offset this improvement, and rendered it impossible after all to make any considerable profit on the year's business.

Several additions to the plant were made during the year, the most important of which was the erection of a steam-hammer, for dressing small masses and barrel work, which have hitherto been prepared for shipment to the smelting-works by a rough calcination and cleaning by hand. The cost of all the improvements is included in the current working expenses.

The final payment of \$30,000, on the sale of pine timber heretofore reported, was made during the year, and the amount divided among stockholders as before stated.

BALANCE-SHEET, DECEMBER 31ST, 1884.

General expenditure to December 31st, 1883.....	\$5,777,176.70
Expenditure in 1884.	
Central mine.....	\$121,724.43
Freight.....	8,446.81
Smelting.....	16,086.20
Insurance.....	591.85
Brokerage.....	640.83
Expenses.....	5,778.49
Storage.....	12.00
Dock and warehouse.....	9,112.07
Accounts receivable.....	359.20
Cash.....	53,148.12
Loans on call.....	40,000.00
Copper on hand.....	46,108.43
Silver on hand.....	485.25
Copper bills.....	34,883.80
Dividends.....	1,710,000.00
	\$7,824,554.18
Capital advanced by stockholders.....	\$100,000.00
Real Estate.	
Sale of timber.....	\$100,000.00
Less cost of real estate.....	20,988.25
	79,011.75
Sales of Copper.	
Sales previous to 1884.....	\$7,463,739.75
Sales in 1884.....	170,690.56
Silver in 1884.....	485.25
Interest received in 1884.....	4,709.00
Accounts payable.....	5,917.87
	\$7,824,554.18

REPORT OF THE AGENT.

CENTRAL MINE, KEWEENAW CO., MICH.,
January 1, 1885.

JOHN STANTON, Secretary and Treasurer, New York:
SIR: The following report of operations at our mine during the year 1884 is respectfully submitted:

GROUND BROKEN.

Sinking in shafts and winzes.....	182 ¹² / ₁₂ feet, average cost.....	\$24.97
Drifting on vein.....	1,299 ¹² / ₁₂ " " " ".....	8.59
Drifting on conglomerate.....	17 " " " ".....	10.00
Stoping on vein.....	1,657 ³⁵ / ₁₀₀ sup. fathoms ".....	12.78
Stoping on vein.....	29 ¹² / ₁₀₀ cubic fathoms ".....	23.18
Stoping on conglomerate.....	68 ¹² / ₁₀₀ sup. " ".....	20.33
Sinking on conglomerate.....	114 feet, " ".....	12.22

The total amount of ground broken in openings and stopes is 2454 cubic fathoms.

PRODUCTION.	Pounds.
839 barrels stamp copper.....	1,169,665
109 hogsheds kiln ".....	392,680
195 masses ".....	500,350
Total.....	2,062,695

Or 1031 ²⁸⁵ / ₂₀₀ tons.	
Average yield of mineral per fathom of ground broken.....	840
Average yield of ingot per fathom of ground broken.....	589

STAMP MILL.

The expenses at the mill were as follows :	
Labor.....	\$7,321.20
1903 cords wood consumed.....	6,184.75
Lights, oils, shovels, etc.....	424.72
Repairs, materials, fixtures, etc.....	1,457.39
Lumber, freight, and teaming.....	43.51
	\$15,431.57

Tons of rock stamped.....	18,146
Yield of rock in mineral.....	3 ²² / ₁₀₀ per cent
Yield of rock in ingot.....	2 ⁵⁸ / ₁₀₀ " "
Cost of stamping and washing per ton.....	85 ¹⁰⁰ / ₁₀₀ cents
Running time of 24 heads.....	156 days
Rock stamped per head, twenty-four hours' running time.....	4 ⁸⁴ / ₁₀₀ tons
Rock stamped and washed per cord of wood consumed.....	9 ³³ / ₁₀₀ " "
Cost per ton of breaking and selecting rock, and tramming to mill.....	11 ¹⁸ / ₁₀₀ cents.

JAMES DUNSTAN, Agent.

A GREAT FIRE-DAMP "BLOWER."

The following very interesting account of the recent great outburst of fire-damp in a Belgian colliery is given by Mr. George G. André in the London *Mining Journal*:

The reports that have been telegraphed to the English papers concerning the colliery disaster at Marcinelle-Nord, in Belgium, are incorrect in one important particular. The accident is described as an "explosion" of fire-damp, in which eighteen persons perished. Unhappily, the latter portion of the statement is true. It is equally true that these deaths were caused by fire-damp, but there was no explosion. There was an outburst of fire-damp, and the miners were suffocated by the gas.

I have in a former note directed attention to these violent outbursts to which the Belgian mines are subject. Not long ago, one occurred by which several tons of coal were forced out from the face of the heading, and large blocks were projected to a great distance, killing two or three of the men who were occupied at the face of work. On the present occasion, the outburst was still more violent, and the quantity of gas liberated much greater. It is spoken of as the worst accident of the kind that has ever occurred in that locality. It appears that four men were at work on the face when, without warning, the mass of coal suddenly moved forward, and with the low roar characteristic of these outbursts, the gas rushed out into the workings, carrying with it an immense quantity of fine dust. So violent was the blast that huge masses of coal were hurled out into the ways, which were blocked up with *débris* for a considerable distance. One of the men was buried beneath this *débris*, the other three escaped almost miraculously. They appear to have been blown along the way to a point at which a ventilating current enters, where they remained until the air had become respirable in the main roads. But a portion of the day shift, who were working in another part of the mine, fared less luckily. It is remarkable that these were nearer the intake—a circumstance which, so far from shielding them from the issuing gas, appears to have occasioned their destruction. The advancing wave overcame the air current, and passing up the ways, enveloped the miners in its choking clouds of dust. As its force diminished, it was overcome in its turn by the air current, and forced back, to pass a second time over the unfortunate group. When the atmosphere cleared, seventeen—fifteen men and two women—had succumbed to the suffocating gas.

Disastrous as this accident has been, there is ground for satisfaction in the result. Nothing but the means of ignition was needed to bring about an explosion that must have killed every one in the mine. There was fire-damp in abundance, mingled with clouds of coal-dust spread over all the working places, and the whole of the day shift of a hundred and sixty persons was present. The gas with its clouds of dust moved along in whirlwinds and hurricanes, and must have passed over the lamps with a high velocity. Yet every one was extinguished! Never before was the Mueseler lamp subjected to so trying a test. The fact that so large a number of lamps stood this test is a matter for intense satisfaction. It opens up prospects of hope that a safety-lamp may after all be made worthy of its name, and that a fair degree of security may yet be attainable. What would have happened had there been several types of lamps present, a circumstance of common occurrence in English collieries, it is impossible to say; but I am inclined to form a pretty definite opinion on the subject. Somebody deserves to be commended for care; for it is certain that every one of these lamps was in a perfect state.

The inquiry into the cause of the accident at Marcinelle-Nord has elicited more evidence concerning that remarkable outburst of gas. One of the men who was working at the face from which the outburst took place, in describing the occurrence, says: "I first noticed a jet of coal-dust spring out from the face of the work; then followed a low rumbling sound, and a moment after came a terrific crash, as if the roof had everywhere fallen at the same instant." The outrushing gas blew all before it. Some horses in the ways several hundred yards distant were thrown off their legs and hurled one upon another. Seven of them were suffocated; when brought to bank, their mouths and throats were choked with coal-dust. The quantity of dust raised and carried along by this singular blast appears to have been enormous. The finer particles remained in suspension a long time, and gave the ways the aspect of being filled with smoke. The work of rescuing the men who had escaped and of removing the dead was attended with great risk in this fiery atmosphere, and the officials deserve the highest praise for the efficient measures taken to insure the safety of the explorers.

MODERN AMERICAN METHODS OF COPPER SMELTING.*

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

CHAPTER IV.—CONTINUED.

The breaking of ore by hand-hammers, technically denominated "spalling," is worthy of more careful consideration than is generally bestowed upon it. The style of hammer is seldom suited to the purpose, though both the amount of labor accomplished and the personal comfort of the workmen depend more upon the weight and shape of this implement and its handle than on any other single factor save the quality of the ore itself. There should be several cast-steel sledges, differing in weight from 6 to 14 pounds, and intended for general use in breaking up the larger fragments of rock to a size suitable to the light spalling-hammers. Each laborer should be provided with a hammer six inches in length, forged from a one and one half inch octagonal bar of the best steel, and weighing about 2½ pounds. This should be somewhat flattened and expanded at the middle third, to give ample room for a handle of sufficient size to prevent constant breakage. The handles usually sold for this purpose are a constant source of annoyance and expense, being totally unsuited to this peculiar duty. It is better to have the handles made at the works, if it is possible to procure the proper variety of oak, ash, hickory, or, far better than all, a small tree known in New England as iron-wood or hornbeam, which, when peeled and used in its green state, excels any other wood for toughness and elasticity. The handles should be perfectly straight, without crook or twist, so that, when firmly fastened in the eye of the hammer by an iron wedge, the hammer hangs exactly true. Their value and durability depend much upon the skill with which the handles are shaved down to an area less than half their maximum size, beginning at a point some six inches above the hammer-head and extending for about ten inches toward the free extremity. If properly made and of good material, they may be made so small as to appear liable to break at the first blow; but in reality they are so elastic that they act as a spring, and obviate all disagreeable effects of shock; wear longer and do more work than the ordinary handle. Such a handle has lasted five months of constant use, in the hands of a careful workman, whereas one of the ordinary make has an average life of scarcely four days, or perhaps thirty tons of ore. Where the ore is of pretty uniform character, it is advantageous to adopt the contract system for this kind of work. A skillful laborer, under ordinary conditions, will break seven tons of rock per ten hour shift to a size of 2½ inches,† taking coarse and fine as it comes, and in some cases being also able to assist in screening and loading the same into cars. This latter operation should be executed with an ordinary strong dung-fork having such spaces between the tines as to retain the coarsest size, while the finer classes are left upon the ground. When a sufficient quantity of the latter has accumulated and the pile or stall is ready to receive its outer layer of ragging, the mixed material should be thrown upon a screen inclined to an angle of about 48 degrees and having three meshes to the inch. This screen is elevated upon legs to such a height that the coarser class that fails to pass its openings will be caught in a car or barrow, while the fines fall either into a second movable receptacle or upon the floor, being in the latter case prevented from again mixing with the unscreened ore by a tight boarding on the front and sides of the screen frame. The amount of space required for convenient spalling is about forty square feet per man, which will allow for ore-dumps, tracks, sample-boxes, etc. A good light is essential, especially if any sorting is to be done, and it is in this case and where fuel is expensive that hand-spalling frequently presents especial advantages. When the ores are siliceous, a mere rejection of such pieces of barren quartz or wall-rock as have accidentally got among the ore or first become visible on breaking up the larger masses, may have a most beneficial influence on the subsequent fusion. Where the expense of treatment is high and work is conducted on a large scale, the profit resulting from raising the average contents of the ore even a single per cent is hardly credible, even aside from the increased fusibility due to the diminished proportion of silica. To illustrate: At certain works that the author was called to superintend, it had been the custom to spall all the first-class ore as it came from the mine without any sorting out of barren wall-rock that was mixed with the ore in considerable quantities. Fuel and labor were very high, and the ore mixture already too siliceous. A rough method of sorting was instituted, and some twelve per cent of the entire weight of the first-class ore was thrown out with the loss of scarcely any metal. The month's average assay of ore due solely to this sorting was increased 2½ per cent, and gave an extra yield of 1500 pounds of copper from 30 tons daily, or 45,000 pounds for the month, which, calculated on the spot at 10 cents per pound, was a gain of \$4500. The net gain was probably even more than this; for the expense of sorting was hardly appreciable, while the increased fusibility of the charges, and the fact that 3000 pounds of barren material could be replaced by an equal amount of good ore, added largely to the profits.

All windows in the spalling-shed must be protected by strong iron wire netting, three meshes to the inch; nor should the eyes of the workmen receive less care than the panes of glass. Accidents from flying fragments of sharp rock are common, and frequently result in a partial or total loss of vision, which entails serious expense on the company, and is an infliction almost worse than death upon the victim. All this can be easily avoided by the use of wire goggles, strongly and properly made, so that, while completely protecting the visual organs, they cause but little annoyance to the wearer. These should be furnished by the employer, and should be constantly worn on pain of dismissal. The workman, with proverbial recklessness, will sometimes claim that he has a right to risk his own eyes if he chooses; but the employer may demand the privilege of protecting himself against those claims which, with more or less reason, are sure to be made in case of injuries received while in his employ. The rights of a corporation especially are little respected, either by public opinion or by the average jurymen. Artificial warming of the building is neither necessary nor desir-

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† Unless otherwise specified, the term "day" or "shift" may be understood to signify the ordinary working day of ten hours, from seven A.M. to six P.M., with one hour for dinner.

nable, the work being of such a nature as to obviate suffering from cold, provided the feet are properly protected. Lithe, active men, or boys of nervous temperament and quick, accurate movements, should be selected for this work, which calls rather for rapidity and knack than for any great muscular effort. The amount of rock broken being about proportionate to the number of effective blows delivered, it follows that, other things being equal, a man who delivers twenty blows per minute will accomplish nearly double the work of one whose deliberate temperament would naturally limit his notions to half that number during the same time. It is just in this matter of selecting workmen adapted to each variety of labor that long experience in the management of men, and a thorough knowledge of human nature, enable one man to obtain results and effect improvements that seem well-nigh impossible to him who is unaccustomed to such a perfect adaptation of means to ends.

The cost of spalling an ore of the same character as that on which the foregoing estimates for machine-breaking are based has been calculated from the average results of a very large quantity of ore, assuming 100 tons to be spalled, screened, and loaded in ten hours.

COST OF SPALLING ORE BY HAND WITH AN OUTPUT OF 100 TONS PER 10 HOURS.

	Per 100 tons.	Per ton.
Labor:		
14 men breaking ore, including screening and loading, at \$1.50.....	\$21.00	
4 men sieging and loading at \$1.50..	6.00	
1 foreman.....	2.50	\$29.50
		\$0.295
Repairs:		
Including new steel and handles.		
5 handles at 30c.....	1.50	
7 pounds of steel at 15c.....	1.05	
Blacksmith's and other work on above,		
1/2 day.....	1.00	
Screens, forks, and shovels.....	1.67	
General repairs.....	0.55	5.77
		0.0577
Sinking fund:		
To replace screens and permanent fixtures.....	0.15	0.015
Total.....	\$35.42	\$0.3542

This is about 25 cents per ton greater than by machine-breaking. The same addition—50 per cent—will here also cover the increased cost of breaking the ore smaller for kiln roasting.

VOLUMETRIC ESTIMATION OF PHOSPHORUS IN WROUGHT-IRON AND STEEL.

Written for the Engineering and Mining Journal.

This method for the estimation of phosphorus by the volume of the yellow precipitate of phospho-molybdate of ammonium appears well adapted for use in cases where frequent and rapid phosphorus determinations are necessary, and where it is not so much an object to obtain very accurate results as to make sure that the percentage of phosphorus in wrought-iron or steel is below a given limit. Though the method is not a new one, it appears to be known to so few that the writer, who saw it for the first time carried out at the important steel-works in Peine, Hanover, thinks it worth while to draw to it the attention of those interested in the manufacture of wrought-iron or steel—more especially by the Thomas & Gilchrist process.

The burette used for measuring the bulk of the yellow precipitate is a tube of from 155 to 160 mm. in length. The lower part of it, which is destined to receive the molybdate precipitate, is uniformly 3 mm. internal diameter for a length of about 80 mm., and it is graduated from the bottom in divisions one mm. apart. The upper part of the tube, which is meant to retain the fluid from which the phosphorus has been precipitated, has a diameter of about 22 mm. and a length of about 55 mm. The transition between the narrow and wider parts is a gradual one, forming an angle of say 68 or 70 degrees with the horizontal, so that the precipitate either does not lie on the sides at all, or can, by gently tapping the burette, be made to roll down to the graduated part of the tube.

The estimation is carried out as follows: 0.0882 gram of wrought-iron or steel is dissolved in 10 or 12 cc. of nitric acid (specific gravity 1.2). After complete solution, the phosphorus is precipitated in the same glass by addition of nitric acid solution of molybdate of ammonium. The precipitate is allowed to settle completely, and, after the greater part of the supernatant liquid has been siphoned off, is transferred to the burette. Every fourth division on the burette is numbered, that is to say, the fourth from the bottom is numbered 20, the eighth 40, the twelfth 60, and so on up to 340, the value of the intermediate divisions being, of course, in proportion. The number indicating the space filled by the precipitate after the same has settled is multiplied by 2.5 (a factor determined by experiment), the result being the amount of phosphorus in the iron or steel expressed in thousandths per cent.

In Peine, where quite a number of these determinations are made daily—the whole operation lasts from three to four hours—the burettes are placed on racks made for the purpose, to allow the precipitate to settle. The burettes are made by C. Desaga, of Heidelberg, and cost 1½ marks (37 cents) apiece.

FREIBERG, SAXONY, April 14.

W. R. F.

Extraction of Zinc by Electrolysis.—Martin Kiliani, of Munich, who has from time to time written several interesting articles on electrolysis, is the patentee of a method of zinc extraction. The material to be worked—precipitated zinc oxide, calamine, calcined blende, zinc ashes, etc.—is placed in lead-lined wooden vats, and digested with a liquor consisting of ammonium and ammonium carbonate, until the liquor is saturated with zinc. After filtration, the solution then passes to a reservoir, from which it is fed continuously to the precipitation-tanks. The cathodes in these are of zinc or brass, the anodes of sheet-iron. A portion of the zinc in solution is precipitated in a compact metallic form on the cathodes, with a corresponding liberation of oxygen at the anodes. The liquor passes through the precipitation-tanks at a speed regulated according to the amount of zinc contained and the strength of the current at the electrodes, and then flows into the reservoir at a lower level, from which it is pumped up again into the first tanks, to extract a fresh amount of zinc, and pass again to the precipitation-tanks. All the vats and reservoirs are well covered over, to prevent loss of ammonia.

THE PRODUCTION OF AMMONIA FROM THE NITROGEN OF MINERALS.*

By George Bellby.

(Concluded from page 300.)

In two previous papers on this subject (*Mining Institute Scotland Journal*, Vol. V., Part 5; *Society of Chemical Industry Journal*, Vol. III., p. 216) I have entered at considerable length into the chemical and thermo-chemical aspects of the process, and in connection with the latter have shown very fully, by means of tables, the theoretical possibilities in the production of fuel gas. It is not necessary to reproduce these figures in detail; it is sufficient to state the general conclusion, which is, that the free heat energy of the gas from the process, after deducting the heat necessarily absorbed and lost in the process itself, amounts to 70 per cent of the theoretical heat energy of the original coal. Stating this in another way, we may say that of 100 tons of coal gasified in air and excess of steam, the heat energy of 30 tons will be used in the process, and the energy of 70 tons will be available for outside use in the form of gas. In the calculations referred to, due account was taken of the loss of heat by radiation and conduction from the retort-benches. Further, no credit was taken for the recovery of heat from the gases leaving the retort, so that in a certain sense the figures are safe; but in any practical estimate, it would be prudent to take the heat energy of the gas as 60 per cent of the theoretical energy of the coal.

The problem before us, for the last three years, has been to devise a practical apparatus for the manufacture of heating-gas by this process. While the theoretical conditions and results could be worked out in the laboratory, the practical solution on a working scale could only be found by the trial and modification of successive plans, at each trial getting rid of some weak point in structure or working. From the necessities of the case, such gradual elaboration of a practical apparatus must be slow—how slow, those only know who have attempted to translate a process from a magnitude of grains into one of hundreds of tons. We have not yet attained perfection, and are, perhaps, hardly yet in sight of it, but we can confidently say that the process can be carried out in a practical way with profitable results. Since October, 1883, there has been in constant use, at Oakbank, a small bench of retorts which produce heating-gas of the composition already referred to, and equal, we estimate, to 60 per cent of the heat energy of the coal consumed. The ammonia produced has varied from 80 pounds to 134 pounds of sulphate per ton of coal, and the present average excess of steam used is about 2500 pounds, or 250 gallons per ton. A cross-section of the bench of retorts is shown on Figs. 1 and 2. The retorts are fire-brick tubes of oval section, built up of grooved and tongued bricks similar to those exhibited. Each retort is self-contained, being closed at the bottom by a faced door, and at the top by a hopper and charging-door. The steam and air are blown in at the upper side of the mouth-piece, and pass up through the coke in the lower half of the retort. The gases pass off by an exit-pipe built in about half-way down the retort proper, and are drawn through condensers and scrubbers by an exhauster. A portion of the cooled and washed gas is led back into the setting, and by its combustion maintains the whole interior at a red heat. The gas-producer in front is only used in heating up the bench at first, and after the retorts are in full work, it is shut off, and the firing is done by the retort gas. When the retort is in working order, it contains in the upper part, above the exit-pipe, coal in process of coking, and giving off hydrocarbon gases and vapors, which pass down through the hot coke, and are led away by the exit-pipe. The lower part of the retort is full of coke that is oxidizing by the oxygen of the air and steam; the resulting gases pass upward, and are also led away by the exit-pipe. As the carbon is burned away in the lower part, the whole sinks down, making room for fresh coal to be introduced at the top. This is done either by hand or by a screw-feeder. At intervals, the bottom door is opened and a portion of ashes and fine cinder is removed. In practice, we have found it of great advantage to have a proportion of unburnt cinder among the ashes, which serves to keep the mass of ash in the bottom of the retort porous and open, so that the steam and air may pass freely through. Care has to be taken that the temperature of the contents of the retort does not rise so high as to fuse the ash and run it into clinkers, as these adhere to the side, and are difficult to remove.

With the object of treating a much larger quantity of coal in each retort, the design shown in Fig. 3 has been adopted. The shell of the retort is built of grooved bricks as before, but it is of circular section, and of much larger diameter than the earlier retorts. The top is closed by a shallow hopper of cast-iron, with two small charging-doors; through the center of this hopper, a large iron pipe is led half-way down the retort. This pipe is for the exit of the gases, and passes up into a large dust-box that runs along the bench. From the dust-box, the gas is conveyed by large pipes to the condensers and exhauster. The bottom of the brick retorts rest on an iron snout-piece, which is provided with a door at the outside of the setting. The steam and air are blown in at the front of this snout-piece. The gas and air for heating the setting are led up by pipes between the walls of the building, and are thereby heated before they take fire. The fire gases surrounding the retorts are drawn downward by chimney draught, and before entering the main flues at the bottom of the setting, they give up their heat to the iron snout-pieces, through which the steam and air are entering. The working of these retorts is similar to that already described. In both the forms of retort described, external heat is applied, and this heat, passing through the walls of the retort, takes the place of the heat absorbed by the reaction within. But it is quite possible to carry out the process of burning coke in excess of steam in a solidly built oven or cupola without any external heating. In that case, the heat necessary for the reaction is supplied in one of two ways, either by pre-heating the steam and air supply, and allowing it to take in the necessary heat, or by consuming a larger proportion of the carbon within the retort by the free oxygen of air—in other words, by using more air with the steam. The latter plan is objectionable, as the quantity of nitrogen introduced with the air so dilutes the resulting gas as to render it almost valueless as fuel. The only difficulty in the way of pre-heating the steam and air is in the construction of a durable form of heater. All who have had

* A paper read before the London Society of Arts, on February 12th, 1885.

experience of steam superheating on a large scale can testify to the troublesome and costly nature of such plant. We are, however, at present working out a form of producer on the pre-heating principle, which we hope will be cheap, durable, and easily worked. I have already spoken of one application of the gas-producing process, the adoption of which will have to depend on the enterprise of individual gas companies. There is another application that we hope will be in operation before long; that is, the erection of plant in colliery districts where dross or slack is plentiful and cheap, where, therefore, it will be possible to work it up for ammonia solely. Even at the present low price of sulphate of ammonium, there is a considerable margin of profit on this operation, after paying costs of coal, labor, interest, and depreciation.

DISCUSSION.

Prof. William Foster said: Prior to these later methods, which were the subject of letters patent, steam was used with the view of preventing the breaking up of ammonia in the retort. Speaking from memory, the amount of ammonia lost in the ordinary distillation of coal was about 25 per cent from one class of coal, another 35 per cent, another 21 per cent, and another 30 per cent. Those numbers represented the percentages of the nitrogen of coal that by the most advanced process were lost to the gas-producer. When steam was introduced into the retort in the way described, it was probable that a portion of this was saved. Of course, after the volatile hydrocarbons had flown, the steam began to act on the nitrogen of the coke. Still, this was a debatable matter, and on it the whole thing turned; for if these recent experiments had any value, it could be shown that this action of steam could only take place by preventing the breaking up of that portion of the ammonia in the retort that came off in ordinary distillation, and was never recoverable as ammonia. There was such a margin of waste in the ordinary mode of distillation that the steam might very well increase the yield of ammonia without touching the great reserve of nitrogen that the author and his able colleague, Mr. Young, and others who had been working on similar lines, had been trying to get at. In the latter

acid, labor, and so on, required to work into sulphate. He feared ammonia had not yet seen its lowest price, and therefore it would be unwise to lay down any hard and fast line as to the money value that this ammonia was likely to bring. The author had done a great deal in showing the practical possibilities of shale distillation, which might be taken as illustrating what might happen in the case of small coal if subjected to similar treatment; but he did not think the operations had been carried on on a sufficiently large scale to influence very considerably the output of ammonium salts.

Mr. Beilby said that he did not desire to dwarf in any way the importance of the process as applied to coal. He considered the treatment of coal was far more important and had far more possibilities in it than shale ever would have. He had given the actual commercial figures of the saving effected in this one small industry, the Scottish oil trade, showing the saving of ammonia equal to £46,000 sterling a year. If the whole of the shale were treated in Scotland by this process, it would not much more than double that amount, and it was, therefore, evident that the possibilities of extension in that direction were very limited, and many years ago, therefore, Mr. Young and himself turned their attention very seriously to the utilization of the nitrogen in coal, feeling quite certain that in it there was a much greater hope of a large success. He had pointed out in the paper a number of practical difficulties encountered in carrying out the processes; but still it had been brought down to this point, that for a year and a half they had been treating coal on a manufacturing scale—a small one certainly, from four to five tons a day—for the production of heating-gas and ammonia, and the results had been remarkably steady. It was not a laboratory experiment, and was not under the direction of chemists, but had been conducted by ordinary Irish laborers working retorts, and the results, therefore, were thoroughly practical. As he had pointed out, the real difficulty was, that it took such a long time to burn away the carbon in steam that air had to be introduced to expedite the process. But since that had been done, the whole process had been marvelously simplified, and could be carried on on a large scale. Mr. Forster

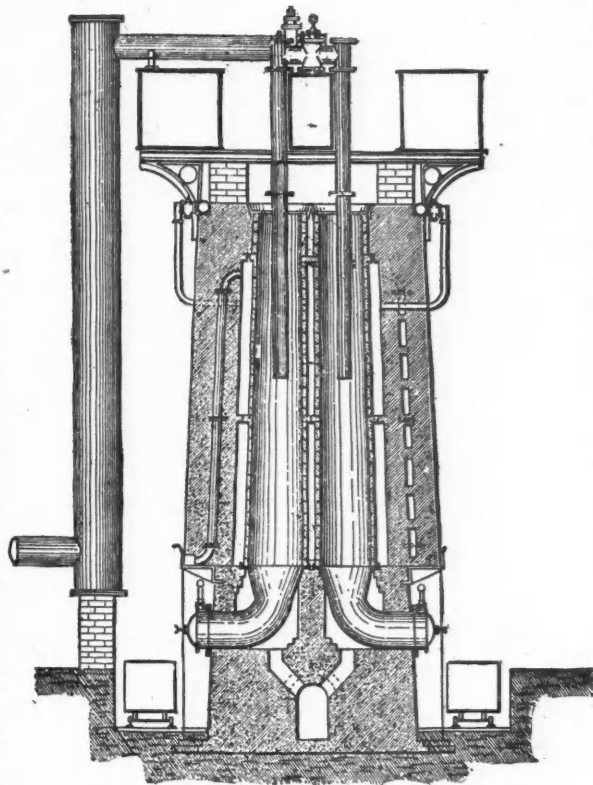


FIG. 3.

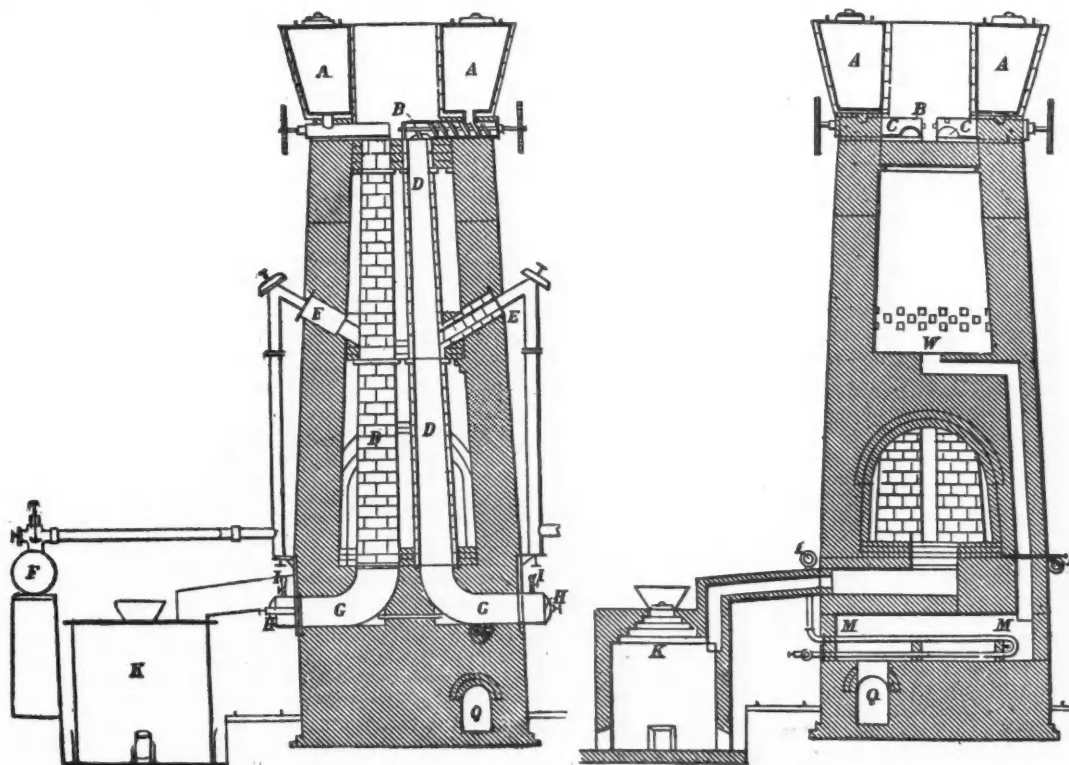


FIG. 1.

FIG. 2.

portion of the paper, reference was made to the erection of works for the recovery of by-products from true coal; there were works already in existence not far from Sheffield for that purpose; but he feared that some of the statements made were scarcely applicable at the present moment. Sulphate was now down in price, say £12 free on board at Hull, whereas, a few weeks ago, it was up to £15 or £16. He did not know whether it had yet reached its lowest level; but, putting the value at £10 a ton, he thought the author allowed very little for the sulphuric

had almost suggested that it was not possible to obtain the whole of the ammonia present in a material such as coal or shale by simple treatment, with excess of steam of sufficient temperature; but it was possible, as had been proved time after time, to do so. The analytical method at least proved that the whole nitrogen could, by proper care, be obtained, and it had been done time after time in his own laboratory; for, after carefully analyzing the residue and ammoniacal liquors, and striking a balance, it really came out with marvelous

accuracy, showing that practically the whole of the nitrogen was accounted for. In the case of a shale retort simultaneously producing paraffine oil, which necessarily contained about 20 per cent of the total nitrogen, you could not obtain that portion as ammonia; but in the case of coal, where the hydrocarbon vapors were almost entirely decomposed by steam, in their passage through the red-hot coke, the theoretical possible quantity of nitrogen could, with care, be obtained. He had abstained, purposely, from entering fully into the chemistry of the question of the decomposition of steam, and the state in which the nitrogen was found in the coal, because he had already expressed his views in a paper read before the Society of Chemical Industry last spring. Mr. Forster had further asked for information as to the actual quantity of ammonia produced from such sources as blast-furnaces, gas-producers, and, generally, such improved methods as had come into use since 1880 and 1881. According to a rough estimate recently made, the total output of ammonia from blast-furnaces and coke-ovens in the West of Scotland was from 3000 to 3500 tons per annum. He had never heard of any really successful process on a large scale for obtaining it from gas-producers. There had been much experimenting, but he knew no one actually producing sulphate of ammonia by the ton except themselves. The increased quantity of sulphate of ammonia produced in the Scottish oil trade was about 4000 tons a year, which was a comparatively small quantity as yet; the total quantity produced in the United Kingdom being from 80,000 to 90,000 tons. With reference to the use of lime with coal, they had all been interested in the coal-liming process so much advocated lately; but it was quite evident to those who studied the subject that hydrated lime could never take the place of soda lime in producing ammonia in a gas-retort. Apart from the state of division in which the two substances existed, the hydrated lime gave off water at much too low a temperature to do the work required. The hydrogen ought to be liberated at a temperature at which water decomposed and carbon oxidized. The chairman had asked as to the loss of hydrocarbons by the excessive quantity of gas, and there he had put his finger on a very important point. In the case of shale distillation, before this new process was introduced, the quantity of gas obtained per ton was something like 1400 cubic feet. At present, working with steam alone, they obtained from 8000 to 9000 cubic feet; therefore they found it was necessary to exercise a great deal more care, and to provide a great deal more plant to recover the additional quantity of volatile hydrocarbons thus carried away. In the coal retorts, in which they produced gas to the extent of about 150,000 feet per ton, they had only by scrubbing been able to obtain benzol, or gas naphtha, equal to about half a gallon per ton; whether it was through a deficiency of the scrubbing arrangement, or to a complete decomposition of the benzol in the retorts, he did not know, but it would be quite hopeless to scrub off the volatile hydrocarbons from such an enormous quantity of gas; it cost quite enough to put up the plant that was required for the purpose of condensing the steam out of it.

ON THE MODE OF OCCURRENCE OF APATITE IN CANADA.

Written for the Engineering and Mining Journal by Robert Bell, B.A.Sc., M.D., LL.D., Assistant Director of the Geological Survey of Canada.

The mode of occurrence of apatite in the Laurentian system in Ontario and Quebec has been a puzzling question to geologists ever since the mineral has been known to exist in these rocks in quantities of economic value. A number of contributions to a knowledge of the subject have been made, principally by Sir W. E. Logan, Drs. Hunt, Dawson, and Harrington, Professor Dawkins, and Messrs. Vennor, Broome, Willmott, Kinahan, and Torrance. The scientific aspects of the subject are discussed more particularly by Dr. Harrington in the Geological Survey Report for 1877-78, and by Dr. Hunt in several of the Survey Reports, and also in an excellent paper in the Proceedings of the American Institute of Mining Engineers, in which he likewise gives valuable statistics of the production of apatite in the Dominion. The rapid progress that has been made in mining the apatite during the last two or three years has enabled us to obtain some additional light on this question.

With the exception of one locality at Lake Clear, in the county of Renfrew, the workable deposits, as yet known, are confined to two areas having similar geological characters and relations, the one running north in the county of Ottawa and the other southwest through parts of Lanark, Leeds, and Frontenac. Apatite has been found in other regions in Canada; but for the present, I shall confine my remarks to the two areas I have mentioned, and more particularly to the one in the county of Ottawa, which latter I have had more opportunities of examining than the other.

The apatite-bearing rocks appear to constitute one of the higher members of the Laurentian system. Although this system extends over such vast tracts of country in the northern regions of the Dominion, rocks like those among which the apatite occurs appear to occupy but a small proportion of the whole area. In the great regions referred to, scarcely any thing is to be found but wearisome repetitions of the commonest varieties of grayish and reddish feldspathic and quartzose gneisses—massive, highly crystalline, hard, granitoid, or not much more cleavable in the direction of the lamination than across it, greatly contorted on the small scale, and so much disturbed on the large scale that it would be almost impossible to map out all the windings and foldings in any given area.

In the apatite-bearing regions, on the other hand, the rocks on the large scale, or geographically speaking, are arranged in great belts, differing more or less from one another and individually traceable for long distances, in which they maintain their distinctive characters. The limestone bands that they contain constitute the great distinguishing feature in which these strata differ from the bulk of the Laurentian rocks. In the immense northern Laurentian country to which I have referred, occupying many hundreds of thousands of square miles (and which I have gone over pretty extensively from the St. Lawrence and the Great Lakes to Hudson's Strait, and from the Labrador coast to their western limit), no limestone bands have yet been detected, although it is probable that other areas of the higher portions of the series, containing such bands, may yet be found. The Laurentian areas at

present known to hold these limestones lie along the southern parts of the Dominion, between the French and the Saguenay rivers. Limestones are also found in rocks classified as Laurentian in Cape Breton and Newfoundland. In the apatite regions, the gneisses of some of the bands are less crystalline than the primitive varieties above described, and they are recognizable throughout by certain peculiarities of color, composition, etc. They are seldom so much disturbed as to prevent them from being traced out upon the ground. While the common Laurentian gneiss holds but a small variety of minerals, the rocks of the apatite regions have already yielded upward of sixty species. Both in the county of Ottawa and in the Perth and Kingston regions, there are several wide bands of crystalline limestone rudely parallel to one another and separated by great thicknesses of gneissic strata. These are similar to the thick bands of limestone in the gneisses of the county of Argenteuil, which were so carefully traced out and mapped in all their windings by the late Sir W. E. Logan between the years 1854 and 1862. Apatite has been found in various places in this region, but apparently not in paying quantities so far as is yet known.

Besides the limestones, the Laurentian rocks of the apatite regions have associated with them bands of schists, slates, pyroxenite, quartzite, jasper, etc., and they also contain serpentine, graphite, pyrite, pyrrhotite, and ores of iron, copper, lead, and other metals.

Coming now to the closer associations of the apatite itself, we find that it is almost invariably accompanied by pyroxenite, which may be either coarsely or finely crystalline and of any shade of green, grayish-green, and gray. A somewhat coarsely crystalline or orthoclase rock, generally very light gray in color, and spotted and mottled with pink, lilac, and neutral gray, is generally found with the apatite, especially in the valley of the Rivière du Lièvre. The other minerals most commonly associated with it are dark mica, which in most cases is biotite, but may occasionally be phlogopite, pyrite, white, red, pink, flesh, and salmon-colored calcite.

In some localities, as in the township of Wakefield, the apatite is accompanied by a very crystalline and distinctly spotted or mottled diorite, in which the hornblende is dark green or black, and the feldspar white, gray, or reddish. A dull red, rather fine-grained gneiss, streaked and spotted with dark gray or black, is found in proximity to the apatite deposits in some parts of Ottawa County. Interstratifying the gneiss, near a number of the apatite deposits in the valley of the Lièvre, I have noticed thin seams, and also beds up to several feet in thickness, of a quartz-rock which is white or light-bluish in color, semi-translucent, non-crystalline, or compact, pitted or honeycombed on weathered surfaces, the cavities being apparently due to the dissolving away of feldspar.

It is well known that some of the metals exhibit a preference, locally at all events, for certain rocks, which, as the miners say, are "kindly" to them; as for example (among the crystalline rocks), oxides of iron with hornblende schists, galena with limestone, sulphides of copper with greenstone and talcoid schists, gold with quartz, tin with granite, etc. There is thus nothing extraordinary in the association of the apatite of the Laurentian system with pyroxenite.

We have seen that, in regard to the apatite of Ottawa County, at any rate, there are certain pretty well ascertained geological and mineralogical associations, so that should we find these conditions repeated in another region, among the widely spread Laurentian rocks of Canada, we may look with some confidence for apatite. These conditions may be briefly recapitulated as follows: A somewhat regular large-scale structural arrangement of the gneiss in bands having distinctive characters and accompanied by limestones, a considerable number of "the Laurentian minerals," and the presence of pyroxenite or of mottled diorite. For these reasons, I have ventured to predict the probable discovery of apatite in the Parry Sound District ever since 1876, when I made a geological reconnaissance of that region and found five distinct limestone bands, of which the general positions and courses were indicated and to which I gave separate names (see Geological Survey, Report of Progress, 1876-77, pages 202-208). The general structure and character of the Laurentian rocks to the northeastward of the Georgian Bay would place them among the higher divisions of the system. In this region, I also found the mottled diorites and the pyroxenites that, in the county of Ottawa, indicate the proximity of apatite. A considerable number of the mineral species that usually accompany the Laurentian limestones was also found.

In the county of Ottawa, the most productive "phosphate belt" as yet known runs northerly and follows the general course of the Rivière du Lièvre. It has been traced through the townships of Templeton and Buckingham, Portland, Bowman, Bigelow, and Wells, and I have been credibly informed that the mineral has been found in places in this direction to a distance of 100 miles north of the Ottawa. In the Perth and Kingston region, the phosphate belt runs from the township of North Elmsley, southwestward through North Burgess, North Crosby, Bedford, Storrington, and into Loughborough.

There is little doubt that the apatite has been derived principally from the pyroxenite. Phosphate of lime, in small quantities, is a common constituent of igneous rocks. Dr. Harrington has shown that the trappean masses forming the isolated mountains in the province of Quebec contain it in very appreciable quantities, and it has been met with in the amygdaloids of the Bay of Chaleur. I have found bunches and crystals of apatite associated with amygdaloid and syenitic granite at Trout Lake, at the source of one of the branches of the Moose River. There is no evidence whatever that the Laurentian apatite has had the remotest connection with organic life, although it is a rather curious circumstance that the average proportion of fluorine in this anciently formed mineral should approximate that contained in the bones of mammals.

The pyroxenite appears to take the form of irregular beds and almost isolated masses running with the stratification; but these have been altered in shape and partially dispersed among the adjoining rocks during the metamorphism of the whole mass containing them. They have probably been originally derived from igneous sources, and have perhaps formed parts of submarine ejections while these ancient rocks were in the course of deposition; or they may have been intruded subsequently. They have since all undergone great alteration and disturbance, in the course of which they have been in a heated and somewhat plastic state and have become more or less mingled with one another. It was

at this remote period that the irregular and somewhat ill-defined veins of the second and third class described by Dr. Hunt as belonging to such rocks were formed (Geological Survey, Report of Progress, 1863-66, p. 187). These veins are very numerous among all the Laurentian rocks. They are filled with the prevailing constituents of the country-rock that they may happen to traverse, such as feldspar, quartz, calcite, pyroxene, apatite, mica, etc., or with some of these minerals mingled together. The gangue adheres strongly to the wall-rock, which, to a certain distance in, is often penetrated by a greater or less proportion of the veinstone.

All writers on this subject have dwelt on the great irregularity and puzzling character of the apatite deposits. At first, the deposits were supposed to be beds; but they are now pretty commonly regarded as being rather of the nature of veins of an irregular and unusual nature. Regular veins, generally of small size, filled with apatite or having this mineral as one of the veinstones, have also been described by writers on this subject. On the second lot of the third range of the township of Bowman, in Ottawa County, I have seen a well-defined, small, isolated vein of pyroxene, cutting gneiss and holding masses of apatite along its center. The mine at Little Rapids, on the Lièvre, appears to be in a large vein. These are probably instances of regular veins of very ancient date. But in the great majority of cases, the deposits, whether of the pure phosphate or of a mixture of this with other minerals, appear to differ from true fissure-veins, and to be extremely uncertain and capricious in their forms.

The mineral is often much mingled with the pyroxenite, but it always has a tendency to form itself into "floors" and branching veins, having two principal local courses. From an attentive study of these in several of the mines that have been opened in the Lièvre Valley, I have come to the conclusion that these lines of deposit mark approximately the original jointing of the rock. These ancient joints belonged to three sets, two nearly vertical, intersecting each other, and one nearly horizontal, analogous to the three sets of dry joints of more recent date that we usually see in massive rocks at the present day. In the course of the disturbances to which these phosphate-bearing pyroxenites and gneisses were subjected, the angular masses into which they had been divided by these joints became in places separated and displaced, leaving the spaces that are now filled with the apatite. The process—one of segregation—was similar to that by which the irregular veins in other varieties of the Laurentian rocks have been filled with quartz and orthoclase or calcite and its associated minerals. Indeed, it has been pointed out that the tribasic phosphate of lime shows an unusually strong tendency to segregate or separate itself from mixtures containing it. Hence we should expect to find that, even when it formed only a small proportion of the constituents of the rock in which a cavity occurred, it would fill it up to the complete or partial exclusion of the more abundant minerals. We do not know the precise nature of the conditions that have caused the elimination of individual minerals from the country rocks, and their deposition in the veins that traverse them; but from the above considerations, it is easy to conceive that the phosphates might be separated out into cavities from the inclosing rocks, in which the mineral is now but sparingly diffused, especially when we consider that the apatite is soluble in heated waters holding alkaline silicates, whereas the feldspars and pyroxene are not then soluble.

In the formation of the apatite masses, or of any other vein-like deposits, it is not necessary to suppose that the whole space that they now occupy was open at once like an empty cavity, or indeed that it was ever open at all to any appreciable extent, but only that where the slightest vacancy occurred from movements in the wall-rock, it was immediately filled by particles of some one or more of the minerals of the parent rock, for the transference of which the conditions were for the time favorable.

The general form of the apatite deposits, as seen in a section across any of the courses of the primeval jointing, approximates what we should expect to find if the above hypothesis be correct. A vein in descending, after following an ancient vertical joint past several nearly horizontal branches, may suddenly jog off to another parallel joint, to which the original opening had been transferred by a lateral movement on the plane of one of the horizontal joints. The horizontal branches, which are sometimes as large as the veins themselves, where exposed in plan, constitute the "floors" or "beds," and they are as likely to be cut off by throws along the planes of the vertical joints as are the veins by those along the horizontal joints. In this way, either vertical or horizontal masses of apatite may be cut off suddenly all round, or they may pinch out gradually or irregularly. The latter would result from the disturbance of the blocks of the country-rock all separated from each other by the three sets of joints during the movements that took place while the strata were in a plastic condition. Both the veins and "floors" of apatite are sometimes observed to curve or gradually change their dip. This form may have been imparted to them either during or subsequent to their formation.

The structure I have attempted to describe is best seen where the phosphate-producing rock is least disturbed and where the joint-fissures are moderately small and close together, but the same arrangement obtains among the larger deposits. The principal mass in a working sometimes passes from a vertical joint to one in the other vertical set, or from one of the latter to a horizontal joint, thus giving the mass the form of the letter L, as seen in plan in the first instance, or in vertical section in the second. An example of the first of these forms on a large scale is described by Mr. Torrance as occurring at Major Chapleau's mine on lot 17, range 6, of Portland East. (Geological Survey, Report of Progress, 1882-84, page 16 J.)

Along the intersections of every two of the planes of the joints, and more especially at the points where all three intersect one another, the apatite is accumulated in the largest quantity. The angles of adjacent blocks are frequently rounded off, and thus larger spaces are formed for the deposition of the mineral. Sometimes the apatite follows only one set of natural joints, when it appears on the surface as parallel veins; at others, it is mostly confined to the horizontal ones, when it forms a succession of "floors;" and again, it may follow both of the vertical sets, or even all three, in which cases it appears in a reticulating form, which is of very common occurrence.

If the above view of the nature of the majority of our phosphate deposits in the pyroxenite be correct, we should naturally expect to find the mineral most freely exposed where upward movements of the apatite-bearing rocks had occurred, and that the deposits of the mineral between the blocks of the country-rock would be widest above, and further, that in going downward they would become pinched toward the next leading horizontal joint below, where they would open out again; also that the successive bunches of the mineral would become smaller and smaller in descending. These conditions appear to correspond with the experience of mining, so far.

The great number of small "shows" that are found on the surface among the apatite-bearing rocks appear to afford additional proof of the correctness of the view I have put forth. Many of these have been worked to a small extent on the surface by farmers and others; but the great majority of them show a tendency to pinch out at a limited depth, when they are usually abandoned. As many as 300 of these "shows" have been opened on a single lot. Dr. Hunt and Mr. Gordon Broome have both described a group of about twenty nearly parallel veins of apatite on lot 4, range 5, of North Burgess. (Geological Survey, Reports, 1863-66, pages 226-27, and 1870-71, page 317.) They all diminish rapidly northwestward in receding from the shore of Rideau Lake, and may belong to the class of parallel joint-deposits I have described. In this township and those adjacent to it, the apatite is often found in isolated crystals and masses in calcite or coarsely crystalline limestone, which is generally of some reddish shade, and is mostly associated with or near to the pyroxene rock. These deposits Dr. Hunt regards as veins also.

Apatite has been detected in a very large number of places in the two principal regions above referred to and in a good many localities in Renfrew County. In addition to these, it has been found in Canada in crystalline limestone in the augmentation of Granville and at the Calumet Falls in the latter township, at St. Roch in the parish and county of Assumption, in an intrusive mass of fine-grained gray dolerite, in the township of Borford (Eastern Townships) in a vein of quartz with copper pyrites, native copper, and mica. I have also found it in crystals with mica in a compact gray dolomite in the township of Marsh, County of Carleton, Ontario. It is mentioned among the minerals brought home in 1878 by Mr. Ludwig Kumlien, of the Howgate Expedition, from Cumberland Gulf, where the rocks are believed to be Laurentian. I may mention here, that near North Bluff, in Hudson's Strait, I have picked up a piece of crystalline limestone quite like one of the common Laurentian varieties. Sir John Richardson found apatite in the neighborhood of the Coppermine River. I have already noticed its occurrence in igneous rocks at Trout Lake, north of Lake Huron, in the isolated mountains of the province of Quebec, and on the Bay of Chaleur.

If the view I have taken of the mode of occurrence of our principal apatite deposits be not sufficiently elaborated or satisfactory, it may, at all events, point the way to further investigation in this direction.

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

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

In undertaking the series of experiments described below, we were actuated by a desire thoroughly to test the respective merits of the cyanide and battery processes now used so extensively for the determination of copper in ores, slags, metals, etc., in regard to the reliability of which such differences of opinion exist.

To decide this question of reliability with greater certainty and to bring the results of our examination most clearly into view, we have arranged our experiments under three heads, namely,

- I. The effect of various substances on the cyanide process.
- II. The effect of various substances on the battery process.
- III. Comparison of the two processes.

I. EFFECT OF VARIOUS SUBSTANCES ON THE CYANIDE PROCESS.

It is to be understood that, in all the following experiments, the cyanide made use of was capable of showing from one twentieth to one thirtieth per cent of copper; that with each series of alloys requiring special treatment, a proof corresponding to them in the quantity of acid and alkali used has been employed to standardize the cyanide; and that all the solutions titrated are of the same degree of dilution (that is, 200 c. c. in volume).

Silver and Bismuth.—Both of these metals are generally considered to exert a powerful influence on the accuracy of the cyanide method, the first because hydrochloric acid is introduced into the solution to displace it (that acid being a source of error when in excess); the second, because a trace of it is left in solution, after precipitating with ammonia.

A solution was made of the following metals:

Copper	550 grams.
Bismuth	200 "
Silver	250 "

Hydrochloric acid was added to the solution in just sufficient quantity to precipitate the silver. After filtering and washing, ammonia was added. After standing one hour, the solution was filtered and washed. On titrating, No. 1 gave 54.90 per cent of copper; No. 2 gave 54.85 per cent of copper, instead of 55 per cent of copper.

The bismuth precipitate had a faint-green tint, showing that it retained a little copper mechanically. This separated on resolution and subsequent precipitation.

These results show that a solution of copper containing 20 per cent of bismuth and 25 per cent of silver can be titrated to within 1 per cent of its value in copper, and these are uncommon percentages in alloys and ores.

Lead.—This is a very common element in many copper ores. After adding ammonia to the solution of copper, it was allowed to stand two or three hours, to separate the lead more completely. Copper, .200 gram; lead, .800 gram, on titration gave 20.28 per cent, instead of 20 per cent of copper. The lead commonly present in ores (from 5 to 40 per cent) would not affect the cyanide to an injurious extent.

Arsenic.—It is well known that arsenic causes much trouble in battery determinations. .600 gram of arsenic, .400 gram of copper. The solu-

tion was treated directly (without filtering, etc.). 39.80 per cent copper, instead of 40 per cent. Small percentages of this metal (from 5 to 15 per cent) do not affect the cyanide in the least.

Zinc.—This metal is well known to be injurious; but it may not be so generally known that it can not be detected during the addition of the cyanide as nickel can, because it does not cause any difference in the color of the liquid, which is bleached just as naturally as a pure copper solution would be, the reaction terminating with a colorless liquid.

A solution was prepared containing copper, 123 milligrams; zinc, 878 milligrams. It required a quantity of cyanide sufficient to indicate 30.65 per cent of copper (instead of 12.2 per cent).

It has been said that the presence of 5 per cent of zinc exercises no influence upon the accuracy of the method. The following experiment will demonstrate the fallacy of this assertion:

A solution of .030 gram zinc, .970 gram copper was prepared. On titration, it gave 97.55 per cent copper, instead of 97 per cent. An error of over one half of one per cent is surely a grave one! Besides, only 3 per cent of zinc was present.

Iron.—This metal, although it does not exert any chemical action on the cyanide solution, obscures the color of the solution so much as to render it next to impossible to watch the progress of the decolorization during titration. It must, therefore, always be removed either by filtration or by separation with hydric sulphide.

We have found that, if iron be precipitated from a solution containing copper, by ammonia, a large amount of copper invariably accompanies it, which neither boiling water nor strong ammoniacal water is capable of removing.

In the case of very rich iron ores, containing copper, as much as 6 per cent of the latter may be retained, as stated.

We saw, while yet engaged in writing these notes, that our experiments in this quarter had for the most part been anticipated, and that this subject had already been noticed in an article by Dr. E. D. Peters, Jr., published in the *ENGINEERING AND MINING JOURNAL* of April 18th.

We are much pleased to see that chemists are beginning to pay the attention to this important source of error that it manifestly deserves.

The following experiments were made on the property that iron possesses of retaining copper:

1. Iron, .300 gram; copper, .600 gram; silica, .100 gram.

The iron was separated by filtration, the filtrate set aside, the filter was well washed, and finally boiled with 25 c. c. of ammoniacal water; all the washings were added to the main bulk of the filtrate.

By titration, only 56.29 per cent of copper was obtained, showing that 3.71 per cent had been retained by the filtrate.

2. Small percentages of iron do not materially affect the process. An experiment with a copper solution containing 5 per cent of iron showed, however, that this amount of iron was capable of retaining half a per cent of copper.

3. By redissolving in a very small quantity of hydrochloric acid, and reprecipitating and filtering, the copper is *not all reclaimed* from the precipitate of iron thrown down by ammonia from very rich iron ores.

An experiment illustrative of this was made: .500 gram iron; .500 gram copper. Ammonia was added to the solution, the precipitate was filtered off, and repeatedly washed and boiled with water. The filtrate and washings were then titrated, and 44.55 per cent copper obtained, leaving 5.45 per cent remaining in the precipitate. By careful resolution of the precipitate, reprecipitation, and washing as before, 4.55 per cent more was obtained.

The filtrate obtained by yet a third operation had still a pale blue tint, and could have been titrated again, but for the presence of so much hydrochloric acid.

Ammonia and Hydrochloric Acid.—The indiscriminate use of either of these reagents is likely to cause serious errors, the results being influenced to the extent of $\frac{1}{2}$ or of 1 per cent by any large excess of either.

Lime and Magnesia.—The former has a tendency to confuse the results when present in large quantity; the latter exercises no action whatever.

Weak Solutions.—To test the accuracy of this method when only small per cents of copper are present in an ore, a solution containing only 24 milligrams was titrated: 23.4 milligrams were indicated.

Before closing this article, we wish to say that we have been aided in the above work by our careful and efficient chemist, Mr. J. F. Sleeper, who has taken great pains with the details of the experiments.

(TO BE CONTINUED.)

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

GRANTED MARCH 3D.

- 313,079. Manufacturing Iron and Steel. Benjamin Bayliss, Jr., Beltzhoover, Pa.
 313,088. Tuyere. William L. Mann, Benwood, West Va.
 313,090. Wire-Barbing Machine. Eugene R. Matteson and William J. Hutchins, Joliet, Ill., Assignors to William H. Hunter and Rose E. Matteson, both of same place.
 313,101. Hydrocarbon-Furnace. Orland D. Orvis, Chicago, Ill.
 313,102. Lining for the Grooves of Pipe-Welding Furnaces. Edgar Peckham, Syracuse, New York.
 313,103. Wire-Barbing Machine. Marcellus H. Pitts and Israel R. Whiteman, Marseilles, Ill.
 313,114. Vertical Drill. Edwin Smedley, Dubuque, Iowa, Assignor to the National Iron and Brass-Works, same place.
 313,145. Ore-Concentrator. Karl F. Willkomm and Carl Schumann, Freiberg, Saxony, Germany.
 313,156. Power-Hoist. Charles W. Baldwin, Denver, Colo., Assignor to himself, Arthur A. Webb, same place, and Artemus J. Smith, Central City, Colo.
 313,164. Amalgamating-Pan. Julius A. Bidwell, Ivanpah, Cal.
 313,180. Means for Packing Piston and Valve-Rods. William S. Colwell, Pittsburg, Pa., Assignor to the Triple Thermo Motor Company, New York City.
 313,203. Machinery for Manufacturing Portland Cement. David Griffiths, Egypt, Pa.
 313,204. Coal-Drilling Machine. James M. Grooms, Avery, Iowa, Assignor of one half to William A. J. Thompson, same place.
 313,206. Rolling-Mill. James Hemphill, Pittsburg, Pa.
 313,208. Metal-Extracting Apparatus. Julius L. Hornig, Jersey City, New Jersey.
 313,217. Manufacture of Portland Cement. Robert W. Lesley, Philadelphia, Pa.
 313,304. Device for Opening and Closing Furnace-Doors. Herman H. Dreyer, Genoa, Ohio, Assignor of one half to John H. H. Uthoff, same place.
 313,312. Roller-Mill. James W. Galloway, Dayton, Ohio, Assignor to Stout, Mills & Temple, same place.
 313,332. Clay-Crusher. Hendrick Heesen, Tecumseh, Mich., Assignor to himself, Albert L. Brewer, Hudson W. Conklin, Charles J. Brewer, and Herbert Stout, all of same place.
 313,348. Regenerative-Furnace. Georg Leuffgen, Brunshausen, near Stade, Prussia, Germany.

- 313,369. Solution of Acid Phosphates. Carl V. Petraeus, Camden, New Jersey, Assignor to the United States Chemical Company, same place.
 313,376. Metal Roof. L. Lewis Sargent, Cincinnati, Ohio, Assignor of one half to Harlan P. Lloyd, same place.
 313,393. Connection for Pipe-Lines. George Westinghouse, Jr., Pittsburg, Pa.
 313,403. Furnace for Burning Liquid Hydrocarbons. Jules Buffet, Paris, France.
 313,414. Knife for Miners. George Freund, Durango, Colo.

GRANTED MARCH 10TH.

- 313,471. Reversible Coal-Chute. Abiather Chadwick, Kansas City, Mo.
 313,479. Construction of Coverings or Housings for the Steam-Cylinders of Pumping-Engines. Charles P. Deane, Springfield, Mass.
 313,480. Brick, Tile, Drain-Pipe, etc. Henry Dickson, Pittsburg, Pa.
 313,514. Apparatus for Removing Paraffine from Oil-Tanks. James W. Norton and Franklin H. Rouse, Kinzua, Pa., Assignors of one third to Jacob C. Fuller, same place.
 313,522. Hardening and Coloring Serpentine Rock. J. J. Pratt, Wakefield, Mass.
 313,537. Blast-Furnace. Daniel Sandstrom and John H. Anderson, Pullman, Ill.
 313,554. Ore-Crusher and Pulverizer. Henry R. Taylor, Oakland, Cal.
 313,572. Clay-Pulverizing Machine. Thomas Birch, William Birch, and James Birch, Crawfordsville, Ind.
 313,577. Coal-Drilling Machine. Alfred J. Cooper, Duryea, Pa.
 313,587. Stamp-Mill. William Grosch, Verona, New Jersey.
 313,615. Amalgating Zinc Plates or Bars for Voltaic Batteries. William S. Platt, Waterbury, Conn.
 313,700. Process of Coating Metal. William J. Wilder, Ansonia, Conn.
 313,701. Steel-Ladle Drying-Furnace. David H. Williams, Bellaire, Ohio.
 313,748. Apparatus for Treating Ores with Superheated Steam. Joseph H. Mathews, Canton, Ohio.
 313,754. Regenerative Furnace. Thomas T. Morrell, Johnstown, Pa.
 313,793. Compound Steam Pumping-Engine. Charles A. Wilson, Cincinnati, Ohio.
 313,805. Process of Manufacturing Perforated Metallic Goods. John J. Callow, Cleveland, Ohio.
 313,818. Rock and Ore-Crushing Machine. David R. Fraser, Chicago, Ill.
 313,823. Composition for Curing Paving Blocks or Bricks. Thomas A. Hugenin, Charleston, S. C.

GRANTED MARCH 17TH.

- 313,840. Hoisting and Top-Filling Apparatus for Blast-Furnaces. Fayette Brown, Cleveland, Ohio.
 313,880. Coal-Hoisting Apparatus. De Witt C. Niblick, Chicago, Ill.
 313,907. Apparatus for Pumping Oil-Wells. George Allen, Franklin, Pa.
 313,915. Method of Tubing and Packing Artesian and Oil-Wells. John Bole, Pittsburg, Pa.
 313,917. Flanging-Machine. Robert A. Carter, Pittsburg, Pa.
 313,918. Flanging-Machine. Robert A. Carter, Pittsburg, Pa.
 313,953. Pulverizer. Orrin S. Richmond, Adair, Mich.
 313,969. Metal-Bending Machine. Alwill Urbahn, Paterson, New Jersey, Assignor to Jacob May, Brooklyn, New York.
 314,004. Process of Purifying Metals. Charles Edwards, Paris, France.
 314,010. Mine Railroad. John C. Fowle, John P. Christopher, and Will P. Smith, Michigamme, Mich.
 314,031. Hoisting-Bucket. Loren G. Ladd, Pawtucket, Rhode Island, Assignor to Smith, Grant & Co., same place.
 314,059. Metal-Drilling Tool. Theodor Scheffler, Paterson, New Jersey.
 314,078. Pump. David P. Stewart, Buffalo, New York.
 314,082. Rolling-Mill for Rolling Leafed Wire for the Manufacture of Barbed Wire. Francis H. Treat, Joliet, Ill., Assignor of one half to Horace S. Smith, same place.
 314,083. Rolling Mill. Francis H. Treat, Joliet, Ill., Assignor of two thirds to Horace S. Smith and Charles Pettigrew, both of same place.
 314,085. Drilling and Tapping Apparatus. Jacob Van Norman, Easton, Pa.
 314,101. Automatic Dump-Bucket for Hoisting and Conveying-Machines. Alexander E. Brown, Cleveland, Ohio.
 314,113. Process of Preparing Iron Ores for Smelting. Michael R. Conley, Brooklyn, Assignor to William Bell, New York City.
 314,117. Double-Acting Submerged Pump. Charles H. Foster, Alameda, Cal.
 314,161. Direct-Acting Pumping-Engine. William H. Worthen, Brooklyn, New York, Assignor to Guild & Garrison, same place.
 314,173. Art of Making Metallic Suspension-Wheels by Casting. Abraham O. Frick, Waynesborough, Pa.
 314,213. Rock Drill. George F. Wynne, Minera, near Wrexham, County of Denbigh, Assignor to Thomas Rowland Jordan and Robert E. Commans, London, England.

REISSUE.

- 10,572. Tripod for Rock-Drills. George M. Githens, Brooklyn, New York.

GRANTED MARCH 24TH.

- 314,218. Air-Compressing Engine. Reginald P. Bolton, Broxbourne, County of Herts, England.
 314,221. Machine for Splitting Bars and Sheets of Iron or Steel. Cyrus M. Carnahan, Pittsburg, Pa.
 314,257. Sciler-Cleaner and Filter. James G. Miner, Cincinnati, Ohio, Assignor to John A. Robinson, Trustee, same place.
 314,261. Truss for Bridges. George H. Pegram, Wilmington, Del.
 314,262. Truss for Roofs and Bridges. George H. Pegram, Wilmington, Del.
 314,276. Hydraulic Engine. Nelson J. Tubbs, Philadelphia, Pa.
 314,297. Rolling-Mill Appliance. David H. Lentz, Indianapolis, Ind., Assignor of one third to John Thomas, same place.
 314,311. Machine for Folding Sheet-Metal. William J. Bayrer, Southington, Conn., Assignor to the Peck, Stow & Wilcox Company, same place.
 314,343. Rock-Drilling Machine. Henry F. Parsons, New York City, Assignor to the Parsons Hand Rock Drill Company, of New York.
 314,378. Method of Utilizing Waste Hoop Iron. William E. Harris, St. Louis, Mo.
 314,504. Process of Purifying Pig-Iron. James P. Witherow, Alleghany, Pa.
 314,505. Ingot Iron and Steel. James P. Witherow, Henry W. Oliver, Jr., John F. Wilcox, and George E. Tener, Pittsburg, Pa., said Wilcox and Tener Assignors to said Oliver and Witherow.
 314,506. Process of Making Ingot Iron and Steel. James P. Witherow, Henry W. Oliver, Jr., John F. Wilcox, and George E. Tener, Pittsburg, Pa., said Wilcox and Tener Assignors to said Oliver and Witherow.
 314,510. Apparatus for Removing Coke from Ovens. G. W. Bierer, Pittsburg, Pa.
 314,551. Converter. John F. Wilcox, Pittsburg, Pa.

GRANTED MARCH 31ST.

- 314,557. Smelting-Furnace. Charles E. Ashcroft, Lynn, Mass.
 314,573. Hot-Blast Stove. Frederick W. Gordon, Alleghany, Pa.
 314,578. Amalgamating Ores. Frederick Hollick, New York City, Assignor of one half to J. J. Greenough, Syracuse, New York.
 314,585. Method of Tamping Blast-Holes. John L. L. Knox, Alleghany, Assignor to the Knox Rock Blasting Company, Pittsburg, Pa.
 314,614. Machine for Applying Babbitt-Metal Linings to Bearing-Boxes. Noah Shaw, Eau Claire, Wis., Assignor to Addie M. Shaw, same place.
 314,615. Flanging-Machine. Henry W. Shepard, St. Louis, Mo., Assignor of one half to Albert E. Bowman, same place.
 314,656. Coal-Car. Dennis S. Dockstader, Meadville, Pa.
 314,689. Hydraulic Engine. Samuel N. Knight, Sutter Creek, Cal.
 314,696. Hoisting Machine. William H. Lotz, Chicago, Ill.
 314,705. Pump. Hans Mortensen, Leadville, Colo.
 314,711. Process of Freeing Quicksilver from Lead. A. Patchen, Westfield, New York.
 314,755. Rock-Drilling Machine. Lewis W. Tracy, Philadelphia, Pa.
 314,766. Air-Pump. Franz J. Weiss, Basle, Switzerland.
 314,777. Diamond-Drill Core Catch or Retainer. Albert Ball, Claremont, New Hampshire.
 314,793. Rock-Drilling Machine for Artesian Wells. J. Button, New York City.
 314,802. Fire-Brick and Packing for Furnaces and other Purposes. Jacob F. Clinchard, Chicago, Ill.
 314,824. Blasting Power. Adrian Gacon, Paris, France.
 314,861. Regenerator Furnace. William S. McKenna, Pittsburg, Pa.
 314,878. Centrifugal Pump. John Richards, San Francisco, Cal.
 314,897. Rock-Drill. William R. Willets and Harry Ball, Stamford, Conn.
 314,906. Transmitting Power to Cranes and other Hoisting Apparatus. Hugh Young, New York City.
 314,925. Steam and Air Injector for Furnaces. Frank E. Fahrig, Scranton, Pa.
 314,927. Molder's Flask. Edvard Friess, Louisville, Ky.

FURNACE, MILL, AND FACTORY.

Articles of incorporation for the Matchless Concentrator Company have been filed with the Secretary of State of the State of Colorado. The capital stock is \$600,000. The operations of the company will be carried on throughout the United States, and beyond its limits, with the principal office in Denver, Colorado. The incorporators are Horace A. W. Tabor, Peter McCourt, James S. Hudson, Lafayette Seaman, Thomas S. Hudson, and Edward W. Stephens.

Henry M. Sanders, doing business under the name of the Worcester Galvanized Iron Company, at Worcester, Mass., has failed, with liabilities of \$20,000, and no assets.

The Old Virginia Rail-Works, at Lynchburg, Va., have shut down on account of overproduction.

The Laughlin & Junction Steel Company has been formed for the purpose of manufacturing within the States of Ohio and West Virginia steel of all kinds, and for converting the same into various useful and merchantable products. The company's charter is to expire April 28th, 1935. The privilege is reserved of increasing the capital stock to \$500,000 in all. The incorporators are Samuel Laughlin, Henry K. List, James Maxwell, John J. Jones, Alexander Laughlin, M. L. Ott, David Gutman, Manuel Gutman, and Wilham L. Glessner, all of Wheeling, and W. Holloway, Bridgeport. The works will be at Mingo, Ohio.

At a meeting of the Boston Nail Association, May 5th, it was voted to unite with the Eastern and Philadelphia Nail Associations in stopping production for two weeks in May and two in June. The Boston & New England Association includes all the New England nail mills except Fall River.

The International Inventors' Exhibition at London, England, was opened formally by the Prince of Wales May 4th.

A fire broke out May 4th in the engine-room of the rail department of the Lackawanna Iron and Coal Company's steel mill at Scranton, Pa. The engine-house and rail mill were entirely destroyed, together with all the valuable machinery. The blooming mill was also badly damaged. The loss to buildings and machinery is about \$250,000.

At the Union Iron and Forge Works (Wilson, Walker & Co.) at Pittsburg, Pa., the amount of work is larger now than at any time since late last summer. The puddling and all the finishing departments are on single turn, but since January last the former has worked much less than half-time.

The owners of the Falcon Iron and Nail Company and the insurance agents can not agree on adjustment. The owners have appointed appraisers and sent proof of losses to the companies, and, if they are not settled, they will bring suit. The amount involved is \$40,000.

The Triumph ore concentrating-tables for the new Wolfe Tone mill, at Leadville, Colorado, were purchased from Montgomery & Co., of Denver. This firm has already placed twelve of these concentrators in the Leadville District. The machines are manufactured by the Joshua Hendy Machine-Works, of San Francisco, Cal.

The Cherry Ore Purifying Company, of Chicago, has in course of erection on the line of the Wabash Railroad at Chicago, a building 100 by 50 feet, for smelting and purifying ores by the Cherry process. The main building will be three stories high, and will be equipped with a double set of elevators for hoisting; a rock-crusher; a smelter of 10 tons capacity; a number of amalgamators; and a purifier having a daily capacity of 60 tons. Among other machinery there will be a 40 horse-power air-compressor and a 25 horse-power hoisting-engine; also, two large boilers and a large steam-heater, as superheated steam is used in the purifying process. The arsenic, sulphur, etc., are volatilized and expelled as the process goes on, until the ore is ready to go the amalgamator. These works will be used to fully test the practical utility of the Cherry process as to any and all ores, thus enabling the owners of mines to determine the results that can be relied upon before making the large outlay necessary to erect a plant. The company starts out with a cash capital of \$200,000. J. H. Bass, President; Homer C. Hartman, Treasurer; and A. Wallace, Secretary. Mr. Cummings Cherry, Sr., the inventor of the purifying process, will have general supervision of the works. The company expects to begin operations about July 1st.

Crozer furnace, of the Crozer Steel and Iron Company, at Roanoke, Va., having been relined and put in

first-rate condition, will go into blast again about the 20th of May.

The new nail factory and other works of the Ellis & Lessig Steel and Iron Company at Pottstown, Pa., began operations May 1st.

A firm in Hartford, Connecticut, has received an order from the Italian government for one hundred Gardner machine-guns, to be delivered within a year.

Randolph Brandt, manufacturer of the Selden Patent Packing, 38 Cortlandt street, New York, has received the following letter from George A. Groff, engineer, Chadwick's Mills Cotton Company, Chadwick's Mills, New York: My piston packing all blew out. I packed it over again with your sample "rubber core" (Selden patent packing) that you sent me, and it is in yet. That must be four or five weeks ago. I have tried almost every kind of packing, and this is the only packing I have found yet that answers my purpose. I have not put in any new, and have only tightened up twice in over three weeks.

The Salt Lake City Foundry and Machine Company's capital stock is \$60,000, fully paid up. The new organization magnanimously agrees to issue stock at par to all the creditors of the old concern. The former company failed, owing about \$10,000, when the secured creditors foreclosed on their mortgages, and five or six of the principal stockholders in the old concern, to protect their interests, bought in the property, and they now offer any of the old stockholders the privilege of purchasing stock in the new company at the same rate that it cost them.

The Lane & Bodley Company, of Cincinnati, Ohio, has a creditable display of its leading specialties at the Exhibition at New Orleans, among which is an automatic cut-off Corliss engine, and a center-crank engine, stationary circular saw-mill, gang-edgers, turned and polished iron shafting, mill gearing, etc. The company has done a considerable trade in mining machinery in the South during the past year.

The Germania Lead-Works, of Salt Lake City, Utah, shipped to Denver a car-load of lead pipe.

The blast-furnace and lands connected with the La Grange Iron-Works, owned by the late E. S. Rogers, will be offered at public sale at the court-house in Belair, Maryland, on June 2d, at eleven o'clock A.M. A full description of the property can be obtained by addressing Robert Archer, trustee, Belair, Maryland.

The real estate and plant of the Abbott Iron Company, of Baltimore, Maryland, will be offered at public sale on the 14th inst., on the premises.

The two blast-furnaces of the Mount Hickory Iron Company, at Sharpsville, Pa., will be offered for public sale May 30th.

The furnace and other property of the Cedar Point Iron Company, of Port Henry, New York, have been purchased by Messrs Witherbees, Sherman & Co., under the judicial sale. The new owners have leased the furnace to the Port Henry Iron and Steel Company, composed of several gentlemen, among whom are Mr. T. F. Witherbee and Mr. A. Dickey, of Perry & Co. The new company will operate the furnace and contemplates putting in the new Clapp-Griffiths steel process.

There was to have been, on the first of May, a final decree of sale entered on the intervening petition of the Vulcan Iron-Works mortgage trustees, Lackland and Edgar, in the St. Louis Ore and Steel receivership case; but the matter has been postponed until May 15th. It was stated that negotiations were in progress that might end in the withdrawal of the application for the decree.

LABOR AND WAGES.

The miners at the Pennsylvania colliery, Shamokin, Pa., struck May 6th. Those at the Sterling colliery refuse to work, claiming that the mine is unsafe. It is thought they have other grievances that they refuse to state. The miners at the Garfield colliery have resumed work, the differences in regard to wages having been satisfactorily adjusted.

Laborers on the new Reading & Pottsville branch railroad struck May 5th for an advance in wages. They were getting \$1.10 a day, and wanted \$1.35. The contractors offered them \$1.20, which was rejected.

The miners employed by the Isabella Coke-Works at Cokeville, Pa., are debating the advisability of a strike for an increase of wages.

Five hundred miners are on strike at Green Ridge,

Pa., against a reduction in wages. They have just resumed work after a suspension of fourteen weeks, and can not make more than \$1 a day.

The striking coal miners at Collinsville, Belleville, and other places in Madison and St. Clair counties, Ill., are reported to have given up the fight. At Streator and Braidwood, compromises have been made between the miners and mine-owners, and the men resumed work May 4th.

A strike inaugurated at the South Chicago Rolling-Mills, Chicago, Ill., May 1st, by some seventy furnace men, pitmen, and ladle-liners, has caused both the steel and rail mills to shut down. The strikers were receiving from \$1.25 to \$1.50 a day for twelve hours' work, while last fall their pay was \$1 a day for ten hours' work. They demanded an advance of twenty-five cents a day.

The United Nailers of America, the new organization composed exclusively of nail cutters, have sent out from their headquarters in Bellaire, Ohio, a scale of wages to go into effect June 1st. The scale is identical with that of the Amalgamated Association, except that steel and iron nails are placed on the same basis. The Amalgamated Association demands twenty per cent additional for steel nails, and the action of the nailers in reducing the scale is regarded as a declaration of war on the old association.

At Lemont, Ill., the quarrymen are quiet, after an encounter with the State militia at the beginning of this week.

The Amalgamated Association of Iron and Steel Workers presented in its scale propositions to the iron manufacturers' committee demanding the same wages as are paid under the present scale, with an advance of 20 per cent over iron for making steel rails, and \$1.25 per ton extra for one quarter inch round and squares worked from piles. The present rate for the latter is 50 cents a ton extra. An adjourned meeting will be held May 14th. The manufacturers have made an informal demand for a reduction, and will make it officially at the next meeting. The new scale will go into effect June 1st.

The miners in the Elk Garden coal regions of West Virginia struck May 5th for an advance of ten cents. The men demand fifty cents a ton for mining, and all other labor in proportion.

A meeting was held at Lonaconing, Md., May 6th, to settle the question of a strike in the George's Creek region.

In obedience to instructions from headquarters at Denver, Colo., all the members of the Knights of Labor in the employ of the Denver & Rio Grande Railroad at Gunnison and Grand Junction quit work on May 4th.

At Drifton, Pa., some of the miners have accepted the proposition made by Coxe Brothers & Company, and have been hired again.

The employes of Brown, Bonnell & Company's large iron-works at Youngstown, Ohio, have been notified by a circular that after May 31st they would have to accept a reduction in wages or quit work. The men intend to resist the proposed reduction.

There is a strike among the miners in the Tuscarawas and Conotton valley districts, Ohio; 6000 miners are said to be idle.

The miners at the Youghiogheny Scott Haven gas-coal mines in Westmoreland County, Pa., have resumed work, after being out since early in February. They held out for 3 cents a bushel for mining, but returned at the old rate of 2½ cents.

TRANSPORTATION NOTES.

The Denver, Aspen & Grand River Railroad Company has been incorporated in Colorado. The object of the company is to construct and operate railroad and telegraph lines in Colorado. The route is from Red Cliff down the valley of the Eagle River to its junction with the Grand River, thence down the valley of the Grand River to its junction with the Gunnison River, and thence westward to the eastward line of the Territory of Utah, with a branch up Roaring Fork River to the town of Aspen and the mines of Pitkin County. The capital stock of the company is \$5,000,000, divided into fifty thousand shares of \$100 each. The principal office of the company will be in Denver. The incorporators are D. H. Moffatt, of Denver; W. S. Cheeseman, of Denver; W. S. Scott, of Erie, Pennsylvania; Josiah C. Reiff and A. E. Engler, of New York City; J. B. Chaffee, of Denver; C

D. Woerishoffer and Addison Cammack, of New York City; and N. H. Painter, of Westchester.

A new railroad enterprise is in course of development in Tennessee. The Cumberland Railroad Company has registered its charter, with Colonel E. W. Cole, of Nashville, as president. The company owns and is securing large coal interests in Cumberland and adjoining counties, and is devising means to have them developed. The project is to build a road from the coal mines near Carthage to the nearest and most accessible point on the Cumberland River, so as to get the benefit of river transportation to points below, and also to extend the Tennessee & Pacific from Lebanon to that point. The company expects to establish large coking works, and, putting a fleet of barges from this point, to supply the demand below, as Pittsburg is supplied by barges down the Monongahela.

The Pennsylvania Railroad Company has begun the construction of a new road between Hollidaysburg and Cresson, Pa. The road will be thirty-seven miles long, and will cost \$1,000,000. It will open up some rich coal and lumber tracts.

A meeting of bondholders of the Union Canal Company was held at Philadelphia, May 7th, for the purpose of taking action in regard to a foreclosure of the property on May 19th. The Philadelphia & Reading Railroad Company is owner of two thirds of the bonds, and a letter from the road's counsel was read stating that it proposes to purchase the property at the sale unless a price is bid above what the railroad company believes to be a fair figure. If the property should not be acquired by the railroad company, the latter would assert its claim for about \$156,000, advanced to maintain the canal. In order to give all bondholders an opportunity to participate in the purchase of the canal, a committee of four was appointed to report at an adjourned meeting on May 18th.

In the suit of the Oaks Land Company against the Pennsylvania Railroad, for land taken for the new road through Germantown, the jury have rendered a verdict of \$96,400 for the land company. The case has been on trial for weeks.

COAL TRADE NOTES.

CALIFORNIA.

Mr. John M. Hughes has reopened the old Cumberland coal mines at Nortonville, Contra Costa County, having leased the same from Mr. Francis Avery. There are large quantities of coal in sight, the quality of which is excellent for domestic use as well as for steam purposes. The vein is over four feet thick.

MASSACHUSETTS.

Haddock & Steele (Metacomet Coal Company), Fall River, are reported to be financially embarrassed.

OHIO.

The Goshen coal mines near New Philadelphia have shut down.

Ralph T. Wick, as receiver of the Leadville Coal Company, sold to P. L. Kimberly and others the Leadville shaft and all the appurtenances. These new owners possess a large belt of coal land adjoining that of the Leadville, part of which is the Dan Moberman property. Already the mine is pumping out, and as soon as it is cleared of water, the new company will begin running. The shaft is a valuable one. The company that will operate the mine will be known as the Raccoon Mining Company, and the amount of the capital stock will be \$100,000. The incorporators are P. L. Kimberly, of Sharon; J. G. Butler, Jr., and Thomas Williams, of Youngstown; William T. Williams and J. Burlingham, of Mineral Ridge.

One hundred feet of trestle-work of the Willow Bank Coal Company, at Massillon, were destroyed by fire May 3d; also the office scales and chutes of the company and three railroad cars. Loss, \$6000.

PENNSYLVANIA.

Franklin B. Gowen sailed for Havre, France, May 6th, on the steamship St. Laurent, from New York. His trip is purely one of rest and recreation.

ANTHRACITE.

Morgan's coal-breaker at Pittston was destroyed by fire May 6th, causing a loss of \$20,000.

At the suit of the creditors in Philadelphia, the personal property of the Phoenix colliery at Pittston was sold, May 4th, by the sheriff. The proceeds will be applied to the wages due the employes in whose interest the writ of execution was issued.

The New York offices of the Philadelphia & Reading Coal and Iron Company have been removed to the

Central Building, No. 3 Beaver street, corner of Broadway.

The fire is still making headway in the mine at Preston colliery No. 3, at Girardville, where the explosion occurred May 1st. The mine will probably be flooded.

At the Cuyler colliery, Raven Run, the coroner's jury, May 4th, rendered a verdict that the deaths were caused by insufficient support where the cave-in occurred. The bodies of several of the victims have since been recovered. Suits for \$20,000 each in ten cases against Heaton & Co. have been filed by relatives of the victims at the recent disaster at Raven Run.

COKE.

The grading for the erection of two hundred additional ovens at Vanderbilt has been completed.

WEST VIRGINIA.

The Mount Carbon Coal Company, composed of English capitalists, is now opening the coal-beds on a property it has owned for a number of years on Armstrong Creek, near Mount Carbon station of the Chesapeake & Ohio Railroad, Fayette County. It is stated that a short railroad will be constructed from the mines to the Chesapeake & Ohio and to the Great Kanawha during this year.

At a recent meeting of the stockholders of the Atlantic & George's Creek Consolidated Coal Company in Baltimore, it was announced that the new property of the company, in Mineral County, West Virginia, on the line of the West Virginia Central Railroad, eleven miles from Piedmont, has been opened and thoroughly equipped for mining. The capacity of the mine is between 500 and 600 tons a day, and the quality of the coal is equal to that on the other property of the company on George's Creek.

GAS AND PETROLEUM NOTES.

Exports of refined, crude, and naphtha, from the following ports from January 1st to May 2d:

	1885.	1884.
	Gallons.	Gallons.
From Boston.....	2,119,256	1,964,444
Philadelphia.....	34,785,481	16,378,338
Baltimore.....	2,826,438	1,766,211
New York.....	113,444,206	112,881,338
Total exports ..	153,175,471	132,990,331

OHIO.

A large vein of gas at a depth of 480 feet was struck at Shelby May 6th.

The manufacturers at Youngstown have succeeded in getting a bill through the Legislature authorizing pipe-laying for natural gas. All rolling-mill and blast-furnace owners in this valley are interested. A large capital stock will at once be issued, and this vicinity drilled for gas, and, if not found, an eight-inch pipe line will be laid into Butler County, Pa., thirty miles away, and gas introduced into all the mills and furnaces at Youngstown.

PENNSYLVANIA.

The Farley well for oil, at Washington, has struck a pocket of gas at a depth of 500 feet. Drilling will begin for oil shortly in the Dunkard region.

S. McKee & Co., of Pittsburg, are making a test with natural gas in the melting-furnace. In case the experiment is successful, gas will be introduced as fuel in the furnace.

In the Supreme Court, at Philadelphia, May 4th, Justice Green filed an opinion in the case of *Emerson et al. vs. the Commonwealth*, better known as the natural gas case, refusing a re-argument. The Supreme Court some months since reversed the judgment of Common Pleas No. 1, of Alleghany County, and decided that the incorporation of companies for furnishing natural gas was not provided for by the act of 1874. After a most careful examination of the case, Judge Green holds that no latitude of judicial interpretation would warrant the conclusion that it was the intention of the Legislature to include the distribution of natural gas among the objects for which companies can be incorporated. The opinion closes as follows: "It will be infinitely preferable that the law-making power should now be directly invoked to confer the requisite authority for the full development of this great and new industry in clear, plain terms—and enlightened by the experience of the recent past. If this is done, we see no reason to doubt that the application will meet with a ready and hearty response from the representatives of the people, who possess all the power necessary to the occasion."

WEST VIRGINIA.

The boring at the gas-well at Morgantown will be continued until a depth of 2200 feet is reached, or 300 feet deeper than it is now. The flow of gas is large, and it is stated that the work of laying mains will soon begin.

GENERAL MINING NEWS.

ARIZONA.

Land Commissioner Sparks has sent a letter to Royall A. Johnson, Surveyor-General, at Tucson, relative to the alleged grant to one Peralta, claiming and embracing a region of country 49 by 150 miles in extent, amounting to 4,000,000 acres of land, inclusive of the city of Phoenix and the towns of Florence, Globe, and Silver King, the major portion of the counties of Maricopa, Pinal, and Graham, a large portion of the White Mountains, and the San Carlos Indian reservation; said alleged grant purporting to carry all minerals. The material reliance of the claimants is copies of the alleged decree of Ferdinand VI., of Spain, and various reports by inquisitions and tribunals of Spain in Mexico. The commissioner declares that he has caused thorough search to be made in the Spanish records at Madrid and in Mexico, without finding any corroboration of this claim; and that, as those records are peculiarly accurate and trustworthy, the absence of data supporting the Peralta claim is satisfactory evidence of its worthlessness.

MARICOPA COUNTY.

ITHACA CONSOLIDATED.—The successful milling of the ores of this group is announced. The mill is running twelve hours a day and the returns from the rock are even better than hoped for. The company is said to be beyond its legal and financial difficulties.

CALIFORNIA.

BONANZA KING.—According to the *San Francisco News Letter*, Colonel Ewing and A. K. P. Harmon have sold the Bonanza King to Messrs. Kelly & Warburton, of Arizona, who in turn have bonded the mine to G. de la Bouglise, a French mining engineer, for \$100,000. The intention is to dispose of the property in France.

MONO COUNTY—BODIE DISTRICT.

There is nothing of importance to report. The usual amount of work has been done at the mines, and the prospects remain the same.

PLACER COUNTY.

MINES DE GOLDEN RIVER.—We are informed by M. de la Bouglise that the Mines de Golden River, formerly known as the Weskie, of Succor Flat, promise to be quite successful, having made \$1700 profit in April. The mines, we are told, cost the French company \$200,000. Mr. Charles Hoffman is superintendent.

PLUMAS COUNTY—GREENVILLE DISTRICT.

ALTONA.—A second tunnel, which was begun for the purpose of tapping the chimney at greater depth, is now in 230 feet, and it will be pushed ahead until the chimney is reached.

GOLD STRIPE.—Work has begun in the Bidwell tunnel, the length of which is 900 feet. After making an uprise of 70 feet for an air-shaft, the tunnel will be driven ahead 275 feet, to tap the pay chimney, which was in the tunnel above. It is said that, if the stockholders would put up the proper amount of money for development, the mine could be made to yield as richly in the future as it has in the past.

HALSTEAD.—It has been reported that this extensive property has changed hands, and that the purchasers are San Francisco parties.

SAN BERNARDINO COUNTY.

ALVORD.—The work in the mine is progressing, and the ore is hauled to the mill, which is now running smoothly.

CALICO MINING AND REDUCTION COMPANY.—This company, which has just been incorporated, is erecting a five-stamp mill in the western portion of Daggett. It is said that the company will work a lower grade of ore than heretofore handled in this camp.

GOBLER.—Work has been resumed in this mine, adjoining the Silver Odessa, after a suspension of operations for about a year. A tunnel on the east side is driven in, to cross-cut the ledge. It is in 60 feet, and the indications for striking a body of ore are good.

COLORADO.

CLEAR CREEK COUNTY.

FARWELL.—R. B. Stanton has leased this old mill, which is located on the middle fork of South Clear

Creek. The inside portion will be thoroughly renovated, and work is now in progress. The Stanton concentrators will be put in.

LILY.—A petition is circulating at Idaho Springs by the property-holders on the line of the Sunshine flume, which is repairing in the interest of this company, praying the town council to see that the repairs be done in good faith, and that the parties be made to give security against all damage that may at any time hereafter be sustained by the property-holders on the line of the flume from leakage, or overflow, or damage to life or property because of an open flume traversing one of the main thoroughfares of the town.

OSBISTON SMELTER.—Ground was broken May 1st for this smelter, the site for which is located immediately west of the Whale and Hukill hoisting-works. The smelter will be used for the reduction of the ores of the Whale, south extension of the Freeland, and several other properties owned by the parties interested in the smelter.

DOLORES COUNTY.

PASADENA.—The smelter blew in April 25th, and the result of the first day's run was 150 bars of bullion. After the former gratifying run, which ceased January 30th, ore has been accumulated at the works, so that fully 1000 tons are in the bins. Arrangements are making for increased capacity.

RICO REDUCTION COMPANY.—The lixiviation-works will resume operations soon.

GILPIN COUNTY.

GUNNELL.—The cross-cut running from the 600-foot level north, to tap the main Gunnell vein and the pocket worked by Lohman & Co., has reached the vein, and work will begin at once. Sinking the Grand Army shaft, west of the pump-shaft, has begun.

LAKE COUNTY.

We condense the following from the Leadville Herald:

The Leadville smelters have all sent orders to the Colorado Coal and Iron Company to suspend the further shipments of coke to Leadville. The amount of coke now at Malta awaiting delivery is sufficient to keep the smelters going for about two weeks more. Most of them expect by that time to have their ore supply pretty well exhausted. If nothing is then done toward a protection of the smelting industry, the smelters will all close down, and remain out of blast until the situation changes sufficiently to allow them to make a profit on the ores they purchase and reduce.

It is very generally believed that the Denver & Rio Grande Railroad will reduce the freight on coke and bullion, and that other advantages will be extended to the smelters that will warrant them in continuing business.

Last year, although the season was rather unfavorable, the placer mines of Lake County produced over \$65,000 worth of gold. At present, all indications promise a very prosperous season for 1885. This class of mining has increased considerably in the last two years, and is annually becoming a more important feature of the mining industry of this district. The productive capacities of many of the placer properties have of late been largely augmented through the building of extensive flumes and ditches, opening up much rich ground hitherto not available.

The season this year is opening up early, and will be at least a month in advance of last year.

The properties that will be more actively worked are those of the Twin Lake Hydraulic Mining Company, situated in the southwest corner of the county, the old placers of California Gulch, and the placers in Iowa, Colorado, and Frying Pan gulches.

ADAMS.—The product for April is estimated at 1200 tons. The exploration-drift, driven to the northward from the Brooklyn shaft, has opened up a four-foot body of ore, of high grade in silver. It is highly impregnated with chloride of silver. The mixture of this ore with the other mineral of the mine has brought the product of the Adams property up to fifty dollars a ton above smelting charges. The drift advancing eastward from the Clontarf shaft has not intersected the vein in its eastern dip. It has so far attained a length of about seventy feet, and ore is looked for daily.

AMIE.—The old workings are yielding handsomely, having lately disclosed some small streaks of high-grade ore.

CLIMAX.—This property, which is operated by lessees, last month produced about 800 tons of market-

able iron ore, and forty tons of good silver and lead ore.

COLONEL SELLERS.—The trouble from surface water has ceased, and the mine is again producing the usual amount of ore.

DENVER CITY.—During April, about 1000 tons of ore and iron were produced, averaging between twelve and fifteen dollars a ton above smelting charges.

DUNKIN.—Explorers in the northern part of the mine have struck a rich lead of horn-silver, assaying high.

H. A. W. TABOR VS. IROQUOIS MINING COMPANY AND TRIMBLE & HUNTER.—The trial of this case is set for May 25th. This case arises out of a complicated state of circumstances. The plaintiff claims that, in 1881, in the case of the Meyer Mining Company vs. the Glass-Pendery Mining Company, an arbitration was had regarding ore extracted from disputed ground. The arbitrators found in favor of the Meyer Mining Company for about \$13,000. The court confirmed the award, and the Glass-Pendery moved to set it aside and for a new trial, and the latter appealed the case to the Supreme Court; Messrs. H. A. W. Tabor, Samuel McMillen, S. H. Foss, and Tim Foley going on the appeal bond as sureties. The Supreme Court affirmed the judgment. Upon the affirmation of the judgment, an execution was issued, and the property of the Glass-Pendery was sold to the Meyer Mining Company for about \$200, and thereupon the Meyer Mining Company had recourse to the bond, whereupon the plaintiff paid some \$14,000 to said company. The plaintiff now claims that said judgment was a lien on the property, and seeks to recover from the defendants the said sum paid to the Meyer Company.

LA PLATA.—Winzes lately sunk in some of the southeastern workings disclose a large body of ore. At present, this ore can not be economically extracted, but a drift is advancing from the lower level, which in the course of from sixty to ninety days will open up this mineral body and greatly increase the product of the mine. A decision has been rendered by Judge Goddard, in the District Court, in the case of the La Plata against the Crown Point mine. The Crown Point was restrained from working the territory of the Geneisen claim, owned by the La Plata Company, and held by it under a mineral entry as well as a deed from the owners of the Wells & Moyer placer claim. The case grew out of the discovery of a small wedge-shaped fraction of ground, twelve feet wide at one end, and running to a point, and 120 feet long, which was not included in any of the rock hill locations. The decisions practically affected only this small piece of contested territory, and had no bearing on the much disputed placer question.

LEE BASIN.—The repairing of machinery and the erection of buildings will be completed by June 1st, when active operations will begin.

LITTLE SILVER AND AMERICAN.—Mr. Edward Wolcott, of Denver, is in New York trying to arrange for the resumption of work at these mines. Mr. Wolcott, on behalf of himself and other Colorado owners in these mines, will propose to contribute a *pro rata* share of the probable expenditures necessary to open these mines properly. Should this proposition not meet with favor, and be rejected by the Eastern owners, a proposition will be submitted looking toward the leasing of the properties for five years.

NEW PITTSBURG.—Ore recently extracted from the Blonger shaft returned forty-seven per cent in lead and about ten ounces in silver.

ROBERT E. LEE.—Some of the richest ore obtained from the mine during the past fortnight was extracted along the Hibernia line, and was discovered and some of it broken by the lessees of the Hibernia, but afterward returned to the Lee. During the existing bad roads, the mining of ore has not been forced, and considerable attention has been paid to exploration-work, resulting in the opening up of much new ground, and extensive ore resources.

WELDON.—The owners are receiving bids for a lease on the property. They will demand from the lessees that they sink the Weldon shaft to greater depth.

PUEBLO COUNTY.

COLORADO SMELTING-WORKS.—This establishment, under the management of Mr. Eilers, has four furnaces in blast the greater part of the time. Most of the lead supply is drawn from the Madonna mine, in Chaffee County, owned by the company.

NEW ENGLAND SMELTING COMPANY.—This company is in the market prepared to buy ore. The works

are provided with two furnaces, only one of which will start up at present.

PUEBLO SMELTER.—Eight out of fourteen shaft-furnaces are now in blast, reducing about 400 tons of ore a day. The refining department connected with the works is also in operation.

PARK COUNTY.

EXCELSIOR.—Arrangements have been made to erect a \$36,000 plant on the property for treating the low-grade ore by the Meech process, which, according to tests already made, has proved satisfactory in handling it. The machinery is now on the way from Cleveland, and just as soon as the weather will permit, it will be placed in position on the company's property.

PITKIN COUNTY.

Mr. E. C. Atkins, proprietor of the Swansea process smelter at Ouray, Colorado, is at Aspen looking over the mines and prospects of the camp with the view of putting up reduction-works there during the next summer.

John Hurlbert, of Aspen, began suit April 30th in the United States Court at Denver, against J. B. Wheeler, of New York City, for an undivided one-tenth interest in the Emma, the Vallejo, the Aspen, the Mammoth, the General Shields, the Robert Emmet, the Golconda, the Ruby, the Evening Star, the Morning Star, the Way Up, and the Broadway mines, and one tenth of the proceeds of the same, claiming that he made an oral agreement with the defendant in the city of New York some years since to come to Colorado and take charge of his mining property, and, in consideration of plaintiff's large experience in mining matters, he was to receive for his services a deed for an undivided tenth interest in all mining property purchased by defendant upon plaintiff's recommendation. Defendant has persistently refused to make deeds as agreed, hence the suit. This has all the appearance of one of the usual dormant "shady" claims that are sprung on every successful mine. To the outsider it appears to be one of the flimsiest and most transparent kind usually nursed by one of the fraternity called "shysters" in New York.

PRINCE ALICE.—Leadville parties have been seeking to obtain a lease and bond upon this tunnel. Negotiations are pending, although the owners refuse to grant a bond.

SUMMIT COUNTY.

Mr. Wetherell has contracted for a new pulverizing and amalgamating mill, to be erected at the Lincoln avenue bridge, Breckenridge.

KINGBOLT MILL.—The superstructure of the mill is complete, and the machinery is getting into position.

WARRIOR'S MARK.—This mine has gone into the hands of a receiver, but the indications are, that it is only temporary. During this time, some work in taking out ore will be done. It is said that this is known to be one of the best mines in the county, and only requires good management to be one of the best paying ones.

CUBA.

NEW YORK & CUBA IRON COMPANY.—Messrs. W. W. Van Voorhis, Edwin Mickle, Jerome L. Boyer, L. M. Keifer, and Charles Mayer have incorporated this company with a capital stock of \$800,000, with the object of mining iron ore and other minerals on the island of Cuba.

DAKOTA.

LAWRENCE COUNTY.

FATHER DE SMET.—Official reports state that the indications are very good for getting a much better class of ore in the Eureka cut, and the chances are certainly favorable for soon getting better results in other places. East cross-cut, fourth level, is out about 60 feet. The report for the week ended May 1st shows ore extracted from first, second, and third levels, 6825 tons. Ore milled, 6825 tons. The east cross-cut, fourth level, advanced 40 feet since April 7th, at \$8 a foot. Total length, 84 feet.

PENNINGTON COUNTY.

ESTRELLA DEL NORTE.—The superintendent states that all litigation has been settled. Instructions have been received to prosecute the work vigorously during the present year. The prospect is now fair that the company will follow out the projects of extensive work in the placers of Rapid Creek conceived a number of years ago.

EGYPT.

The discovery of gold and copper deposits at Tam-buk is reported. The gold, it is said, is not in suffi-

cient quantities to pay for working, but the deposits of copper in the hills are rich and valuable.

IDAHO.

The new mines near Albion, in Cassia County, are said to be coming to the front. The district is located four miles northeast of the little town of Albion, and about 200 locations have thus far been made. The first claim located, known as the Albion lode, and owned by Lucas & Wells, was struck late in the fall of 1884. No development was made during the fall and winter, but recent developments show it to be a well-defined lead, 14 feet wide, and traceable on the surface for about one mile. Assays from this claim run high in silver to the ton, with a small percentage of lead and a trace of gold, the average being about 100 ounces and 14 per cent lead. The climate and altitude of this camp are such as will enable prospectors and miners to continue their operations the year through.

IDAHOAN.—Complete hoisting-works have been placed at the mine, and active operations will be carried on.

MINNIE MOORE.—A strike has been made on the 400-foot level.

ILLINOIS.

CHICAGO REFINING AND SMELTING COMPANY.—The company is at present receiving base bullion only from the American Mining and Smelting Company, of Leadville, and the Royal Gorge Smelter, of Cañon City, Colorado. During the winter, a large portion of the bullion product of the La Plata smelter, of Leadville, was also sent to these works.

MEXICO.

JESUS MARIA.—This property is reported to be doing well. During March, a product of \$25,000 was realized. Better results were expected in April. Only forty feet more are required to open the vein through the new tunnel. As soon as this new opening is effected, the mine will be drained of water, and the property be placed in a condition for a large monthly production.

SAN IGNACIO.—Mr. William Howard, an American mining engineer, is at this mine, at Real del Monte, setting up drilling machinery. The work in the mine has not advanced as yet sufficiently to determine the probable value of the output, but the amount of ore taken out is considerable.

SANTA TERESA.—Work is actively pushed.

SANTO NINO.—This mine has for some time been worked to a certain depth, which the managing board proposes to increase, following the vein, which improves daily. It is thought that at the greater depth ore of a value of \$40 per ton will be encountered.

MICHIGAN.

Through the efforts of Senator Hubbell, the tax on gold and silver produced in this State will probably be removed for at least a period of five years. This was a four per cent tax, and was made in 1847. A bill introduced by Mr. Hubbell to suspend the law for five years has passed the Senate, and will meet with no opposition.

IRON MINES.

BEAUFORT.—The mine is unwatering preparatory to starting up again.

INDIANA.—Operations are to be resumed.

MILWAUKEE.—This mine, which has not been operated for some time on account of excessive royalty, will be again worked, a compromise having been effected. It is reported that the Carmichael Brothers have taken a contract to mine 30,000 tons of ore from this mine at \$1 a ton. This price at a first glance seems very low, especially if they perform all the work of getting it out; but the machinery is all on the ground, and a large amount of dead-work had been done previously to shutting it down, so that a considerable amount of the ore may now be exposed, or there may be other circumstances that would put a different face on the case. If this ore can be mined at \$1 a ton, it could be put in Cleveland at about \$3.25, and as it has 61 per cent metallic iron and is low in phosphorus, it ought to bring from \$4 to \$4.50 a ton.

PENN IRON COMPANY.—Five mines are operated by the company, the Quinnesec, East Vulcan, West Vulcan, Norway, and Cyclops. The company has not fully decided on its policy for the season. At the Quinnesec, it has 6500 tons of ore in stock; at the Cyclops, 5000; at the Norway, 20,000; at the East Vulcan, 15,000; and at the West Vulcan, 40,000 tons. The company is doing considerable exploratory and dead-work.

MONTANA.

BEAVERHEAD COUNTY.

SHELBY.—This company has been organized from the Birch Creek Prospecting Company with the follow-

ing officers: President, Guy C. Barton, Omaha; Vice-President, Henry Knippenberg, Glendale; Secretary and Treasurer, B. F. White, Dillon; Superintendent, O. Willis, Birch Creek. The company owns the extensive iron mines on Birch Creek. The ore is said to contain from \$3 to \$13 a ton in precious metals. Upward of 50 tons of this ore have lately been shipped to the Omaha smelting and refining-works.

DEER LODGE COUNTY.

GRANITE MOUNTAIN.—The affairs of this company are stated by official reports to be in a very prosperous condition. Since starting the mills last December, bullion has been produced to date, valued at \$389,749.26.

LEWIS & CLARKE COUNTY.

A. M. Esler has completed arrangements for the erection of sampling and concentrating-works in Helena, for the purpose of buying ores of every description, in small or large quantities, and will be prepared for business about the first of June.

COLORADO.—The smelter is running to its fullest capacity. About sixty tons of ore are reduced each day, and shipments are made regularly.

GAGNON.—No work is done below the 400-foot level. About twenty tons of ore, the bulk of which is concentrating, are taken out each day.

LEXINGTON.—The air-compressor that was recently put in place has started up, and is running satisfactorily. Three Ingersoll drills have been put in operation. The company is taking out about the usual quantity of ore, and shipments are regularly made.

LITTLE DARLING.—The ore taken from the lower level is of a grade ten per cent higher than that of the upper portions. The ore-bodies are said to be improving. The product is treated at the Lexington mill.

MONTANA PARROT.—From the bottom of the new three-compartment shaft, which is down to the 300-foot level, drifts have been extended east and west, from which are taken sixty tons of ore a day. This is treated at the Montana smelter. Little stoping is now done, as the lead remains intact, except where it is penetrated by the drifts running east and west.

MOULTON.—The ore taken out of the mine averages about \$60 a ton in gold and silver. The sinking of the main shaft to the 700-foot level will be resumed in a short time.

NETIE.—A small amount of ore of a manganese character is taken out from the surface workings.

PARROT.—Operations at the Parrot mine have been resumed. The smelter has probably also started by this time, as, at the time that work was suspended on the mine, there was a large amount of ore on hand, upon which work was to begin at once.

SWANSEA.—The ore from the north vein averages from 15 to 20 per cent copper and about 50 ounces in silver. About 250 tons of this ore are now on the dump, a small portion of which has been sent to the Colorado smelter for trial. It is intended to continue sinking the shaft down to the 300-foot level, and the developing and prospecting of the mine will be advanced as fast as possible. At present, no ore is taken out, the further prospecting of the mine being mainly attended to.

WEST END POSER.—Although the shaft is down only 50 feet, good pay ore is taken out, which is shipped to the Moulton mill for reduction. An abundance of \$50 ore is in sight, which is taken out and milled as fast as possible.

SILVER BOW COUNTY.

Mr. James Douglas, Jr., has arrived at Butte.

NEVADA.

EUREKA COUNTY.

At Cottonwood Cañon, the nickel mines are looking splendid. There are two mines worked, which are producing good ore. One is owned by the Nevada Nickel Company and the other by George Lovelock.

A large number of the smaller mines of the Eureka District are making regular shipments to the Eureka and Richmond Company's furnaces.

EUREKA.—Official reports by Superintendent F. Robbins state, under date of April 25th, that during the past week they have hoisted 53 cart-loads of ore from tributaries. Every thing at the mine remains the same as last reported. They are taking out ore from a number of places in the mine, but have not found any thing worthy of note in any other prospect, though many of them are looking very favorable for ore. Work at the furnace is progressing.

RICHMOND CONSOLIDATED.—It is rumored that a number of men will soon be put to work in the mine

on day's wages, and that the furnaces were to be fired up the beginning of May.

LINCOLN COUNTY.

The Smelting Company discontinued leaching at Bullionville the last of April, and will not start again until it has the large Stetefeldt furnace in running order, which will be some time in July.

STOREY COUNTY—COMSTOCK LODGE.

BALTIMORE CONSOLIDATED.—Steam was got up at the hoisting-works on American Flat, April 25th, for the first time in several years, and the tributaries at work on the 400 level are engaged in hoisting to the surface the waste and ore that has accumulated in the drifts the past three months. The tributaries have determined to build a furnace at the works for the purpose of roasting the ore. There is a ten-stamp steam-power quartz mill on the grounds, at which the crushing will be done.

HALE & NORCROSS.—Reports of local papers, dated April 30th, state that work has been suspended in the face of the south drift along the vein from west cross-cut No. 4 on the 3000 level, as the face of the drift showed a breast of ore 11 feet in width. They are now driving north on the vein from west cross-cut No. 2, at a point opposite the south drift, and the face of this north drift is also said to be in ore.

NEW MEXICO.

SAN PEDRO & CANON DEL AGUA.—The reorganization committee of this company has issued a circular stating that the reorganization is complete. Bondholders can exchange bonds upon payment of \$35 per bond for preferred stock of the new company of par value of \$550, and a bond of the new company for the payment of \$10 and interest. Stock of the new company to the value of \$10 and trust certificates issued against the common stock of the new company, par value \$5, will be given upon the surrender of each \$5000 in par value of the stock of the old company and payment of assessment of 2½ cents a share.

SIERRA COUNTY.

It is stated that Mr. Grant, of Denver, will build a smelter at Hillsboro' the coming summer.

NORTH CAROLINA.

CLEVELAND COUNTY.

Mr. Arthur Winslow, of Raleigh, has sent us the following: My attention has been called to a note on the King's Mountain tin mine in Cleveland County of this State, contained on page 268 in the General Mining News column of your issue of April 18th. As a correction to the impression that this note might convey, I wish to state that the tract of land bought from A. F. Weir is a mile or more from the town of King's Mountain, where most of the tin ore has been found, and where nearly all of the exploration has been done. It is an isolated tract, which lies about in the continuation of the tin deposits of King's Mountain proper. Some cassiterite has been found scattered over the surface there, but it has not been thoroughly prospected, and it constitutes a subordinate part of the property of the tin company.

UTAH.

BOX ELDER COUNTY—NEWFOUNDLAND DISTRICT.

In this new district, which lies forty miles west of Terrace, there are some good locations already made. Assays show the ore to be of a high grade, running from 90 to 300 ounces in silver and from 30 to 40 per cent lead.

WASHINGTON COUNTY—SILVER REEF DISTRICT.

CHRISTY.—The company is working about eighty men. The ore from the California and Maggie mines alone keeps the mills in constant operation. A large body of high-grade ore has been opened up on the 300 level, which appears to improve in quantity and quality every day. There is a large body of first-class ore exposed in the stopes of the Tecumseh and Stormy King, but there will be no ore taken from these mines before the proper air connections are made, which are about completed.

STORMONT.—The mines are producing and the mill is constantly running ten pans on the ore extracted.

WASHINGTON.

An important mining discovery is reported from Cheney, which consists of a deposit of carbonate of lead, rich in silver, within three miles of Cheney.

are all busy, and expect to gather up enough business to keep them crowded through the summer. There is some talk of a change in prices, which it is said may be made within a month.

Cast Pipe.—The cast-pipe works are all busy, and within a few days several good-sized orders have been placed.

Plate and Tank-Iron.—There is nothing new. The mills are working to about the same output as during the past month, but prices are very low, and there is not much to say as to the immediate future.

Steel Rails.—Considering the season, a large amount of work has been placed during the past week. Some big orders have been quietly put in. There are negotiations on this week for three or four large blocks, which will be placed in Pennsylvania markets, but at prices which are only guessed at. Small orders are quite plentiful at about \$27 and \$27.50.

Old Rails.—Holders are asking \$18@18.20, but buyers will not pay that price.

Louisville. May 5.
[Special Correspondence.]

The general market for pig-iron remains quiet, with moderate sales to consumers for immediate and short deliveries. The grades for which there is a regular demand are held very firm, and any large inquiry now on the part of buyers would be very apt to be followed by an advance in price. As a general thing, May is apt to be the dullest month in the year. We quote for cash in round lots as below:

PIG-IRON.			
Southern Coke, No. 1, Foundry	.....	\$16.50@	\$17.00
" " No. 2	.....	15.50@	16.00
Hanging Rock Coke, No. 1, Foundry	.....	16.00@	16.50
" " Charcoal, No. 1, Foundry	.....	21.00@	21.50
Southern Charcoal, No. 1, Foundry	.....	18.00@	19.00
Silver Gray, different grades	.....	14.00@	15.50
Southern Coke, No. 1 Mill, Neutral	.....	13.75@	14.50
" " No. 2 " " "	.....	13.25@	13.50
" " No. 1 " " Cold-Short	.....	13.25@	13.75
" " Charcoal, No. 1 Mill	.....	16.00@	17.50
White and Mottled, different grades	.....	12.00@	13.00
Southern Car-Wheel, Standard Brands	.....	25.00@	26.00
" " Other	.....	20.00@	22.00
Hanging Rock, Cold-Blast	.....	24.00@	25.00
" " Warm-Blast	.....	20.00@	21.00

Pittsburg. May 8.

The following telegram has been received at the Metal Exchange:

Dull and unsatisfactory are the times. That just describes the condition of the pig-iron market at present; \$15@15.50, four months, may be fairly given as the price of Gray Forge lake ores, with an occasional sale at lower figures. Native ore coke forge has been selling at \$14.50, with more offered at the same price.

The sales reported this week are as follows:

500 tons Gray Forge Lake ore	.....	\$15.50	4 mos.
100 " Bessemer Native	.....	18.00	"
200 " Gray Forge Native ore	.....	17.25	cash.
100 " " " "	.....	14.50	4 mos.
150 " Cold Blast charcoal	.....	15.50	"
50 " " " "	.....	22.50	1/2 cash.
100 " No. 1 Wrought Scrap	.....	27.00	4 mos.
100 " No. 2 " " "	.....	17.00	"
100 " " " "	.....	15.00	"

COAL TRADE REVIEW.

NEW YORK, Friday Evening, May 8.

Anthracite.

This market is quiet, and though the coal produced under the quota moves off without much difficulty, yet the trade is dull, and in the East, at least, is reported as unpromising. It is conceded that anthracite is giving way to bituminous in the Eastern market, and the total consumption of coal will probably be less than it was last year, unless, indeed, the long hoped for revival in business should come soon.

Prices are steadier and about as we quoted last week. Wilkes-Barre, Scranton, Lackawanna, and Schuylkill standard coals f. o. b. at New York shipping ports:

Broken and Egg	.....	\$3.10@	\$3.40
Stove	.....	3.65@	3.90
Chestnut	.....	3.30@	3.50
Pea	.....	2.00@	2.35
Buckwheat	.....	1.60@	1.90

Stocks are generally light, and in some sizes prices are quite well maintained. Special and hard coals bring somewhat higher prices, though the old-time difference between the prices of hard and free-burning coals has almost disappeared, and all the standard coals can be obtained in quantity at the above prices.

The accuracy of our quotations is shown by the promptness with which our contemporaries and the trade hasten to correct a single slip that occurred in our report last week of the sale of Reading coal to the Brooklyn Elevated Railroad at \$3 to \$3.05 alongside. The price should have been "about \$3.30 along-

side." The coal is to be the very best Reading hard white ash. Bids were put in for other coals at about the figures we mentioned, and it was, naturally enough, supposed the contract price was not higher.

Bids put in to supply the Brooklyn Water Department, were opened this week. The advertisement called for 20,000 tons of grate, 2650 tons of egg on board cars at Hunter's Point, Long Island, and also 350 tons of egg, delivered at Mount Prospect engine-house. For the large lot, the bids were as follows: J. F. Schmadeka, \$3.67, Reading coal; F. A. Potts, \$3.85 for Plymouth red ash, and \$3.60 for Plymouth white ash; R. B. Leech, \$3.67, Scranton coal; H. A. Aechtenacht, \$3.54, Reading coal; R. H. Gibson, \$3.80, Scranton coal; Thompson & Co., \$3.60, Pittston coal; Joseph K. Wells, \$2.54, Lehigh coal. The awards of the contracts were not announced. The lowest and, it is supposed, successful bidder proposing to furnish Reading coal was Mr. Aechtenacht, whose bid was \$3.54. It was estimated that the cost of placing coal on the cars at Hunter's Point from the barge would be about seventeen cents per ton, and the expense of loading at Elizabethport and towing to Hunter's Point about the same, say total 34c.; as the contract called for 2000 tons per month, and the deliveries would therefore be regular; regular charges would be about 60 cents. This would leave \$3.30 as the cost of the coal to Mr. Aechtenacht, which was in the neighborhood of the figure received by the Reading on the Brooklyn Elevated contract.

The weakness in prices that we have noted for a few weeks past is not quite so noticeable, possibly because there is less important business doing, and the small orders going do not draw out a very active competition.

From Philadelphia, our well-informed "special" reports that circular prices are better maintained than ever before in that market, and that the coals move off as rapidly as they arrive.

This market might well take a lesson from Philadelphia in this matter of firmness in prices, though they are not as wild this week as a week ago.

The Philadelphia Press says: "It is known that some of the new managers of Reading are opposed to the restrictions of the combination, and firmly believe that they hamper rather than help the company."

The average price received by the Delaware, Lackawanna & Western Company for all its tide-water coal in April is estimated to have been about \$3.37 1/4 per ton, or a little less than in March. The price declined quite rapidly toward the end of April. The price for this month of May will probably be lower.

This company evidently believes in making hay while the sun shines. While prices were up, it greatly exceeded its quota, and when they are down, it reduces its overproduction. This, it is said, has greatly offended the Delaware & Hudson Company, which alone kept to the quota when the demand allowed of an overproduction. A company that has seen so much of coal combinations could scarcely be much surprised at this slight disregard of the spirit of the agreement. Every one else is greatly astonished at the degree of good faith shown by even the worst sinner in keeping this combination agreement.

By some it is thought that trouble is breeding by certain companies trying to secure business in fields that naturally belong to other companies. The Lehigh Coal and Navigation Company is said to be seeking all-rail markets in New York State and the East; Reading is said to be canvassing the Hudson River Valley; while the Delaware & Hudson is shipping to Philadelphia by the Pennsylvania Railroad via Harrisburg.

Bituminous.

The large contracts reported in our last at prices below standard rates effectually disposed of the pool as a regulator of prices. The name is, however, still used in negotiating with "tender-feet," who come in from the country, or who read only the colorless "may be it is and may be it isn't" reports that circulate as information for the trade.

There is little business doing this week, and, in the absence of temptation, some of the shippers who have recently undersold will quote "pool" prices for small lots, but all large contracts are made at a concession. The insinuation is, that the heavy contracts for Clearfield and Cumberland coals, noted by us as having been made at "cut rates," will be filled by "cheap" coals from the Vanderbilt and Lehigh Valley lines; but this

is only a very transparent ruse to blind those to whom "pool prices" are talked. The facts probably are, that the railroads, which are carrying grain from Chicago to New York, 1000 or 1100 miles, at 12 and 15 cents per 100 pounds (\$2.40@\$3 per ton), are willing to make concessions on coal to any point that will hold the business.

We would quote prices for Cumberland, Clearfield, and Virginia coals f. o. b. New York, at \$2.75@\$3.10, and large orders can shade these figures.

It is said Norfolk & Western coal has been offered in Troy at \$3.15. We refer to our Philadelphia and Buffalo reports for much interesting information.

Philadelphia. May 7.

[From our Special Correspondent.]

The local trade is excessively dull. The dealers stocked themselves liberally during April, and the consumers buying but very little, the yards remain filled up. It is generally the condition of that branch of the trade at this season of the year, but the reluctance to lay in a supply in advance is more pronounced. The East is also slow in ordering coal shipped, although orders are coming daily, and there is a better feeling. Vessels are scarce, but freights remain low, being but slightly firmer than in the latter part of April; \$1.05@\$1.10 is paid to Boston in some instances where vessels could readily be obtained at \$1 a short time ago. Southern freights are much depressed. Broken and egg bring an advance of 10 cents over selling prices in April, and stove and special coals continue firm at circular prices. Notwithstanding the dullness acknowledged by all, there is no accumulation of coal, and what is produced seems to find an outlet as quickly as it reaches shipping points. With the restriction carried out strictly, as it is now, there is no excess. Full-time does not begin before August, and an active fall is expected. The stocks in consumers' cellars are less than at this time last year.

Captains continue their exertions to have a minimum freight rate established high enough to cover expenses; and with that view, a meeting of vessel-owners is to take place on the 12th inst. in Boston. There is to be no attempt to regulate freights, but merely to establish a rate that is reasonable, and below which no one will attempt to run his vessel. It is meeting with such encouragement that unanimity of action is expected. The rate mentioned is \$1.25 from here and \$1 from New York. There seems to be no opposition to the plan among shippers or dealers. No one sees this large interest driven to the wall without hoping that something may be done to stop the downward course. Vessels can not indefinitely be run at an absolute loss.

THE PHILADELPHIA & READING COAL AND IRON COMPANY.
Circular No. 2. 1885.

PORT RICHMOND.

	Broken.	Egg.	Stove.	Chestnut.	Pea.
Hard white-ash coal	3.25	3.25	3.85	3.40	2.30
Free-burning white-ash coal	3.15	3.15	3.85	3.40	2.20
North Franklin white ash coal	3.85	3.85	3.40	2.20	
Schuylkill red-ash coal	3.50	4.40	3.50	2.20	
Shamokin white-ash coal	3.85	4.25	3.40	2.20	
Shamokin red-ash coal	3.90	4.65	3.50	2.20	
Lorberrry coal	3.90	4.65	3.50	2.20	
Lykens Valley coal	4.90	5.15	5.40	5.15	

Hard white-ash—Lump, \$4; Steamboat, \$4.

ELIZABETHPORT, N. J.

	Broken.	Egg.	Stove.	Chestnut.	Pea.
Hard white-ash coal	3.50	3.50	4.10	3.65	2.55
Free-burning white-ash coal	3.40	3.40	4.10	3.65	2.45
North Franklin white-ash coal	4.10	4.10	3.65	2.45	
Schuylkill red-ash coal	3.85	4.75	3.85	2.45	
Shamokin white-ash coal	4.20	4.60	3.75	2.45	
Shamokin red-ash coal	4.25	5.00	3.85	2.45	
Lorberrry coal	4.25	5.00	3.85	2.45	
Lykens Valley coal	5.25	5.50	5.75	5.50	

Hard white-ash—Lump, \$4.25; Steamboat, \$4.25.

The company reserves the right to change prices at any time, except on orders entered prior to such change, and orders sent in will not bind the company until accepted.
THOMAS M. RICHARDS, General Coal Agent.

Buffalo. May 7.

[From our Special Correspondent.]

The following are the rates until further notice for anthracite coal per 2000 pounds, delivered within our city limits; Grate, \$4.70; Egg, \$4.80; Stove, \$5.20; Chestnut, \$5; No. 2 Chestnut, \$4.30.

Prices for interior points west of Buffalo and Erie as well as Suspension Bridges for the West and Canada, have not been made yet. The sub-committee appointed to meet at Buffalo to-day, to whom the task was delegated, have decided to postpone the settlement of prices until some day next week, as the rates of railroad freight hence to Western points have not been agreed upon, but will be in a day or two.

The representatives of the Western railroads centering here met at the office of Mr. John Crampton, General Agent of the Michigan Central Railroad, yesterday, in order to fix West-bound coal rates for the summer season; but from unavoidable causes, no definite conclusion was arrived at. In a few days, the schedule will be published.

On Saturday and Monday last, vessel men and shippers of coal hence to Western points were apart on their views; 50 cents bid, and 60 cents asked to Chicago and Milwaukee. Since then, charters have been made ranging from 60 to 50 cents to Chicago and Milwaukee; and 25 cents to Sandusky and Toledo. The Duluth opening rate was 50 cents; but yesterday and to-day, 40 cents was the best offer to all Lake Superior ports.

Navigation has fully opened here, a large number of vessels having arrived and departed. The Straits of Mackinaw are open, and propellers have passed up and down, experiencing but little difficulty.

The coal shipments from Buffalo reported to date are as follows: 7430 tons to Chicago, 1480 tons to Milwaukee, 1250 to Sandusky, 1500 to Duluth, 690 to Racine; total, 12,350 tons. These figures are from the Custom-House books.

It was rumored that the New York Central Railroad contract for soft coal had been divided into three lots; of which Langdon & Co. received one third, and Bell, Lewis & Yates two thirds. This may be true, but the real statement may be announced before your next issue.

Mr. Andrew Langdon, of this city, is largely interested in the What Cheer mines, Iowa, which produce about 300,000 tons of inferior bituminous coal annually. An effort is to be made to introduce this coal in the shape of coke into the iron districts of Green Bay and Lake Superior, if it can be coked to advantage.

The contract for supplying coal was let by the Rome, Watertown & Ogdensburg Railroad Company last Thursday. It goes to the Clearfield district, operated by the Pennsylvania Company. As announced in the ENGINEERING AND MINING JOURNAL last week, Buffalo parties think that there is something curious about this contract, as Messrs. Bell, Lewis & Yates, and the Buffalo, New York & Philadelphia Railroad bids were the lowest; yet it went to the Pennsylvania men at \$1.80.

The Consumers' Gas Company, of Toronto, Canada, advertises for bids for 8000 tons of grate size screened Scranton, Pittston, Wilkes-Barre, or Lehigh anthracite; 2000 tons of gas coal; 1000 tons of bituminous; and 500 tons of canal coal. Tenders will be received until noon of Friday, May 15th, addressed to the president of the company.

The bids for 8000 tons of broken or egg anthracite coal from Scranton or Pittston collieries, for the Toronto Water-Works, were opened yesterday. The prices have not been announced here yet. Mr. P. Burns, of Toronto, has secured the contract for many years past. We wonder whether he will succeed this year?

We hear of bituminous coal selling at \$1.75, free on board, at Cleveland, for Western shipment, to meet the Bituminous Coal Producers' Association, of Pennsylvania, which ships from Buffalo.

The agent of the Hamilton Coal Company, of this city, denies the report that his company has sold out its interests to Messrs. Bell, Lewis & Yates.

Duluth items inform us that the Northwestern Fuel Company expects to receive this year 225,000 tons of coal, as against 175,000 tons last season and 280,000 in 1883. The Ohio Central Coal Company has only 300 tons of coal left on its dock, and is anxiously awaiting a fresh supply; 200,000 tons will be its quota

for the season. The St. Paul & Pacific Company's dock is nearly cleaned out of coal.

[From an Occasional Correspondent.]

The prices announced a week ago to-day were a disappointment to those who hoped to see the circular fixed at about the actual market. The decision to make them at the present high figure seems to have been arrived at under some pressure from the transportation interests, and will prove short-sighted. It is asserted that the Erie and Lehigh Valley have advanced their freight rates, except to the Delaware & Hudson, the Pennsylvania Coal Company, and the Lehigh Valley Coal Company.

There is no market, although there is some inquiry. Quite an amount of coal has been loaded for Chicago and Milwaukee, but represents nothing but a movement to a more distant stocking-ground. It is singular that this movement continues in face of the bitter experience of all parties that they can not maintain prices after they pile up the coal for sale West.

I have said there was no market, but I should have excepted some public contracts that have been let during the past day or two. The Detroit Water-Works received some twenty bids, all but two or three of which were at a cut. The award was made at a price equal to the f. o. b. price here, the seller paying the freight hence to Detroit. The Toronto Water-Works purchased their coal also at a cut, so that it is evident that the new prices are none too low to suit some.

It would seem rather early to have to report trouble in the local market; but some of the parties here, thinking they might be lame, thought it wise to start early in the race, and by circulars and canvassing have raised such a commotion that a meeting was held to-day to see if some judicious discipline could not be administered. It was asserted that some parties had canvassed our principal streets, offering coal at wholesale prices and twenty-five cents cartage, which would involve quite a loss if the parties had to pay cart rates.

It is by such signs that the true position of affairs is discovered, and our largest shipper is in the habit of waiting until the others give themselves away, and then, quietly stepping in and meeting the bottom prices, makes himself solid with his customers. It is a plan that wins.

Boston. May 7.

[From our Special Correspondent.]

Great dullness is still the order of the day among anthracite coal men. Dealers have not been in the habit of stocking up before May 1st, and it is doubtful whether they would depart from the old custom if freights were very much lower than they now are. It is mainly from this cause that trade is light. Of course, there is some fear concerning the future of the market. Prices are within five or ten cents of the lowest figures of last year, and it would seem as though nothing but armed warfare among producers would cause a further decline. At the same time, the absence of a definite programme acts as a drawback, notwithstanding the reasonable arguments advanced to the effect that f. o. b. prices will be no lower. It is claimed that a fairly good trade, conducted in keeping with the allotment plan, would cause at least a slight advance on present figures.

The market is at present in a somewhat peculiar condition. There is a firm feeling in stove sizes, because of a real scarcity. Egg is fairly abundant, but broken is in only moderate supply. The Philadelphia & Reading officials here deny that \$3.50 was the delivered figure of a recent contract for broken with a New England mill. They assert that a fair price was obtained. It is hard to say what broken coal is worth in large lots this year. Trade has started up somewhat within a few days.

We quote f. o. b. prices as follows:

At Port Richmond: Stove, \$3.75@3.85; Broken, \$3; Egg, \$2.85@2.95; Chestnut, \$3.25; Pea, \$2.05@2.15. Shamokin Stove, \$4@4.30; Egg, \$3.50@3.40; Nut, \$3.30@3.40. Lykens Valley, Broken, \$4.90; Stove, \$5.40; Egg, \$5.15; Nut, \$5.15. At New York: Stove, \$3.85; Broken, \$3.25; Egg, \$3.25; Chestnut, \$3.60.

No important transactions come to light in the bituminous branch of the market. Dealers are "doing a little something" all the time. We quote cargo lots at \$2.25@2.35 at Baltimore and Philadelphia respectively. On contracts, pool rates are nominally maintained; but at the present rate of freights, cargoes

can be delivered in Boston at from ten to fifteen cents below \$3.50, the minimum pool rate. There is nothing of note in gas-coal, so far as business is concerned. Considerable attention has been drawn to the spontaneous fire in a pile of 20,000 tons of gas-coal owned by the Boston Gas-Light Company. The coal was of the Pennsylvania variety; but it had been piled up for a year, and it is not strange that the fire occurred. The coal was bought on the low freights of last year. It is a tedious as well as an expensive matter to move the coal. We quote f. o. b. prices nominally \$3.15@3.25.

Vessels have been unevenly distributed at the various ports, and the rates have been rather uneven. We quote 75 cents at New York as an average rate. Baltimore has been paying higher rates in proportion than the other ports, but the better distribution of vessels will set this inequality to rights. We quote:

New York, 75c.; Philadelphia, \$1@1.10; Baltimore, \$1.20@1.25; Newport News, \$1.15; Richmond, \$1.25.

There is a fair retail movement. A decline is expected during the month, and we hear of transactions at a price to be made when new quotations are announced. We quote:

White ash, furnace and egg..... \$5.25@5.75
 " " stove and nut..... 5.50@ 6.00
 Shamokin, egg..... 6.00@ 6.25
 " " stove..... 6.25@ 6.50
 Lorberry, egg and stove..... 6.50@ 7.00
 Franklin, egg and stove..... 7.50
 Lehigh, furnace, egg, and stove..... 5.50@ 6.00
 " nut..... 5.75@ 6.50

STATISTICS OF COAL PRODUCTION.

Production Anthracite Coal for week ended May 2d, and year from January 1st:

Tons of 2240 Lbs.	1885.		1884.	
	Week.	Year.	Week.	Year.
P. & Ead. RR. Co.	62,373	3,033,835	331,373	3,279,656
L. V. RR. Co.	55,560	1,458,967	164,299	1,834,980
D. L. & W. RR. Co.	28,061	1,224,165	130,255	1,505,441
D. & H. Canal Co.	69,697	690,397	99,932	1,102,991
Penna. RR.:				
N. & West Br. RR.	21,069	369,206	12,209	270,108
S. H. & W. R. RR.	6,597	54,706	3,893	66,718
P. & N. Y. RR.	7,146	109,728	13,318	155,573
Penna. Coal Co.	24,487	329,109	41,202	362,110
Penna. Canal Co.	15,237	17,398	12,692	42,963
Total	290,227	7,587,511	808,543	8,610,360
Increase.....	518,316	1,022,869		
Decrease.....				

The above table does not include the amount of coal consumed and sold at the mines, which is about six per cent of the whole production.

Production for corresponding period:

1880..... 7,151,235 | 1882..... 8,058,218
 1881..... 8,481,532 | 1883..... 9,174,165

Production Bituminous Coal for week ended May 2d and year from January 1st:

Tons of 2000 pounds, unless otherwise designated.

	1885.		1884.	
	Week.	Year.	Week.	Year.
EASTERN AND NORTHERN SHIPMENTS.				
Philadelphia & Erie RR.	72	11,238		
*Cumberland Region, Md.	73,527	807,698	68,967	762,412
*Barclay Region, Pa.				
Barclay RR.	3,274	87,928	6,450	118,813
*Broad Top Region, Pa.				
Huntington & Broad Top RR.	3,586	58,394	3,669	65,870
Clearfield Region, Pa.				
Snow Shoe.....	1,680	65,680	609	75,519
Karthaus (Keating).....	1,974	49,251		
Tyrone & Clearfield.....	59,547	1,054,540	63,348	984,681
Alleghany Region, Pa.				
Gallitzin & Mountain.....	10,193	160,102	4,263	130,616
Total	153,862	2,303,831	147,146	2,137,311
WESTERN SHIPMENTS.				
Pittsburg Region, Pa.				
West Penn RR.	5,959	95,314	2,046	103,092
Southwest Penn. RR.	2,433	36,658	5,650	56,379
Pennsylvania RR.	4,272	56,000	7,246	100,147
Westmoreland Region, Pa.				
Pennsylvania RR.	3,358	270,546	24,310	370,672
Monongahela Region, Pa.				
Pennsylvania RR.	3,764	65,014	2,951	56,536
Total	19,786	523,532	43,103	666,826
Grand total	173,648	2,827,363	190,249	2,804,137

*Tons of 2240 lbs.

† Considerable gas-coal shipped East, of which no division is made in report.

Production of Coke on line of Pennsylvania RR. for week ended May 2, and year from January 1st:

Tons of 2,000 pounds.

	1885.		1884.	
	Week.	Year.	Week.	Year.
Alleghany Region.	3,693	62,990	2,436	45,150
West Penn. RR.	1,276	11,189	277	24,241
Southwest Penn. RR.	41,441	647,786	41,968	747,115
Penn. & W. Region.	3,205	78,301	3,170	66,613
Monongahela	1,919	28,254	2,625	26,966
Pittsburg Reg.				136
Snow Shoe.....		5,923	50	8,111
Total	51,534	834,443	50,526	918,352
Decrease.....		83,909		

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES (No., Par value), ASSESSMENTS (Total levied to date, Date and amount per share of last), DIVIDENDS (Total paid to date, Date and amount per share of last). Rows 1-133.

Table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES (No., Par Value), ASSESSMENTS (Total levied to date, Date and amount per share of last), DIVIDENDS (Total paid to date, Date and amount per share of last). Rows 1-133.

G. Gold. S. Silver. L. Lead. C. Copper. * Non-assessable. † This company, as the Western, up to December 10th, 1881, paid \$1,400,000. ‡ Non-assessable for three years. § The Deadwood has previously paid \$275,000 in eleven dividends, and the Terra \$75,000. ¶ Total number of shares, 5,110,000; 5,000 shares have never been issued, and are still held by the company.

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Table with columns for company names, dates (May 2-8), highest/lowest prices (H/L), and sales. Dividend-paying mines include Alice, Amie, Argenta, Bassick, Belle Isle, etc. Non-dividend-paying mines include Albion, Alta, American Flag, Barcelona, etc.

Dividend shares sold, 42,145. Non-dividend shares sold, 28,820.

FINANCIAL. Mining Stocks.

NEW YORK, Friday Evening, May 8.

Excepting a slight increase of business, the situation of the mining market remains the same. The prices declined in a few instances, but on the whole were firm.

The price of Standard Consolidated has been irregular, the highest during the week being \$1.35 and the lowest \$1.10, closing at \$1.20; the sales amounted to 5200 shares. The latest official report, just received, shows that the company's expenses are small, and the present cash surplus sufficient to pay them for several months. The twenty-stamp mill will start up June 1st, which will add to the company's surplus. It is the intention of the present management to accumulate about \$150,000 before resuming the payment of dividends. Bodie Consolidated's business was small, only amounting to 800 shares at from \$1.50@1.55. Bulwer Consolidated was lower, opening at 32c. and closing at 29c., but 1800 shares changing hands. The interest in Consolidated Pacific is apparently growing less. The transactions have amounted to only 800 shares at 48@50c. Gold Stripe appears with a sale of 1800 shares at from 7@8c. Some work is doing at the mine, and it is said that, if money for further development were advanced, good results would be received. Green Mountain, in the same district as Gold Stripe, records sales of 300 shares at from 54@50c. Plymouth Consolidated is adding new laurels to its former brilliant record; a dividend of \$50,000 has just been paid, making a total to date of \$1,200,000. The dealings are not as large as might be expected, considering the good prospects of the mine; but the high price of the stock accounts in a measure for this; it sold during the week at from \$16.63@16.88.

Consolidated California & Virginia has been the feature of the Comstock shares. A report that rich ores had been discovered is, no doubt, the cause of the sudden jump in the price of the stock from 80c. to \$1.40. This report, however, has been officially denied. The ore-body, so far, has been low-grade ore, the quantity of which is uncertain. The stock closed at \$1.25, the sales amounting to 7390 shares. Sutro Tunnel has again added a large share to the week's business, the dealings amounting to 208,00 shares, at from 14@17c.

Hale & Norcross is apparently resting; the price has been steady at from \$6@6.25, with sales of only 550 shares. Sierra Nevada has been active, selling at from 95c.@1.15, with sales of 1050 shares. Savage, at from \$2.75@3; sales of 550 shares. The price of Navajo has taken a downward course, going from \$1.50 to \$1; the business has been large, showing sales of 5500 shares. Eureka Consolidated is strong, but shows declining prices; it opened at \$9.25, and during the week sold as low as \$7.50, with sales of 530 shares.

The price of Horn-Silver has varied considerably during the week, the opening price being \$2.05, and closing at \$1.75. The sales have been larger, compared with those of the previous week, amounting to 6335 shares. Quite a business was done in Stormont, at from 9@10c; sales of 1500 shares.

But little interest is manifested in the Colorado stocks; the former favorites being allowed to rest. Bassick appears with sales of 800 shares, at from \$2@2.20. Colorado Central, with 300 shares, at \$1.20. Little Chief, with 2400 shares, at from 22@25c. Chrysolite, with 200 shares, at 65c. Lacrosse, with 1000 shares, at 10c.

The business in Alice has been quite large, amounting to 1200 shares at from \$1.85@1.90. Moulton sold at \$1.25. Silver King, at \$3@3.20. Homestake, at \$11.50. Central Arizona, at from 18@19c.

The transactions, as compared with those of the preceding week, show an increase of 6615 shares; the total transactions amounted to 70,965 shares. A complete summary of the market will be found elsewhere.

The following shares were sold at auction May 6th, in this city:

Thirty shares Central Mining Company, \$7.50 a share. Seven shares St. Louis Ore and Steel Company, 6. \$3000 New York, Lackawanna & Western Railroad first mortgage 6 per cent registered bonds, due 1921, 120. 30 shares Bertha Zinc Company, of Martins, Va., 100. \$1000 Central Railroad of New Jersey consolidated mortgage bond, 98.

Coal Stocks.

The foreign war has dropped out of speculative influences entirely, and the stock market has had its attention drawn more closely to the railroad wars at home. As these have been of the most active char-

acter, and are the outgrowth of the disease "too many railroads and not enough business," they are looked upon as of a somewhat permanent character, regardless of any temporary agreements that may be entered into, and tend to discourage would-be purchasers of securities.

The coal stocks have sympathized with the rest of the market, as well as with the great depression in the coal trade. The sales have been larger, but prices have had a downward tendency, as will be seen by our table of sales and quotations. Delaware & Hudson has suffered in price, owing to the very poor report made by the company on its leased lines to the Railroad Commissioners of this State. Those who have in hand the resuscitation of Reading speak more hopefully; but there is undoubtedly much work before the committees, before any thing of a substantial character can be accomplished. It is supposed that Mr. Vanderbilt has agreed to the compromise scheme of the Whelen and Bartol committees.

To-day, the Jersey Central annual meeting took place. The old Board of Directors was re-elected, thereby proving that neither the Baltimore & Ohio nor the Pennsylvania Railroad has secured control of the property. President Little spoke very discouragingly of the company's condition and prospects, but advised that the road be left in the hands of the Reading. The stockholders, however, voted that the directors should immediately take possession of the road and operate it until the Reading is in a position to pay interest on bonds and dividend on stock. President Little says this means instant litigation, and plenty of it.

The prospects of the coal companies are such as should warrant lower prices for stocks, but the market is still so strongly held by cliques that it is unsafe to predict them at present.

The report filed by the Delaware & Hudson Canal Company with the Railroad Commissioners, at Albany, shows that the company lost \$284,957 on its leased lines in this State for the quarter ended March 31st. This is a remarkably bad showing.

Meetings.

The following companies will hold their annual meetings at the time mentioned: Grand Belt Copper Company, No. 47 Broadway, New York City, May 20th, at twelve o'clock M. Haile Gold Mining Company, No. 151 Broadway,

New York City, May 12th, at half-past eleven o'clock A.M.

Las Nuevas Minas de Santa Maria Gold and Silver Mining Company, office of William A. Stewart, attorney for the receiver, No. 49 Wall street, New York City, May 12th, at two o'clock P.M., general meeting of creditors, when all accounts and demands for and against said corporation, and all its open and subsisting contracts, shall be ascertained and adjusted as far as may be, and the amount of moneys in the hands of the said receiver declared.

Pennsylvania Coal Company, Hawley, Pa., June 9th, from three to four o'clock P.M.

Uncompahgre Mining and Smelting Company, office of Charles G. Cronin, attorney for the receiver, No. 33 Pine street, Room 22, New York City, July 15th, at twelve o'clock M., general meeting of creditors, when all accounts and demands for and against said corporation, and all its open and subsisting contracts, will be ascertained and adjusted as far as may be, and the amount of money received, and paid out by and in the hands of the receiver will be declared.

Dividends.

Granite Mountain Mining Company, of Montana, has declared dividend No. 2, of ten cents a share, or \$40,000, payable to stockholders of record May 2d, at the company's office, No. 204 North Third street, Room 35, St. Louis, Mo.

New Hoover Hill Gold Mining Company, of North Carolina, has declared an interim dividend for the six months ended March 31st, at the rate of five per cent a year; 3d. or 6½ cents a share, free of income tax, payable May 1st, in London.

Pennsylvania Railroad has declared a semi-annual dividend of 3 per cent, payable at Philadelphia in cash on and after May 29th, as registered on the books April 30th, 1885. Messrs. Collis & Levy, of New York, report the dividend payable to stockholders in this city on the same date.

Philadelphia & Reading Railroad purchased, May 8th, the interest and coupons due 1st instant of the following divisional coal land mortgage bonds: The West Flowery Field tract, at the rate of 6 per cent per annum; Big Schall and Fishing Creek Improvement Company tract, at the rate of 5 per cent; and the Helfenstein, Randenbush, Weaver et al., and Eli and Riehle tracts, at the rate of 4 per cent.

Plymouth Consolidated Gold Mining Company, of California, has declared a dividend (No. 24) of \$50,000, payable May 5th. Total dividends to date, \$1,200,000. DIVIDENDS PAID BY MINING COMPANIES DURING THE MONTH OF APRIL AND FROM JANUARY 1ST, 1885.

NAME OF COMPANY.	Location of mines.	Paid during month of April	Since January 1st, 1885.
Adams, S. L.	Colo.	\$22,500	\$75,000
Alice, G. S.	Mont.		50,000
Atlantic, C.	Mich.		20,000
Bellevue-Idaho.	Idaho.		12,500
Big Bend Hydraulic, G.	Cal.		18,000
Bodie Cons., G.	Cal.	50,000	50,000
Bonanza King, G.	Cal.		10,000
Central, C.	Mich.		100,000
Colorado Central, S.	Colo.		15,000
Father de Smet, G.	Dak.	20,000	80,000
Granite Mt., S.	Mont.	60,000	60,000
Hecla Cons., G. S. L. C.	Mont.	15,000	60,000
Helena, G. S. L. C.	Mont.		36,000
Homestake, G.	Dak.	31,250	125,000
Honorine, S.	Utah.		12,500
Idaho Quartz, G.	Cal.	23,250	93,000
Jocunita, S.	Mex.		50,000
Little Chief, S. L.	Colo.		20,000
Moulton, S.	Mont.	30,000	60,000
Navajo, S. L.	Nev.		50,000
Ontario, S.	Utah.	75,000	300,000
Oro Grande, G.	Cal.		15,000
Plymouth Con., G.	Cal.	50,000	200,000
Queen of the Hills.	Idaho.		12,500
Quincy, C.	Mich.		100,000
Rooks, G.	Vt.	15,000	30,000
Silver King, S.	Ariz.		50,000
Small Hopes Con., S. L.	Colo.		187,500
Valencia Mica, M.	N. H.	3,750	3,750
		\$395,750	\$1,895,750

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

Pipe Line Certificates.

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

Opening.	Highest.	Lowest.	Closing.	Sales.
May 2... \$0.79	\$0.79½	\$0.78½	\$0.79	3,464,000
4... .78½	.79½	.77½	.77½	6,499,000
5... .77	.78½	.77	.77½	5,518,000
6... .77½	.78½	.77½	.78½	4,498,000
7... .78½	.78½	.76½	.77½	5,776,000
8... .77½	.77½	.77	.77½	4,934,000
Total sales.....				30,689,000

COAL STOCKS.

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

NAME OF COMPANY.	Par value of shares.	Quotations of New York stocks are based on the equivalent of \$100. Philadelphia prices are quoted so much per share.												Sales from April 25th to May 1st inclusive.			
		May 2.		May 4.		May 5.		May 6.		May 7.		May 8.					
		H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.				
Barclay Coal	50																
Cameron Coal	10	10¼		10¼	10	9¾		10½						10¼			1,400
Ches. & O. RR.	100			4½		4½					4½	4½		4½			720
Consol. Coal	100																
Cumb. C. & I.	100																
Del. & H. C.	100	81¼	81	81¼	79	79½	78¾	80	79	79	78	80	78¾				17,719
D. L. & W. RR.	50	106¼	105¾	105¾	103¾	104	103	104¾	103¾	104	102¾	104	103				172,187
Elk Lick Coal Co.	50	43¼	42¾	43	42¾	43	42¾										1,860
Lehigh C. & N. F.	50	59½		59½		60					59½	59½					168
Lehigh Valley RR.†	50																
L. & W. C. & I. Co.	100																
Maryland Coal	100																
Montauk Coal	100																
Morris & Essex	50	124¼	124¼	124½	123½	123¾		123¼		123¾	123						366
New Central Coal	100																
N. J. C. RR.	100	36¼	35¾	35¾	35¼	36¼	34¾	30¾	35¾	36¼	35¼	36¾	35½				30,593
N. Y. & S. Coal	50																
Penn. Coal	50	53¾	53¼	53¼	52¼	52¾	51½			52¾	52¼						9,196
Penn. RR.†	50	16¼		15½	14¾			14¾	14¾	15		15¼	15				7,011
Ph. & R. RR.*	50																
Spring Mountain	50																
Westmoreland Coal.†	50					60											17

* Of the sales of this stock, 4811 shares were in Philadelphia and 2200 in New York. Total sales, 241,237.
† The quotations for these stocks are not percentage, but actual price.

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

NAME OF COMPANY.	CLOSING QUOTATIONS.					
	May 1.	May 2.	May 4.	May 5.	May 6.	May 7.
Albion						
Alpha						
Alta	.20	.20	.20			
Argenta						.25
Bechtel						
Belcher	1.00	1.00	1.12½			
Belle Isle						
Best & Belcher	1.75	2.00	2.50	2.62½		2.50
Bodie	1.50	1.62½	1.50	1.50		1.50
Bullion						
Bulwer						
Chollar	1.50	1.50	1.50	1.50		1.50
Con. Pacific						
Con. Cal. & Va.	.85	.95	1.37½	1.25		1.37½
Crown Point	1.37½		1.37½	1.37½		1.37½
Day						
Elko Cons.						
Eureka Cons.	8.25		8.50			8.75
Exchequer						
Gould & Curry	1.25	1.25	1.37½	1.50		1.50
Grand Prize						
Hale & Norcross	5.87½	6.00	5.62½	5.50		6.25
Independence						
Martin White		.40				
Mexican	.60	.60	.65	.85		.95
Mono						
Mount Diablo		3.75	3.75			
Navajo	1.62½	1.50	1.37½	1.12½		1.12½
Northern Belle						
North Belle Isle						
Ophir	.60	.65	.70	.90		1.25
Overman						
Potosi	.60	.60	.65	.65		.60
Savage	3.00	3.00	2.75	2.62½		3.00
Scorpion						
Sierra Nevada	.85	.85	1.00	1.00		1.12½
Silver King						
Tip-Top						
Union Cons.	.45	.50	.55	.65		.75
Utah			1.00			2.25
Wales Cons.						
Yellow Jacket	2.25	2.25	2.25	2.50		2.50

Boston Copper and Silver Stocks.

[From our Special Correspondent.]

BOSTON, May 7.

The market for copper stocks the past week has shown a fair degree of activity, and prices generally are quite firm, and in some instances are a little higher. The trading, however, is as yet confined to a few stocks, and those of the dividend-paying mines; but we look for more activity in the speculative list, if ingot copper should continue to improve and reach a price at which some of the now dormant mines can be worked to advantage. Calumet & Hecla is steady and in good demand at \$161, a small lot only being sold at a less figure; closing strong at \$161 bid, \$162 asked. Quincy advanced from \$33 to \$34, reacted to \$32½, and rallied again to-day to \$33, which was the bidding price to-day; \$34 asked. The April product shows a falling off of about 30 tons from last year, not from any lack of ore, but because it was deemed best to reduce the output somewhat, which can, however, be increased at any time if the sales of ingot at the advanced rate should warrant it. Franklin is firm at \$7, with but little stock offering. The April product shows a satisfactory increase over last year, and at the present price of ingot will yield a handsome profit, and enable the company to pay a dividend during the present year. Osceola is firm at \$8½ for round lots, small lots being sold a fraction less. The report that the mine was to shut down altogether is denied, the intention being to open

up sufficient ground to supply the new mills when completed. A small sale of Atlantic at \$7 is reported, the first since February 25th at \$7½.

In silver stocks, Dunkin has been most active, with sales at 25@27½c., and later at 22½c. Bonanza, steady at \$1½, sales and bid.

At the Mining Exchange, there has been but little doing. Bowman has gone to sleep again, and, although the stock is freely offered at 18c., there are no takers the best bid to-day being 14c., offered at 17c. The price of this stock seems to be controlled by the insiders, who advance or depress it as their interests require. It is noticeable that outsiders are not buying, but are ready to sell at every favorable opportunity.

The miscellaneous stocks, with the exception of American Electric and Illuminating Company, are dull and without feature. In American Electric, there is some demand for conversion into the stock of the new company, which has advanced the price from 65c. @ \$1.15 for common, and \$3½ for preferred.

3 P.M.—There was nothing doing at the afternoon Boards. Closing prices: Calumet & Hecla, \$160 bid, \$163 asked. Quincy, \$33 bid, \$33½ asked. Osceola, \$8½ bid. Franklin, \$7 bid.

JAMES F. TOPLIFF & CO.,
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