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CONTENTS.

EDITORIALS:	PAGE.	NOTES:	PAGE.
Mr. E. E. Olcott.....	365	Temperature of the Earth.....	372
The Baltimore & Ohio Railroad's Staten Island Terminus.....	365	A Carbon Dioxide Gas Well.....	372
The New York Sun's Erratic Rays.....	365	COAL TRADE NOTES:	
The Unlimited Assininity of the Metallurgical Association, Limited.....	365	Arkansas.....	373
Mr. Franklin B. Gowen and the Philadelphia & Reading.....	365	Maryland.....	373
Beating the Record at South Chicago.....	365	Nevada.....	373
The Bi-Metallic Hobby-Horse.....	366	Ohio.....	373
A Steam-Pump for Molten Lead.....	366	Pennsylvania.....	373
CORRESPONDENCE:		New Mexico.....	374
The Colorado Central Consolidated Mining Company.....	367	GAS AND PETROLEUM NOTES:	
The Lower California Copper Mines.....	367	Arizona.....	374
Note on an Exhibition of Banded Structure in a Gold Vein.....	367	California.....	374
On the Utilization of Waste Anthracite.....	368	Canada.....	374
Some Experiments in the Chlorination of Calcareous Gold Ores.....	369	Colorado.....	374
Modern American Methods of Copper Smelting.....	371	Dakota.....	375
Books Received.....	372	Illinois.....	375
Patents Granted by the United States Patent-Office.....	372	Mexico.....	375
Furnace, Mill, and Factory.....	373	Michigan.....	375
Labor and Wages.....	373	Minnesota.....	375
Transportation Notes.....	373	Montana.....	375
NOTES:		Nevada.....	375
British Iron Trade Declining.....	367	South America.....	376
New Process for Producing Hydrogen Gas.....	367	Utah.....	376
Glass Flooring.....	367	Vermont.....	376
Metallic Railroad Ties.....	369	Wisconsin.....	376
Title to Mineral Lands—Pre-emption Laws.....	370	Wyoming.....	376
A New Method for Preparing Liquid Carbonic Acid.....	370	MARKETS:	
Mystery Gold.....	372	Silver, Copper, Tin, Lead, Spelter, etc.....	376
Electrolysis of Salts.....	372	Iron Market Review.....	376
Manufacture of Bichromate of Potash.....	372	New York.....	377
		Philadelphia.....	377
		Louisville.....	377
		Coal Trade Review.....	377
		Statistics of Coal Production.....	377
		New York.....	377
		Buffalo.....	378
		Boston.....	379
		FINANCIAL:	
		Mining Stocks.....	379
		Coal Stocks.....	379
		Boston Copper and Silver Stocks.....	380
		Advertisers' Index.....	xii

MR. E. E. OLCOTT, the well-known mining engineer, has recently returned from Sonora, Mexico, where he had charge of the St. Helena gold mines, and has opened an office at No. 10 Cedar street, in this city.

THE importance of the Baltimore & Ohio Railroad Company's control of the Staten Island road, and of the establishment of shipping docks on the island, can scarcely be overestimated; for although the present action and apparent haste to get terminal facilities on Staten Island is generally considered to be a "bluff" by which a better arrangement can be secured from the Pennsylvania Railroad for the use of its terminal facilities, it is none the less certain that the unequalled advantages that Staten Island offers as a shipping point will eventually be utilized. The facilities that the Baltimore & Ohio would then possess for delivering coal, ores, and other heavy freights would undoubtedly have an

important influence in bringing to this harbor a still larger proportion of the trade of the country. That it could greatly lessen the cost of coal from such low figures as have recently ruled here is not to be expected; but it would certainly not tend to increase prices, and it must be remembered that from the Cumberland (Md.) District, the Elk Garden, and other points on the Baltimore & Ohio, unlimited supplies of coal can be obtained.

It is said that the Baltimore & Ohio Railroad proposes building a subway or tunnel under the Kill Von Kull, and not a bridge or viaduct over it.

THE New York Sun that shines for all sometimes throws off very erratic rays:

"Depend on it, silver is a far better currency medium than gold. Gold seeking is a mere process of gambling. Silver mining, on the contrary, is as much an industry as coal mining."

This particular ray is commended to those in darkness for its concentrated comprehensiveness; its high moral tone, and the nice distinction it draws between gold and silver mining; its profound knowledge of the subject it discusses, and the beautiful modesty with which its opinion is expressed.

Here is still another ray:

"Judging from present appearances, the gold-using nations are insolvent. The tide of their currency requirements is retreating and leaving them stranded high and dry on the mud banks of a contracted currency."

THE Metallurgical Association, Limited, is the title of a new company, registered in London with the large capital of £300,000, in £1 shares, to acquire and work patents. Here is the long-desired "opening" for all metallurgical cranks. The notice speaks of £300,000 as a "large capital;" but it should have been at least £300,000,000; for even that would be a small sum, compared with the inventors' valuation of a few of the grand metallurgical inventions brought to our personal notice, and which have been held back, waiting for just this opportunity to "revolutionize science." We would recommend that the capital be at once increased to at least the figure we have mentioned, and that rules be adopted to secure the equitable and safe division of the dividends, and, in the interest of the strictest economy and safety, that no inventor shall be paid in cash more than ninety per cent of his own estimate of the value of his invention. The company should have an expert board of managers, composed exclusively of inventors upon whom unappreciative, cold, and heartless scientists have frowned.

THE chances of Mr. FRANKLIN B. GOWEN becoming the next president of the Philadelphia & Reading Company are greatly improving, as might have been expected. The stock and junior security holders must necessarily look to Mr. GOWEN as the only person yet suggested who can possibly save their interests, and the utter incapacity that has characterized the management of the company since Mr. GOWEN retired from it has naturally shown every one interested in the company's securities that a change is absolutely necessary.

The overshadowing question to all outside as well as in the company is the danger of having the magnificent coal property of the Reading Company fall into the hands of the Pennsylvania Railroad. Such an event would practically place the entire coal trade of the East in the hands of a single corporation, which would then have it in its power—and it has never shown itself slow to use its power—to crush out all independent action or rivalry in the coal trade. The Pennsylvania Railroad would become to the coal trade what the Standard Oil Company is to the petroleum trade; and all other coal companies or individual operators would exist only by the sufferance of the great dictator; and the public—but Mr. VANDERBILT has recorded in familiar, classic language what the public has to expect of a railroad company that has the power all in its own hands. Whatever Mr. GOWEN'S mistakes may have been in the past—and they certainly could not exceed those of his successors—there can be no question of the fact that he is the only one yet suggested who may possibly be able to save the Reading from annihilation, and the country from the foreshadowed immeasurable danger of a "Standard" coal company that could—an if it would—rule with that delicate consideration for the public for which monopolists are noted.

BEATING THE RECORD AT SOUTH CHICAGO.

The South Chicago Works have again beaten their own unequalled record, as shown by the following statement of the work done for the week ended November 21st

BLAST-FURNACE DEPARTMENT.		
No. 5.....	1427 tons iron.	1958 pounds coke per ton iron made.
No. 6.....	1444 " "	1864 " " " " " "
No. 7.....	1569 " "	1836 " " " " " "
	4440 " "	1921 " " " " " "

BESSEMER DEPARTMENT.
453 heats aggregating 4283 tons ingots.

The rail mill department made 3650 tons of rails. Some question has

been raised as to whether high sulphur does not result from the practice that gives such remarkably low fuel; but we are informed by Superintendent E. C. POTTER that their iron is running less than .05 per cent sulphur and under 2 per cent silicon, and is as good in grade as any the works ever made.

This is very satisfactory, and the consumption of fuel still decreases, and has reached a wonderfully low figure, while the Bessemer department is rivaling the blast-furnaces as every point is gained. Assuredly these works have found the "alkahest" or "universal solvent," and it looks as though it were simply brains.

THE BI-METALLIC HOBBY-HORSE.

When any one touches its favorite hobby, our esteemed bi-metallic, mono-maniacal contemporary, the *Mining Record*, becomes as furious and insensate as a bull before a red flag; but since in its hand the hobby is harmless enough, and since without it our esteemed b-m., m-m. c. would collapse from absolute vacuity or continue to be filled with the more injurious though perhaps more fruitful puffs of some Nevada wild-cat or some Bodie swindle, no one would willingly deprive it of its innocent little pleasure, and we certainly would not have the heart to do so; on the contrary, we hope to see its little pages continue to be filled with the modest scintillations of its little wisdom on the subject of its hobby.

The red rag that now unnecessarily irritates our neighbor is the following official cablegram concerning the action taken at the recent Monetary Convention of the Latin powers:

"France, Greece, Italy, and Switzerland have renewed the Monetary Convention for five years; silver coins redeemable in gold, no additional silver coinage permitted; convention open to Belgium.

"The Monetary Convention between the Latin powers, providing for the suspension of the coinage of silver, permits each power to resume, provided the silver circulating in the other states is redeemed in gold by the resuming state. It also gives to these states the right to exclude the silver coins of the resuming state."

There is no difficulty in understanding the meaning of this language; and that it expresses what the convention adopted is evident from the fuller reports since received. It must be clear to every one except our afflicted neighbor that, when a power agrees to redeem one of its metals in the other, it practically and distinctly makes a single standard; but it is quite unnecessary to point out to any intelligent reader that, adopting a single standard and redeeming a balance in gold is not withdrawing all silver from circulation, so that the bugaboo that so alarms our afflicted neighbor is only the creation of its own diseased imagination.

It is nevertheless a fact that the new agreement among the Latin powers distinctly recognizes the gold standard, and provides practically for the winding up of the Latin Union.

Our neighbor's wild and inaccurate citation of the proportions of gold and silver in the reserve of the German and some other European banks, as a proof that the bi-metallic standard can not without ruin be rejected by countries that long ago repudiated it is characteristically ridiculous. Nor has the per capita holding of silver by France any thing to do with the plain announcement quoted.

But we repeat, we have no idea of taking away our poor contemporary's little hobby. So ride away on it, dear boy—ride away, to the infinite amusement of others, and to your own innocent entertainment.

A STEAM-PUMP FOR MOLTEN LEAD.

We are indebted to Metallurgical Inspector BERNHARD RÖSING, of Friedrichshütte, Germany, for a description of the apparatus invented by him, and used at the Friedrichshütte, and elsewhere in Germany, for removing molten lead from kettles, such as are employed in the zinc process of desilverization. These kettles are usually emptied either through tapping-holes, or by means of a siphon (the invention of the lamented STREITZ) or with ladles. The latter method is confessedly laborious, slow, and expensive. The two former require that the kettles shall stand higher than the molds or other apparatus to which the lead is to be conveyed; and in old works, built, for instance, to use the Pattinson process, this is frequently not the case. Hence RÖSING'S lead-pump.

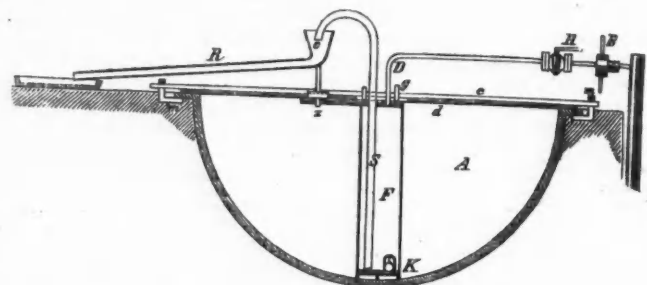
This device consists of an iron pump-cylinder, closed at both ends, but having a ball-valve in the lower end, and the upper cylinder-head pierced with two pipes. One is a steam-pipe, which does not go farther than just to enter the cylinder, and which is provided with a three-way cock, so that the interior of the cylinder can be put in communication, at will, with the outer air or with the steam-boiler. The other pipe passes down inside the cylinder till it almost touches the bottom; and its outer end is carried up a short distance, and then curved over, so as finally to point downward. This is the discharge-pipe, intended to deliver the molten lead into a funnel and connecting pipe placed below its mouth, which convey it to any desired point.

It will be seen that the arrangement closely resembles the ordinary

pipette of the chemical laboratory: only, there is at the outset nothing in it; it has a valve in the bottom; and it is to be operated with steam instead of air (though, in fact, compressed air might be used).

When the pump is to be used, it is placed vertically (with suitable precautions as to previous warming, covering of the bath to prevent sputtering, etc.—all of which "understands itself," as the Germans say) in the lead-bath, the three-way cock being set so as to connect the interior with the outside air. There being only the weight of an air-column inside, the weight of the lead column outside lifts the ball-valve, and the lead enters, rising in the cylinder and in the exit-tube to the level of the outside bath. The cock is now turned so that the outside air is excluded, and the steam is admitted, with a pressure of say from 30 to 37 pounds, that is, from 15 to 22 pounds in excess of the atmospheric pressure. This at once closes the valve at the bottom of the cylinder, and forces the lead up and out through the discharge-pipe, until the cylinder has been practically emptied. The lower end of the discharge-pipe, inside the cylinder, is thus opened by the expulsion of the lead, and the steam passes through to the atmosphere. This causes an immediate drop in the pressure from 30 or 40 pounds to 15; the ball-valve opens again, and fresh lead enters from the bath, rises in the cylinder, shuts off the exit of the steam, and thus, rising still farther, brings about again the higher steam pressure, which in turn closes the valve and expels the lead through the discharge-pipe. These alternate operations go on with great rapidity, say 30 times in a minute; and the pumps at Friedrichshütte throw at each pulsation about 4 kg. of lead. The stream is continuous but not perfectly uniform. It pulsates.

Another way of operating the pump is to turn off the steam after each stroke, and allow the lead to rise and fill the cylinder to the level of the outside bath; then turn on the steam and blow it out. According to either method, the kettle is rapidly emptied, to a point where the remain-



ing lead has not depth enough to give a pressure capable of opening the valve. About 500 pounds of lead constitute this minimum remainder in kettles of the usual size and hemispherical shape.

Of course, the pressure of steam required depends on the height to which the lead is raised, from the bottom of the discharge-pipe to the highest point of its outside bend. The dimensions of pipes, cylinder, etc., must be carefully adjusted, so that the pump will work automatically and satisfactorily. This is done at several places. The pumps at Friedrichshütte are lifting 7500 kg. of lead 1½ meters every hour, with steam at 1½ atmospheres above atmospheric pressure. It is believed that this apparatus could be used for other hot liquids, and (compressed air being substituted for steam) also for cold ones.

The Imperial German Patent-Office has distinguished itself in this case once more, adding, we might say, a superfluous laurel to its already abundant wreath. It rejected the inventor's application for a patent, not on the ground of want of novelty, but on the ground that it was doubtful whether it would work. The following *verbatim* translation of the official deliverance on that head is awe-inspiring. Addressing the inventor, the office declares: "You have not touched the point most important to the operability of the apparatus, namely, the excessively high pressure, corresponding with the temperature of the molten lead, which the steam must acquire through contact with it, and which renders doubtful the operability and applicability of the apparatus!"

Unfortunately, this friendly warning came too late. The pump had been running beautifully for a month when the prophecy was uttered. The Imperial German Patent-Office should be more prompt with its predictions, or should not make any. We are accustomed to think of Germany as a country where science "lies around loose," and every body has all he needs of it. We can not help being astonished when high functionaries, appointed to deal with scientific subjects, confound superheated with saturated steam, and prate about excessive pressures produced by superheating the extremity of a small steam-current, which possesses an open connection all the way back to the boiler. As a matter of theory, the notion is absurd. As a matter of practice, tests on this lead-pump in operation have shown that no "high" pressure exists in it. The expansion of the steam by brief and limited contact with the lead may slightly increase its effectiveness, but that is all.

The Imperial German Patent-Office, however, can boast the virtue of consistency. The lead-pump might work, impertinently and illegitimately, in spite of its edicts; but it could not be patented! On this point, the office, at the latest date, stood firm, with a sublime solidity on which, we do not doubt, melted lead and superheated steam would not produce the slightest effect.

Meanwhile, the unpatented pumps are doing as well as could be expected, and are sold at about \$87 apiece, to disloyal and eccentric metallurgists.

CORRESPONDENCE.

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

The Colorado Central Consolidated Mining Company.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In your issue of the 14th inst., I notice "Y. I.'s" reply to my letter in the previous issue of the JOURNAL. There is no essential difference between our statements, and I still claim mine to be substantially correct. I need not occupy your space in repeating what has been said. What I stated concerning the Colorado Central mine was said in the most friendly spirit, and called for no ill-natured reply. In mentioning the wisdom shown by the directors and by Mr. Hall in its management, it appeared to me that the success that followed this unusual wisdom was worthy of being cited as an example, that others might be induced to adopt the same course. I accordingly sent my notes to your paper as the best means of placing the subject before those interested in mining operations. What I stated as matters of fact have been substantially corroborated by "Y. I." himself. The opinions I expressed are my opinions still. I had a right to express them; but I certainly do not wish to force them on any body.

GEORGETOWN, COLO., Nov. 19.

H. F.

The Lower California Copper Mines.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Referring to an article in your paper of October 17th, 1885, about the Lower California copper mines formerly owned by Messrs. Moller & Co. and Eisenmann, and bought lately by a French syndicate, I notice that you must be misinformed as to the merits of the property, the amount for which it was sold, and its actual status; and feeling convinced that the truth about the whole business will be welcome, I take the liberty of giving you the following items regarding the property, which you are at liberty to use as you may see fit.

As early as 1881, I went to the mines, eighty-four miles across the Gulf of California from Guaymas, and, after thoroughly inspecting the mines, took a bond on them from the owners, and proceeded to New York, where I tried to place them, but failed.

In December of the same year, David W. Brunton, of Leadville, and Professor Triple reported on the property, and corroborated in every particular my previous report; stating that the Lower California copper mines referred to could safely be ranked among the largest producers in the world.

The property was offered for sale in London for the sum of £200,000; but on account of some misunderstanding between D. W. Brunton's and my own representative, Mr. H. Campbell, the attempt failed to sell to an English syndicate, at the head of which was Sir Thomas Elliot, Bart.

Some time after my failure to sell the plant, a certain party, named Lezinsky, obtained a partial bond on the property, and tried to place it in New York, but failed to interest capital; consequently, after six months, he found himself with his bond expired; and that is all the claim or interest said Lezinsky ever had in any part of the mines, notwithstanding his wild statements as to his present ownership of part of the property.

Twenty-six months subsequent to the lapsing of Lezinsky's bond, I made the acquaintance of Professor de la Bouglise, who, accompanied by Mr. Cumengo, consulting engineer of the Rio Tinto copper mines in Spain, Mr. Renevey, of Paris, Messrs. E. Charonnat, Prof. M. Tinoco, Mr. E. Fuchs, of the School of Mines of Paris, Engineers Laforgue, Rabolaz, and myself, repaired to the mines, and, after a most critical and thorough examination, lasting sixteen days, reported very favorably on the property, and advised the aforesaid syndicate of bankers to purchase the entire property, then offered by myself and associates for one million dollars in United States gold coin.

Before concluding the bargain last January, Prof. J. D. Hague, of your city, and Lewis Williams, M.E., and manager of the Copper Queen copper mine, in Bisbee, were sent to the property and ordered to make a careful examination of the entire property and report to Paris directly.

Upon the report (final) of said gentlemen corroborating every thing that had been reported before by at least ten experienced mining engineers (not including myself), the house of Mirabeau Puyrar & Co. paid \$1,000,000 for the plant on the 27th day of October, 1885.

The entire capital stock (paid up) amounts to 12,000,000 francs, of which some 6,000,000 francs are intended for machinery, railroads, smelting plant, wharf, etc., now about to be contracted for in order to produce, as soon as possible, from 10,000 to 12,000 tons of from 96½ to 97 per cent of black copper yearly.

	Francs.
Price of mines.....	5,095,000
Machinery, etc.....	6,000,000
Funds on hand, more or less.....	5,000
	12,000,000

This, Mr. Editor, is the uncolored and true history of the property to

date—statements that you can investigate, and are at liberty to criticize.

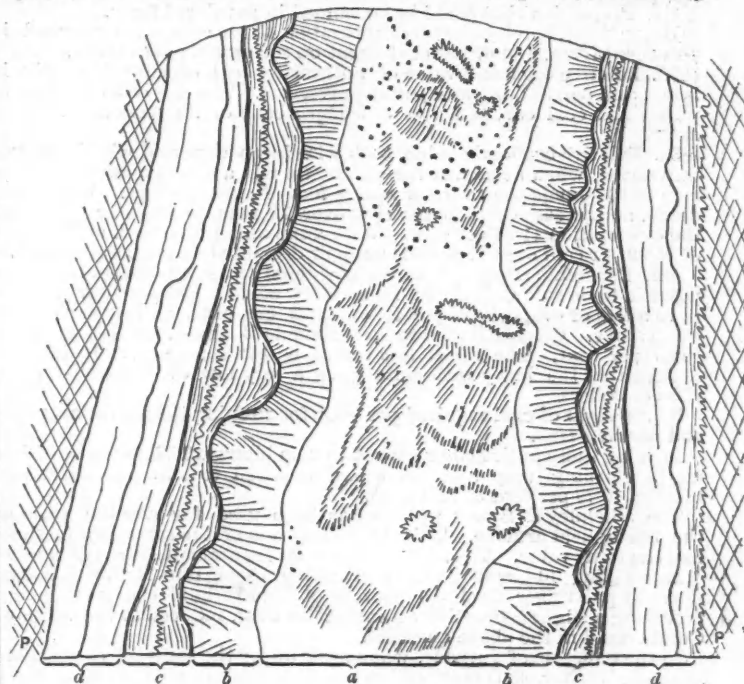
Hoping that you will do so, and give your numerous readers the benefit of your inquiries, I remain, yours very respectfully,
A. DERRÉ.
No. 40 NEVADA BLOCK, 13 GLEN PARK AVENUE,
SAN FRANCISCO, CAL., Nov. 16.

NOTE ON AN EXHIBITION OF BANDED STRUCTURE IN A GOLD VEIN.*

By Charles M. Rolker, New York City.

I desire to put on record this memorandum and accompanying sketch of a vein examined by me, in Honduras, Central America, which exhibits a well-marked banded structure. The illustration is of natural size.

The vein traverses trachytic porphyry. It is from three to four inches wide. The central band *a* is of white quartz, one inch wide; it is full of cavities and vugs, lined with quartz crystals, and its mass is largely stained with hydrated oxide of iron, in which is a heavy sprinkling of coarse gold, indicated by dots and shading in the section. On each side of *a*, is a band of pure white crystalline quartz *b*, from ¼ to ½ inch wide, showing incomplete crystals in radial forms. This band contains no gold. Next follows a band *c*, on each side of *b*, from ¼ to ½ inch wide. Through its center, runs a fine fissure, lined with interlocking quartz crystals, on each side of which is bluish "ribbon quartz," containing



very finely impregnated gold. The outside band *d* also varies from ¼ to ½ inch in width, and is made up of compact but columnar quartz, the outside face of which (toward the wall-rock) is frequently lined with fine quartz crystals. The columnar quartz is more or less frequently stained yellow by hydrated oxide of iron, and it contains some very fine but light gold. *P, P*, are walls of trachytic porphyry. The whole vein-matter has a tendency to split off in slabs, in a vertical direction, the full width of the vein. The section illustrated represents, of course, an exceptionally rich piece, from one of the bonanzas that occur as nests and isolated, irregular bodies in the vein. From a slab similar to the one illustrated, weighing 2½ pounds, I panned over 1½ ounces of gold.

British Iron Trade Declining.—Evidence given before the Royal Commission on trade depression shows that the iron trade in the north of England from 1881 to 1885 decreased almost one half, as compared with that from 1871 to 1875. The falling off is attributed to colonial protection, and manufacturers urge federation, in order to prevent the shutting out of British goods from the colonies.

New Process for Producing Hydrogen Gas.—MM. F. Humbert and Henry say that superheated steam is driven upon incandescent coke in a first retort heated to redness. The products are hydrogen and carbon monoxide in equal volumes. These gases are passed into a second retort also heated to redness, and containing refractory bodies. Jets of steam, superheated to the point of dissociation, enter this retort, the result being carbon dioxide and a double volume of hydrogen. To remove the carbon dioxide, the gases are passed through milk of lime, and the pure hydrogen is led away to the reservoir. The yield is said to be 3200 cubic meters of hydrogen per ton of coke, or 96,000 cubic feet per ton, and the cost price 0.015 franc (1½ cent per 1000 feet) per cubic meter.

Glass Flooring.—The substitution of glass flooring for boards continues to increase in Paris, this being especially the case in those business structures in which the cellars are used as offices. At the headquarters of the Crédit Lyonnais, the whole of the ground is paved with large squares of roughened glass imbedded in a strong iron frame, and in the cellars beneath there is sufficient light, even on dull days, to enable clerks to work without gas. The large central hall at the offices of the Comptoir d'Escompte has also been provided with this kind of flooring, and it is said that, although its prime cost is considerably greater than that of boards, glass is in the long run far cheaper, owing to its almost unlimited durability.

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

ON THE UTILIZATION OF WASTE ANTHRACITE.*

Prepared for the Engineering and Mining Journal by L. N. Lukens.

(Continued from page 256.)

I regret that my information as to the results of this process is not more reliable. I was unable to make any experiments myself. Lieutenant Dutton's report does not contain any definite figures. Mr. Isherwood's report shows a very unfavorable result, which I am unable to account for.

The theoretical increase in efficiency, both of the heating surface and of the furnace, obtained by a reduction in the excess of air, has just been shown; and if mechanical difficulties can be overcome, it would seem that this process would allow of this reduction.

To obtain the large reduction in efficiency shown by Mr. Isherwood, either an excess of air above the usual practice must have been introduced, or a very large proportion of the fuel must have been unburned.

However it may be in the Whelpley & Storer process, Mr. Crampton has paid particular attention to this last point, and it does not occur in his practice.

The manufacturers of the apparatus claim that Mr. Isherwood's published report does not correctly represent the result of the trials.

From his experiments, Lieutenant Isherwood determined the following points:

1st. Proportion that could be consumed in powdered form. Using the Whelpley & Storer apparatus, 33 per cent was consumed in powdered form, and 67 per cent burnt on the grate-bars as lump.

2d. Relative economic value of anthracite coal consumed wholly in lump, and partly lump and partly pulverized. The use of 33 per cent of pulverized coal causes a loss of 9.93 per cent of its economic value as lump.

3d. Relative economic value, both with lump alone and with lump and pulverized, when burned at the maximum rate and when burned at the rate of 12 pounds per hour per square foot of grate surface. With lump alone, an increase of 29.88 per cent over 12 pounds an hour decreased the evaporation 11.33 per cent. With lump and pulverized, an increase of 26.09 per cent over 12 pounds an hour decreased its evaporation 3.89.

4th. Economic effect of burning powdered anthracite alone, if it were possible to do so. Calculated from tests made. Powdered fuel alone gave a loss of evaporative power of 41.59 per cent, as compared with lump alone. Calculating from experiments B and E, the loss would be 18.45 per cent. The mean loss would be 30.02 per cent. It must be noticed that the lump anthracite gave a very low evaporation for this class of boilers.

5th. Weight of coal required per hour for running the pulverizing mill and blowing-fans.

Burning lump anthracite required to run blower, 2.53 per cent of fuel used. Burning lump and pulverized required to run pulverizer and blower, 10.79 per cent of fuel used.

The Whelpley & Storer process has been used for over ten years at the Springfield armory. This is probably one of the strongest testimonials as to its value. The following is from Lieutenant Metcalf's report:

In welding 10-pound skelps and rolling them into Remington barrels, the pulverizer used 6.6 pounds of Cumberland coal per barrel, including a slight proportion of anthracite dust, reduced to the value of Cumberland in the above amounts.

In the old style of furnace, when used under the same circumstances as the pulverizer, the consumption was 16 pounds of coal per barrel.

The following is a summary of a trial on puddling-furnaces made at the Union Rolling-Mills, Chicago:

Iron charged.	Iron yield.	Coal.		No. of heats.	Time heats.
		Bitum.	Anth. culm.		
14,284	14,295	7,586 1,188	8,774	18	48.45
12,720	12,515	6,885 1,056	7,941	24	49.00
13,256	13,345	7,565 1,110	8,675	25	49.50
10,600	10,360	5,665 880	6,545	20	44.00

Total loss on iron, from pig to muck-bar, $\frac{3}{4}$ ths of one per cent. Total coal used per ton, 1260 pounds. In many instances, the iron was balled and ready to draw in 1 hour and 30 minutes, the remainder of the time as charged being occupied in waiting on other furnaces, a scrap-furnace and flange-furnace having the right to the rolls.

The consumption of ore and scale is about the same as in an ordinary furnace. Although seeming especially adapted for use in the manufacture of iron, the process has not received an extended trial except at the Springfield armory, owing to certain commercial considerations not affecting the value of the process.

The use of anthracite culm in firing stationary boilers has of late years become quite general at the anthracite mines in Pennsylvania, and is being more and more widely adopted in other districts.

THE WOOTTEN METHOD FOR STATIONARY BOILERS.

The Wootten apparatus for burning culm in stationary boilers consists simply of wide grate-bars perforated with small holes about one quarter inch diameter and as near together as they can be conveniently cast and preserve a good strong grate-bar. The ash-pit is closed. Air is supplied by a steam-jet, as follows:

A one-inch pipe is led from the boiler and a quarter-inch nozzle blows a jet in the center of a larger pipe or pair of cones placed end to end. This is open at the top, and the jet of steam carries the air along with it into the furnace. Carrying a boiler pressure of from 60 to 80 pounds, one of these jets is used for every 12 or 14 square feet of grate. The fire is carried from two to three inches deep on the grate-bars, and is cleaned three times a day. It makes a very hot, bright, and apparently clean fire, very easy to handle and to control by regulating the blast.

On account of the steam-jet, the grate-bars are preserved from burning. Those at Reading have lasted several years and shown no need of renewal. There is, therefore, a small economy in this. The ashes, when drawn, are also slightly damp, making them much more convenient to handle. The whole apparatus is extremely simple and inexpensive.

*The material contained in the following article was collected for my graduating theses, Stevens Institute of Technology, etc.

THE HOWE CULM GRATE.

The Howe process for burning culm is very much like the Wootten, except that a shaking-grate is used. The dimensions of each bar in the furnace tested were: Length, 3 feet 8 $\frac{1}{2}$ inches, two bars being put end to end, to make up the length. Width, 5 $\frac{1}{2}$ inches. Spaces for rockers, 1 foot $\frac{1}{2}$ inch by 1 $\frac{1}{2}$ inches. Rockers, 11 inches by $\frac{3}{4}$ inch, rounded at end. Total area of each grate-bar, 1.71 square feet. Total area air-space of each bar, .467. Ratio of area of grate to area of air-spaces, 3.876. The steam-blast and air-tight ash-pit are used almost exactly as in the Wootten process.

As no reliable figures had ever been obtained for this direct-burning type of culm-burners, I obtained permission from the Lackawanna Iron and Coal Company, of Scranton, Pennsylvania, to make the following tests:

The boiler used was of the locomotive type, entirely unclothed by any thing to prevent radiation. The boiler, with another exactly like it, was used to supply steam for the machine-shop engine, a small engine for breaking pig-iron, and, from about three to half-past five P.M., for the engine running the cupola-fan for the foundry. In winter, the boilers are also used for heating purposes.

The demand for steam was at all times far below the capacity of the boilers, as is shown by the small rate of evaporation per square foot heating surface per hour. The boilers were fitted with the ordinary weighted lever safety-valves. The boiler-tubes are cleaned every Sunday. As there is some demand for steam during the night, it was impossible to have the boilers clean for each day's test. The nut coal test being on Thursday, was therefore made with a somewhat dirtier boiler than the culm test on Wednesday.

The fires, while not carried so thin as in the Wootten process, are moderately thin. They are cleaned at five A.M., eleven A.M., and five P.M. They are shaken down in cleaning to a thickness of from 3 to 4 inches, and are gradually built up to a thickness of from 8 to 9 inches before the next cleaning. While burning culm, the shaker and steam-blast were used. In order to make the comparison with the ordinary method of burning coal, the steam-blast was not used, and the fire was cleaned through the furnace-door, while burning the nut coal.

In burning the culm, it is thoroughly wetted before being thrown on the fire. This is done to prevent the draught carrying the dust through the tubes, and to make as caking a fire as possible. The firemen consider it impossible to burn the culm without so wetting it. As this is, therefore, a necessary part of the process, no account was taken in the calculations of the water so evaporated, and the weight of culm given as used is the weight dry. Our estimate of the amount of this water was, however, made, and it was found to amount to about 10 per cent of the culm burned. The culm burned is given as 3543 pounds. The water used to wet the culm was, therefore, 354 pounds; which, at the rate of 7.85 pounds of water per pound of coal, required 40 pounds of coal for its evaporation—an amount so small that it would hardly show in the calculation.

Steam from Blast.—The steam from the blast entering the fire is decomposed, and, uniting with the carbon of the coal, forms CO and H. These gases are afterward burnt. It is supposed by many that this adds to the heating power of the fuel. This is, of course, not the case. An amount of heat exactly equal to that gained by the burning of the hydrogen is required to decompose the water that furnished the hydrogen. The formation and subsequent burning of CO simply distracts from its essential conditions the attention of some of those who have considered the case.

It has also been stated that the heat of the lower layers of the fire that decompose the steam would otherwise be lost. This is evidently not the case, as all the air supply has also to pass through this lower layer. The amount of steam used by the blast is, however, an important point, and will be discussed farther on.

The coal was carefully weighed and was analyzed by myself in the laboratory of the Stevens Institute, and the analyses are appended.

Water.—The largest tank that could be had being a barrel, and the fact that the other boiler was filled from the pipe to which the hose was attached admitting of no delay in filling and emptying the barrel, it was deemed impracticable to weigh each barrel. The barrel was therefore fitted with an exit-pipe with a plug-cock in the bottom, so as to thoroughly drain it. It was then balanced on the scales, and filled with exactly 300 pounds of water and a quarter-inch overflow-hole bored. In use, it was filled by a hose until the water just trickled from the hole; the hose was then removed, the exit-cock opened, the pump started, the barrel emptied, and the time noted and recorded as a check in keeping the tally. Due care was taken [described at length in the ms.] in getting correct thermometrical and pyrometrical measurements.

Start.—On account of various local conditions and the peculiar fuel used, the alternative method, or running start, was used.

The boiler and engine were run during meal-time, and the consumption of steam was nearly uniform.

The steam-gauge was properly tested by a standard. The conditions were kept nearly the same for the two days, varying only in these respects:

The engine for breaking pig-iron was run while burning nut coal, but not while burning culm. The foundry fan was also run half an hour longer while burning coal.

The blower was not used for coal. The boiler was, as stated, one day's run dirtier while burning nut coal.

While burning coal, on account of its freer burning qualities, it was necessary occasionally to open the top doors to prevent blowing off steam by the safety-valve, it being deemed better to do this than to have the steam thus above the average pressure.

In making the tests for the quality of the steam, the barrel calorimeter was used. In view of its almost universal use and great convenience, it was deemed sufficient. An average of 300 pounds of condensing water was used each time, and steam enough was run into it to raise its temperature from 45 to about 110 degrees. Very great care was taken to make accurate readings, and, in view of this care, and of the amount of condensing water used, the tests are believed to be fully up to the average. In view, however, of the extreme liability to error, as shown by Mr. Kent on page 38 of the *Standard Method*, the tests must be considered to have

an error of at least one per cent. The barrel used was of heavy wood, and the time occupied in heating the water was less than five minutes; no correction is therefore made for radiation. In making up the synoptical report, the one per cent error has been allowed for, it being considered that the steam in each case was at least one per cent nearer saturation than the actual figures showed.

The results of the tests are as follows:

SCRANTON TEST.

DESCRIPTION OF BOILER.

Type, locomotive, with wagon-top and steam-dome.

Diameter of shell	54 inches.
Length of shell	24 feet 5 inches.
Number of tubes	114.
Diameter of tubes	3 inches.
Length of tubes	16 feet.
Diameter of steam-dome	30 inches.
Width of grate	4 feet 7 3/4 inches.
Length of grate	7 feet 5 inches.
Kind of grate-bars	Howe grate.
Width of air spaces	3/4 inch.
Ratio of area of grate to area of air-spaces	3.876 [feet area.
Area of chimney (two boilers)	37 inches diameter, 7.46 square
Height of chimney	80 feet. [feet.
Area of flues connecting with chimney	25 inches diameter, 3.41 square
Length of flues connecting with chimney	About 6 feet.
Grate surface	34.46 square feet.
Heating surface	1552.34 square feet.
Area for draught through tubes	5.6 square feet.
Ratio of grate surface to heating surface	45.5.
Ratio of draught area to grate area	6.15.
Ratio of draught area to total heating surface	217.2.

RESULTS OF THE TRIALS OF A LOCOMOTIVE BOILER FOR THE PURPOSE OF COMPARING ANTHRACITE CULM WITH NUT COAL. BOILER AT THE LACKAWANNA IRON AND COAL COMPANY'S WORKS, SCRANTON, PA.

	Culm. 1885. April 22.	Nut coal. 1885. April 23.
Date	April 22.	April 23.
Duration of test	11 hours	11
Average gauge pressure of steam	28 1/2 Pounds	83
Temperature external air	78.6° F.	80.3°
Temperature of escaping gases	430°	400°
Temperature of feed-water	45.1°	4.75°
Coal consumed	3543.1 Pounds	3535
Total refuse	1087	469
Total combustible	2456	3066
per hour	223.3	278.7
Superheating	20°	20°
Quality dry steam = 1	1.01	.98
Water evaporated, corrected for quality of steam	23,003 Pounds	24,157
Equivalent water evaporated into dry steam from and at 212 degrees Fahr	2529.5 Pounds per hour	2655
Water evaporated per pound dry coal from actual pressure and temperature	6.428 Pounds	6.973
Equivalent water evaporated into dry steam per pound dry coal from and at 212 degrees	7.853 Pounds	8.262
Equivalent water evaporated per pound combustible from 212 degrees	11.33 Pounds	9.528
Rate of combustion dry coal per square foot grate (coal assumed with 1.6 refuse) per hour	7.76 Pounds	7.77
Rate of combustion per square foot heating surface	0.173 Pounds	.175
Rate of combustion per square foot least area for draught	78.8 Pounds	78.8
Water evaporated from and at 212 degrees per square foot heating surface per hour	1.63 Pounds	1.61
Horse-power on basis of 30 pounds of water per hour from 100 degrees, and at 70 pounds	73.3	79.3
Composition of fuel—water	1.31	1.73
“ “ volatile matter	7.89	7.09
“ “ fixed carbon	83.50	78.90
“ “ ash	7.30	12.28
Percentage refuse	30.75	13.26
Percentage of refuse really ash	18.05	85.71
Water evaporated per pound coal after deducting steam for blower, dry steam at 212 degrees	6.864

These results must be modified by the amount of steam used to create the blast, in order to make strict comparison. Careful experiments were made to determine this. Without entering into these details, it may be said that the amount of air supplied per pound of steam used in blower was 27 pounds, and was 1759 cubic feet of air a minute. The amount of steam used by the blower was 12.8 per cent of the total generated. The blower was simply steam-jets blown through bell-shaped pipes into the closed ash-pit under the grate-bars. Deducting the steam used for the blower from the total generated, and comparing the remainder with the coal used, we find 6.864 pounds of dry steam at 212 degrees made per pound of coal, as compared with 8.262 pounds made by nut coal; making a difference of about 17 per cent in favor of nut coal.

The handling of the greater amount of ash from culm would add a little to this disadvantage; but on the other hand, the grate-bars, being cooled by the steam, last very much longer than in the ordinary fire. The bars in the experimental boiler had been in use continuously for nearly three years, and had required no renewal.

(TO BE CONTINUED.)

Metallic Railroad Ties.—At a recent meeting in Paris of the French Society of Civil Engineers, a paper by M. Post, of Holland, upon Metallic Railroad Ties was read. According to the author, the principal advantages inherent in the new system, advantages based on an actual trial of about twelve years in Germany, etc., were: 1. The average durability of the ties remaining in the track after twelve years' use is much greater with metallic ties of a good design than with the best wooden ties. 2. Safety is better guaranteed, as the gauge is better preserved. 3. The expense of maintenance is decreased after the second year of service, while with wooden ties this item increases with the age of the ties. 4. The system is rapidly perfecting, so that the fastenings are made absolutely certain and less expensive for repair and maintenance than fastenings used with wooden ties. 5. The value of the metallic tie when worn out in service is much greater than the value of an old wooden tie. In summing up these advantages, and combining them with the actual cost of purchase, redemption, and interest, M. Post concludes that no country can exclusively use wood for this purpose with true economy; and he cites Holland as a proof of his assertion, where wood is still easily obtained, and iron is not too plentiful. He says all the Holland companies have adopted the metallic tie.

SOME EXPERIMENTS IN THE CHLORINATION OF CALCAREOUS GOLD ORES.

Written for the Engineering and Mining Journal by Nelson W. Perry, E.M.

Every one who has had any experience in the chlorination process has doubtless also had more or less experience with that bane to the process, lime. And I doubt not that every one has also condemned that objectionable but common gangue to sheel, either mentally or audibly, or both, and attempted to find some "cure" for it. For this process, otherwise such a beautiful one and usually so cheap, would be the *ne plus ultra* for many gold ores, were it not for the lime. Sulphur, arsenic, antimony, etc., are readily got rid of by roasting, but not so the lime. CaCO₃ is converted into CaO, which is no improvement, and such rock, if treated with chlorine, consumes large quantities of gas to form CaOCl₂+CaCl₂ before the gold is attacked, which, being leached out with the AuCl₃, gives great trouble when FeSO₄ is used as a precipitant.

You have all doubtless felt as I have when, on adding the solution of FeSO₄ to the leach liquors, you saw them turn black with precipitating gold, only to see them turn white again with precipitating CaSO₄, and, on drawing off the supernatant liquid, found a mass of white precipitate so largely in excess of the black that it was as difficult to get the gold out of it as from the original rock.

I am speaking now of somewhat calcareous ores; but the presence of even the smallest quantity of calcite in an ore is troublesome, and any thing beyond a very small quantity renders that ore unsuited to the chlorination process. It is not the consumption of chlorine that is most objectionable, though that is, of course, an item of great importance in localities where NaCl, H₂SO₄, and MnO₂ are expensive; but many ores would stand this extra expense, and the metallurgist would, in many cases, willingly incur it if there were no other difficulties to follow; but that infernal precipitate of CaSO₄, which soon comes down on addition of FeSO₄, is the bugbear.

It has generally been held, I think, that these two disadvantages, bad as they are, are the only ones we have to deal with in the chlorination of calcareous ores; but my experiments go to show that there is still another and, if possible, worse one, namely, that in the presence of much CaCl₂ the gold is either not precipitated at all, or at best but imperfectly by either FeSO₄ or H₂S.

The many and various attempts to get around the precipitation of lime by the use of other precipitants than FeSO₄ are familiar to many engineers, and I need not rehearse them; but, except in unusual cases, FeSO₄ remains the best known precipitant of gold from solution on a metallurgical scale in our mining districts.

Some two years ago, I was engaged in treating some ore by the chlorination process in Central Mexico. The ore had a gangue that was apparently quartz; but a drop of acid showed the presence of large amounts of carbonates, which, however, were so finely disseminated throughout the rock as to defy detection by ocular inspection. The mineral was chiefly embolite and cerargyrite, carrying gold in the most minute state of subdivision. No sulphurets were present, yet this ore failed to amalgamate satisfactorily. By the *patio* process, practically no gold was obtained; yet the fire-assay showed the gold to be about five times that of the silver in value. In the *haciendas de beneficio* in that district, where this same ore was treated by the *patio*, they valued their bullion at \$9 a marc, \$8 being the value of silver free from gold; and in their fire-assays, the buttons of silver and gold were never parted, but weighed as pure silver, and the value of the ore calculated on this basis, so little value did they place on the gold contained in the ore. Yet the horn showed the gold to be in a clean, bright condition, though the *patio* failed to catch it. The ore was what would be called ordinarily a typical free-milling ore, yet it would not mill. The gold, being so extremely fine, was in the best possible condition for chlorination, so I determined to try that process, notwithstanding the lime, hoping to get around that in some way. H₂S as a precipitant was out of the question with iron worth 20 cents a pound. Then I tried various devices, such as making my solutions strongly acid with HCl before adding FeSO₄, in hopes of keeping up the CaSO₄. Then I tried precipitating my lime first; but all to no purpose, as those know who have been through similar experiences. I finally had to come back to the attempt to extract the gold cheaply from the precipitated CaSO₄. The result, as might have been expected, was unsatisfactory.

In the mean time, it was always my custom to test the leach liquor personally from time to time, to determine when the leaching was complete; and one day I sent a man to the tubs to collect me a beakerful of the leach liquor as it came from the tub, for this purpose. He brought into the office a small beaker of the drippings, and emptied it into a larger beaker standing on my desk, which contained a little *agua miel* (the unfermented juice of the maguay or century plant), which contains a good deal of both cane and grape sugar. When I came in, I noticed the mistake, but thought it would make no difference, and made my usual test for gold by adding a solution of FeSO₄. The gold came down beautifully, but, after waiting some time, there was still no lime. After an hour, there was no lime. I was delighted, but could not explain the phenomenon. After the leaching was found to be complete, I added the FeSO₄ to the precipitating-tank. It immediately turned black with gold; and, putting the *hacienda* in charge of my assistant, I left, feeling that, for some reason or other, this particular charge had worked beautifully. The next morning, bright and early, I was at the *hacienda*, drew off the supernatant liquid, and to my chagrin found the usual amount of CaSO₄ in the bottom. I was disgusted.

I remembered having read somewhere the statement that, where the attempt had been made to precipitate gold by filtering through charcoal, lime would not precipitate from the filtrate on addition of FeSO₄. Without verifying this statement, I assumed it to be true. This called to mind my *agua miel* experiment, and it occurred to me as probable that the presence of a strong reducing agent, such as sugar or charcoal, must account for the non-precipitation of the CaSO₄. I resolved, therefore, to try a number of experiments with the view of ascertaining the correctness or falsity of my theory. This is, in brief, a history of what impelled me to the following investigation, which has led to such interesting results.

In the following experiments, a solution of CaCl₂ of the usual laboratory strength was employed. The gold was in the form of an exceed-

ingly dilute solution of AuCl_3 , and the operations were conducted in test-tubes.

Experiment 1.—To precipitate gold in presence of CaCl_2 with FeSO_4 . When the amount of gold was small, there was none precipitated, but the precipitate of CaSO_4 was voluminous. With more gold, there was some precipitated, but the precipitation was evidently incomplete.

Experiment 2.—Solution CaCl_2 with little gold + FeSO_4 . As before, much CaSO_4 , but no gold. To another portion of the same mixture, I added H_2S water, but still no gold. With more gold, a precipitate was readily obtained.

These experiments were many times repeated with uniformly the same results, showing that CaCl_2 in large quantities materially interferes with the precipitation of gold from solutions, and, where the amount of gold present is small, prevents it altogether.

This, I think, is a very important fact, and one that will partly explain the poor results usually obtained in the chlorination of calcareous ores.

Remembering my *agua miel* experiment, and attributing its success to grape sugar, I proceeded as follows:

To the same solution of CaCl_2 plus a little AuCl_3 , I added a drop of syrup, and agitated well, then added FeSO_4 . The results were more favorable; there was some gold and considerable CaSO_4 , but not so much as before. This was encouraging, and I tried various other organic substances, including alcohol, glycerine, acetic acid, etc., but none acted as well as the molasses.

I then returned to the molasses, and made the following tests: I made a solution of CaCl_2 , as before, and added a few drops of a very weak solution of AuCl_3 , which we will call Solution A.

Experiment 1.—Solution A + FeSO_4 gave almost solid CaSO_4 , slightly colored with gold.

Experiment 2.—Solution A + 3 drops of molasses + FeSO_4 . Considerable CaSO_4 , but not so much as in Experiment 1, and much more color of gold.

Experiment 3.—Solution A, somewhat diluted, + HCl + FeSO_4 = CaSO_4 only.

Experiment 4.—Same as Experiment 2, but used H_2S as precipitant, but no gold appeared. Heated the liquid, but still no gold.

Experiment 5.—Solution A, without dilution + H_2S . Gold comes immediately.

Experiment 6.—Solution A, 1 part, H_2O 5 parts, FeSO_4 1 part = CaSO_4 , but no gold.

Experiment 7.—Solution A, 1 part, H_2O 5 parts + 2 drops molasses + FeSO_4 1 part. Gold comes immediately, no CaSO_4 in the cold, but on heating, the CaSO_4 comes down.

Experiment 8.—Diluted my solution of CaCl_2 , omitted the AuCl_3 , and added FeSO_4 . In a few moments, there was a copious precipitate of CaSO_4 .

Experiment 9.—Same solution as in Experiment 8 plus a few drops of molasses, then FeSO_4 . There is no precipitate of CaSO_4 , even on standing.

My next experiments were to determine approximately what quantity of molasses was necessary to prevent the precipitation of lime. To this end, I made a solution of one part of molasses to 50 parts of water, which I used in the following experiments except where otherwise stated.

Experiment 10.—Diluted Solution A, five times; added one part diluted molasses plus considerable excess of FeSO_4 . On standing five minutes, gold was quite perceptible. On longer standing, much precipitate of CaSO_4 .

Experiment 11.—Similar to Experiment 10, with but few drops FeSO_4 . Gold precipitates in two minutes, but no CaSO_4 , even on standing.

Experiment 12.—Same as Experiment 11, with addition of a few drops HCl . Gold precipitates much more quickly. No CaSO_4 on standing.

Experiment 13.—Solution A heated and well shaken with molasses (not diluted) + FeSO_4 . Gold immediately, but no CaSO_4 .

Experiment 14.—Same as Experiment 13, well shaken with molasses, but not heated. CaSO_4 comes first; afterward, the gold is precipitated.

Experiment 15.—Same as Experiment 13, without molasses, in the cold. CaSO_4 precipitates, but no gold. Another portion treated with H_2S ; still no gold.

Experiment 16.—Solution A, heated with molasses + HCl and diluted fifteen times. Slight reduction of gold noticeable. Add FeSO_4 . Gold precipitates immediately, but there is no CaSO_4 . After standing eighteen hours, a slight precipitate of CaSO_4 was noticeable.

Experiment 17.—Same as Experiment 16, without HCl . Gold precipitates immediately. After ten minutes, there is a large quantity of CaSO_4 . After eighteen hours, the amount of CaSO_4 is somewhat increased.

Experiment 18.—Used double the amount of Solution A, added molasses plus HCl , then FeSO_4 . Gold precipitates at once; no CaSO_4 observed at the time. After eighteen hours, all the gold is precipitated with some CaSO_4 —more than in Experiment 16, but only about one third that in Experiment 17.

Experiment 19.—Same as Experiment 17, but the molasses was boiled with water before adding. Gold precipitates immediately. After eighteen hours, all the gold is precipitated, but no CaSO_4 .

Experiment 20.—Same as Experiment 19, but solution much stronger (Solution A, less diluted); added HCl plus FeSO_4 . Gold immediately, but no CaSO_4 . After eighteen hours, a very little CaSO_4 .

Experiment 21.—Same as Experiment 20, without HCl . Gold immediately. In five minutes, much CaSO_4 . After eighteen hours, test-tube two thirds full of CaSO_4 .

Solution B = 3 to 5 drops of a weak solution of AuCl_3 in three quarter test-tube full of water plus saturated solution of CaCl_2 one quarter test-tube, the whole diluted with an equal quantity of water.

Experiment 22.—Solution B, plus two drops solution of molasses (molasses 1 part, H_2O 15 parts), added FeSO_4 . Gold immediately; no CaSO_4 . After eighteen hours, still no CaSO_4 .

Experiment 23.—Same as Experiment 22, with addition of HCl . Gold precipitates much more rapidly. After eighteen hours, no CaSO_4 .

Experiment 24.—A strong solution of CaCl_2 was heated and well shaken with a few drops of molasses, and FeSO_4 added. There was no precipitate of CaSO_4 after eighteen hours.

Experiment 25.—The same solution of CaCl_2 was used as in Experiment 24, with the molasses omitted. FeSO_4 was added, and in a few

minutes the contents of the test-tube were so solid as to permit the inversion of the test-tube without spilling more than a drop or two.

After the above and many other experiments, which were essentially repetitions of these, I came to the following conclusions:

1. The molasses must be thoroughly dissolved in the leach liquor before the addition of the FeSO_4 . This is a difficult thing to accomplish, if the molasses is added without dilution to the cold liquid, as no amount of stirring will thoroughly incorporate the two under these conditions. I would recommend, therefore, that the molasses be dissolved first in large excess of hot water (say one gallon of molasses to 30 or 40 gallons of water) in an auxiliary tub, thoroughly mixed, and kept for use. The quantity of this molasses solution necessary must be determined for each particular case by testing the liquid in a beaker or test-tube with FeSO_4 . If CaSO_4 precipitates, it indicates either that the molasses is in insufficient quantity, or that it has not been thoroughly incorporated. If the latter be the fault, an inspection by transmitted light will show the liquid to be non-homogeneous. If the fault lies elsewhere, the liquid will appear homogeneous.

Another precaution essential to uniform success is to avoid the addition of any large excess of FeSO_4 .

When molasses is used, I have frequently seen the gold precipitate in floccules at first, very different in appearance from the usual precipitate; but this may cause no uneasiness, as it soon assumes its usual granular form, and settles as rapidly as when no molasses is used; the percentage of molasses being so small as not perceptibly to thicken the liquid.

We have also seen that the best results are obtained when the solution is slightly acid. Now, a roasted calcareous ore, when treated with chlorine, contains considerable quantities of calcium hypochlorite, which, on addition of an acid, liberates chlorine gas. This gas need not be wasted, but may be used in the chlorination of another charge. For this purpose, the precipitating-tank should be constructed with a water-joint of not less than three inches around its upper rim. In this, will rest a light sheet-iron dome, which, for convenience of removal, may be suspended to a traveler overhead. This sheet-iron dome should be constructed exactly like the leaden one to the generators; that is, with acid-trap, delivery-tube, and water-joint for agitating shaft. The charging-hole, however, will be omitted. On the inside, and on all surfaces exposed to the action of the gas, it must be painted with asphalt paint, which will render it proof against the corrosive action of the chlorine.

Now, if the ore contains silver, it should be roasted with salt, as is usually done to prepare silver ores for amalgamation or hydro-metallurgical treatment. The objection raised against lime in leaching for silver, namely, that the CaCO_3 is partially converted into CaSO_4 , and the latter reacts on the AgCl to form metallic silver,* does not hold in this case, as should this reaction take place, the metallic silver would be converted into AgCl by the subsequent passage of chlorine gas.

We have now in our tank the silver as chloride, the gold in the metallic state, and our calcium largely in the form of oxide. In passing the chlorine, the AgCl remains unchanged, the Au becomes AuCl_3 , and the lime becomes a mixture of chloride and hypochlorite. When we leach (I prefer, in most cases, bottom leaching), the CaCl_2 goes into solution and acts as a solvent for the AgCl , this salt, according to Mr. W. M. Courtis,† being one of the best solvents for AgCl , all things considered. The AuCl_3 is also of course leached out. We have now in our solution both silver and gold, which may be precipitated together or separately, as desired.

It seems, therefore, that, since we can so easily prevent the precipitation of lime, and in view of the fact that a large portion of the chlorine consumed by the lime can be recovered and utilized again, the presence of calcite in an ore is a positive advantage, in that it renders the chlorination process adaptable to gold ores containing silver as well as to those containing gold alone, enabling us to extract both metals at one operation.

I would like to call attention to one other important step in advance in the chlorination process. Heretofore, we have been confined to the use of lead in the manufacture of our gas generators. The heat necessary for the largest production of gas is so great as to endanger the vessel. In practice, therefore, we have uniformly fallen short of the maximum output, which of course has materially added to the cost of our gas.

There is an establishment in England, and also one in Brooklyn, that are now making earthenware vessels of large size and of any shape desired, warranted to withstand the temperatures of the furnaces without cracking, and to be proof against the corrosive action of acids and vapors. A generator of such a material is far preferable to the old leaden generator, and must soon supplant it entirely.

Title to Mineral Lands—Pre-emption Laws.—No title to land known at the time to be mineral land can be acquired from the United States under the pre-emption, homestead, or town-site laws, according to the decision of the Supreme Court of the United States in the case of *Deffenbach vs. Hawke*, decided on the 16th inst. Mere occupancy of the public lands and improvements made thereon give no vested right therein as against the United States or any purchaser from them.

A New Method for Preparing Liquid Carbonic Acid.—A patent has been recently taken out in Germany for the above object. Sodium bisulphate in solution in a leaden jar receives an equivalent part of some carbonate suspended in water. The mixture is stirred, and carbonic acid is given off, and led over a drying mixture into a gasometer, where it is condensed into a liquid. The liquid carbonic acid can thus be very cheaply produced, and is applicable to a variety of purposes. About 500 liters of the gas, at ordinary pressure, can be supplied for one mark. At this price, it will pay mineral water manufacturers to buy gas ready made. By evaporation of the liquid acid, so much heat is absorbed that it can be used for the manufacture of ice. The patentee proposes to pass the carbonic acid thus utilized over moist sodium carbonate, which is thus converted into bicarbonate, from which liquid carbonic acid is again prepared.

* C. A. Stetefeldt, Transactions of the American Institute of Mining Engineers, Vol. XII., page 291.

† Transactions of the American Institute of Mining Engineers, Vol. II., p. 99.

MODERN AMERICAN METHODS OF COPPER SMELTING.*

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

CHAPTER X.

BLAST-FURNACES CONSTRUCTED OF BRICK.

This further diminution of the oxide of iron, and consequent necessary increase of temperature to melt the more and more infusible slag, soon bring about the exact conditions prevailing in an iron-ore blast-furnace. Metallic iron is reduced in large quantities, while the temperature is raised several hundred degrees, before the slag—now virtually an acid silicate of alumina and lime—will become sufficiently softened to run at all. In the mean time, the furnace wall, at the panel, is burned nearly through; blue jets of flame appear at every joint and crevice, and the most superficial examination shows that the process is extending into one or the other of the corner columns, threatening the stability of the structure, and still more alarming the person in charge. The column of ore in that end of the furnace hardly sinks at all; the heat is ascending to the surface of the charge; and the general increased stickiness of the rapidly lessening slag-stream, increase in tenor of the matte, and deposition of lumps of metallic iron in one or both compartments of the fore-hearth, show that the end is not far off, and unfold the near prospect of a chilled furnace, and the probable presence of a block of half-molten ore and iron that is almost impervious to tools and may result in the entire abandonment and destruction of the furnace.

This is one of the most common and well-known occurrences in small furnaces and with inexperienced metallurgists, and might just as well happen to the large furnaces now under discussion, were it not fortunately that their construction and management are not likely to be undertaken except by men of experience, and also that, owing to their greater size, a threatening—or even established—chill is much more easily managed than in the case of the smaller cupolas, whose contracted shaft is filled up solid almost before one is aware that any thing is going wrong.

Owing to the great area of the Orford furnace, a considerable portion of the shaft may be completely hidden by a chill, while a brisk fusion is progressing in the other half, giving an opportunity, by the use of skill and experience, to gradually smelt away the solidified portion and eventually bring matters back to their normal condition.

Returning to the imaginary case that has just been followed to a disastrous termination, the writer will endeavor to show how such a catastrophe may be averted, and will describe the course of events as they have occurred scores of times to every practical smelter.

The moment that it is noticed that one end or corner of the furnace is becoming abnormally hot, and that the column of ore corresponding thereto is sinking slowly, the tuyeres belonging to that portion of the shaft—from one to three in number—are immediately removed, and the openings slightly plugged with clay. At the same time, several charges of the most fusible slag—that from matte concentration and containing a very high percentage of iron is best—are given, in place of ore, and the whole furnace is most carefully watched, to learn whether the burning is due merely to some local irregularity in feeding, or whether some important point affecting the whole process is at fault; such as too much or too little fuel in proportion to ore; improper composition of slag; incorrect feeding; too strong or too weak a blast, etc., etc.

Experience alone can qualify the metallurgist to quickly and correctly detect the cause of the trouble and apply the appropriate remedy; but in any case, if, after taking the precautions enumerated and waiting a sufficient time to get their full effect, the burning still continues, it becomes evident that the trouble is deep-seated and of some extent.

Vigorous measures are therefore required to stop the melting of the brick-work above the tuyeres, and not only to cool down the heated end of the furnace, but also to repair, as far as possible, the damage already done to the panels—or even to the corners of the main columns.

Still keeping the offending tuyeres closed as already described, a full charge of siliceous ore should be fed in such a way that it will sink to the indicated spot. This may be given either with or without coke, or may be followed by a second or third, or even a greater amount, as the circumstances indicate; proceeding with extreme caution, and allowing some two hours to intervene between charges.

The author has found it necessary to charge as much as 11 tons of almost pure silica—quartz with specks and veinlets of carbonates and oxides of copper—into one corner of an overheated furnace, and this entirely without coke, before the gradual cooling of the external walls, normal and even sinking of the charge, and lowering of the temperature at the charging-door, indicated that the mischief had ceased.

The office of this siliceous addition is not to render the slag in general more siliceous. This would only bring about the evils already indicated, and probably cause a heavy reduction of metallic iron. Its object is rather to produce, by the sudden arrival of such a body of cold, infusible material, such an overwhelming effect as completely to cool down that portion of the shaft, the ore itself softening somewhat and remaining for the most part in the corner of the furnace corresponding to the point over which it was charged. It attaches itself to the walls and bottom, and fills up the cavity caused by the fusion of the fire-brick, lowering the temperature at the same time to a considerable extent, but producing no marked effect on the general character of the slag.

When this operation is successful, as is usually the case, the thinned and heated brick-work is virtually restored, the deeply excavated bottom is filled up to the general level, and matters resume their normal condition, all irregular bunches and protuberances of the siliceous addition that may have adhered to the furnace walls becoming gradually melted away and smoothed down until the interior mason-work, if visible, would be seen to have almost assumed its original appearance.

Such a result may seem very doubtful, and, in fact, the whole operation may appear to partake too much of the marvelous to those unfamiliar with such practice. The author would hesitate before describing the foregoing operation as a matter of general every-day occurrence, were it not that it can be vouched for in its entirety by a considerable number of well-known and reliable gentlemen. This practice, as initiated by certain members of the Orford Company, already mentioned, has spread until it is now a well-known and recognized part of our

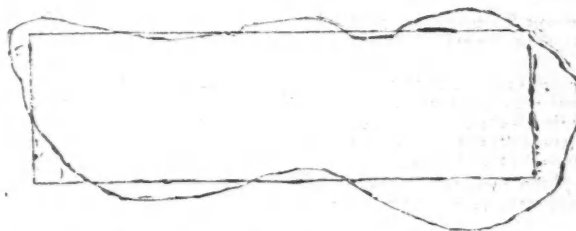
local copper metallurgy. The skill attained by certain foremen in managing these very large furnaces is quite remarkable and far beyond any thing described in this treatise.

While the imaginary case just described in detail represents only one of the various accidents peculiar to all forms of blast-furnace, it still is at the bottom of a very large proportion of the instances of "freezing," "choking-up," "burning-out," etc., etc. Paradoxical as it may appear, the two common accidents of "burning-out" and "freezing-up" are closely connected, and in reality only two different stages of the same morbid process. The young metallurgist can not overestimate the importance of the fact that it is quartz in one or another of its forms that is the most frequent cause of smelting difficulties and disasters. Seven out of the last eight cases of metallurgical difficulties for which the writer was called upon to prescribe were due to this cause.

In spite of the frequency and apparent simplicity of this difficulty, some smelters of experience never seem to have learned the cause, and attribute the slow and irregular running of the cupola and the frequent filling up of the crucible with sows to "too much iron in the charge"—"too much sulphur"—"magnesia in the limestone flux," etc., when, in almost every instance, a mere ocular examination of the slag is sufficient to show that silica is at the bottom of the trouble. No apology is needed for emphasizing this point, when men considered as expert metallurgists are constantly falling into this error.

It is especially during such accidents and irregularities that the great advantages of these very large furnaces become fully apparent. Where a small shaft would soon be completely and irretrievably choked, necessitating the great expense of blowing down and subsequently chiseling out the half-fused mass of ore and cinder, no large furnace, in any instance known to the author, has ever become so blocked up and filled with a chill that it has not been quite easy to save it by using appropriate means. Even though one end be completely blocked, there is always ample space at some points of its eleven-foot shaft to permit the descent of the charge and retain a sufficient number of tuyeres intact to gradually melt out the chill and restore the shaft to something like its former dimensions. Some considerable irregularity of form naturally results from repeated manipulations of this kind; but so long as sufficient area remains at the tuyere level, and no projecting masses impede the regular descent of the charge, no diminution of capacity need follow, nor increase of difficulty in managing the furnace.

The accompanying sketch gives a tolerably correct view of the shape of one of these large brick furnaces at the tuyeres upon its blowing out for repairs after a continuous campaign of 8½ months, during which time over 18,000 tons of exceedingly ferruginous ore were smelted in it, yield-



Owing to Thanksgiving, the engraver requests us to say that the square lines indicate "before the campaign," and the dotted or irregular lines "after the campaign."

ing a very low-grade matte and a slag averaging about 22 per cent silica and over 70 per cent protoxide of iron. As it is drawn to a scale, the extent of the irregularity is easily appreciable, the original dimensions being 3 feet 4 inches by 11 feet 4 inches, as indicated on the drawing.

In fact, the full capacity of this type of furnace, when smelting a basic ore, is not reached until the walls are burned out to a considerable extent, which may indicate the policy of widening the furnace in the first place. When smelting a siliceous ore, or when a large proportion of fines is present, the gain in width is accompanied with a decrease of temperature and irregularities in the descent of the charge—circumstances that soon rectify the trouble by adhering to the walls, and filling up the shaft again with a rapidity that may be disastrous if not observed and remedied in time.

As has been already briefly mentioned, the cutting down of the bottom and piercing of the foundation-walls is an accident that sometimes occurs, although usually only when the charge consists of a very fusible unroasted ore, producing a matte of low grade—from 25 per cent downward, whose fiery and corrosive qualities are well known to all furnace men. It is to the great quantity, as well as corrosive quality, of this substance, and this usually in connection with a basic slag, that this destructive process is due, and in spite of much care and expense bestowed on the matter, no material has yet been found that will withstand a daily production of from 20 to 45 tons of this intractable product. But a means of greatly lessening its destructive action, as well as of greatly prolonging the life of the entire structure and rendering its management much easier, has been discovered and quite generally adopted, being first brought into notice by Mr. John Thomson, of the Orford Company. It consists in duplicating the furnace plant and running each individual cupola only ten or twelve hours of the twenty-four. This is a scheme that seldom recommends itself to one on first hearing, but, after a thorough trial, will be found to possess numerous important advantages, while its only drawback is the increased first cost of the plant—a trifling consideration in comparison with the large interests usually at stake.

A mere doubling of the cupola plant is sufficient to overcome the difficulties mentioned; but if it is desired to reap the full advantages of the scheme, a corresponding increase should be made in the blast apparatus. This being effected, the entire smelting process may be confined to the daytime, avoiding the difficulties and drawbacks of night work, saving the wages of one or more foremen, and rendering it possible for the manager to retain that complete personal oversight of the smelting process that is unattainable when half of it is concealed from his inspec-

tion. If this were the only benefit derived from the above plan, it would in most cases be well worthy of adoption; but the advantages accruing to the furnaces themselves, as well as to the entire process, are too numerous and far-reaching to be thoroughly explained in this treatise.

In the first place, the cutting down of the furnace bottom is usually completely remedied by the long and ever-recurring periods of complete repose, during which the thinned brick-work is again sealed by the chilling of the molten products; the hearth is renewed by the solidification of the matte and slag still remaining in the cavities of the hearth; the overheated brick-work cools from the outside to such an extent that the area that to-day has given constant annoyance by its obstinate burning, with the constant threat of finally breaking through and causing serious trouble, will to-morrow be found as cool as or cooler than any other portion, owing to the thinness of its walls; and various slight difficulties that are pretty sure to occur in the course of a long run are averted before they become of importance, while the trouble begins at a new point, only to be again averted before it has gained serious headway. This is by no means an uncommon or imaginary case, but a matter of frequent occurrence, and these lines are written after several years' trial of both the constant and intermittent method of smelting, the experience of others who have fairly tried this plan, in connection with large brick furnaces, being equally favorable.

The writer's attention was first called to this matter in 1871, when noticing the almost invariable improvement in behavior and capacity that succeeded any accidental stoppage of cupola-furnaces that he was then managing. The ores were exceedingly bad and siliceous, and the difficulties detailed in the preceding pages followed each other with disheartening regularity and frequency. Great pains were taken to secure a steady and uninterrupted run, fears being entertained that any stoppage would be disastrous to the furnace in the more or less critical condition that seemed to be its normal state; but after finding that the benefits following any temporary stoppage of the machinery had become so obvious that the foreman was in the habit of purposely causing slight accidents in order to help his furnace out of some particularly critical situation, it was decided to adopt the practice of stopping for two or three hours whenever the ordinary incidents of burning out, etc., became unusually critical. This habit was carried farther and farther, proceeding with caution and gradually lengthening the stoppages, until it came to be considered an almost universal remedy, and was as often applied for chilling or freezing up as for the opposite condition of affairs, and no misfortune ever arose from its reasonable application.

This practice, like every other, must be used with care and judgment, and may easily be carried to an extreme, but as a rule is the least dangerous measure that can be adopted with a badly acting furnace of large area. A small furnace might easily chill in a few hours, so that the length of the period of repose must be proportioned to the size of the shaft and to the cubic contents of the heated material. The thickness of the walls must also be considered, as the rapidity of the escape of heat depends upon the thickness of the brick-work. It is hardly necessary to say that every orifice and crevice about the furnace must be tightly sealed, the tuyeres being removed, and their openings, as well as the slag-run, being tightly filled with damp clay, while the brick-work in their vicinity must be searched for possible cracks, and all such openings carefully plastered over. Otherwise, the incoming currents of air would gradually burn away all the fuel contained in the charge, leaving the furnace in a hopeless condition. If it is to stand still any length of time, such as over night, a few extra. charges of coke should be given an hour or two before stopping, so that there may be an abundance of fuel in the bottom of the furnace. A small charge of basic slag should also be given; and as soon as the blast is taken off, the basin or fore-hearth tapped, and all openings sealed, the surface of the charge should be covered with a layer of fine coke, over which is spread an inch or two of fine, fusible ore. The slag-hole connecting the furnace with the fore-hearth should be thoroughly cleared out; the layers of chilled slag and ashes, by which the blowing through of the blast is prevented, removed, and the channel itself filled with fine charcoal or coke, well rammed in with a "stopping-pole." This is rendered impervious to air by an exterior plug of clay, and the fore-hearth, while still hot, being scraped clean of all half-fused masses of slag or reduced iron, and every thing being prepared for the morrow's work, the cupola may be left in charge of an experienced watchman—preferably an old smelter. On the ensuing morning, a light blast is put on, and the channel being cleared out, slag will flow in from five to ten minutes, while in half an hour the furnace will be in normal condition, and in most cases smelting more rapidly and satisfactorily than when left the previous evening.

(TO BE CONTINUED.)

"Mystery Gold."—This consists of 2.48 silver, 32.02 platinum, and 65.5 copper. It is not touched by boiling nitric acid. [See ENGINEERING AND MINING JOURNAL for October 17th, 1885, page 272, art., "A New Gold-Like Alloy."]

Electrolysis of Salts.—In a paper recently read before the Académie des Sciences, M. Renard stated that in solutions sufficiently dilute the amount of metal precipitated is proportional to the concentration of the liquid. The proportions of metal deposited are in the same relation as their atomic weights. According to the law of Faraday, the quantity of metal precipitated being proportional to the intensity of the current, the conductivity of solutions containing equivalent atomic weights of metal is the same, as M. Bouty has sufficiently demonstrated.

Manufacture of Bichromate of Potash.—An improved method of manufacturing bichromate of potash has been devised by Mr. Roemer, of Elberfeld. A concentrated solution of sodium bichromate is dissolved in boiling water and potassium chloride added. This mixture is then maintained at the boiling-point until a mutual decomposition takes place, potassium bichromate and sodium chloride being formed. The mother liquor is concentrated, so that sodium chloride is salted out, which is removed and washed with hot water, and instead of bichromate the neutral chromate of sodium may be employed, in which case the solution

is first sufficiently acidulated with hydrochloric acid to be transformed into bichromate; when the latter is treated as before mentioned.

Temperature of the Earth.—The German government, *Engineering* says, is having a deep shaft sunk near Schladebach, with the view of obtaining trustworthy data concerning the rate of increase in the earth's temperature as we descend into the interior. The excavation is carried on by a diamond-tipped borer driven by water. At the beginning of 1885, the shaft had reached a depth of 4640 feet. The temperature at successive stages is ascertained by an instrument that serves as a special thermometer, the principle of construction being that, as the heat increases, the mercury will expand so as to flow over the lip of a sufficiently short open tube in greater and greater quantities. The measurement of the differences of these overflows will give the rate of increase of the temperature. It has been ascertained that the temperature at the depth of 4640 feet was 130 degrees Fahr. If the temperature increases regularly at this rate, the boiling-point of water ought to be reached at a depth of 10,000 feet.

A Carbon Dioxide Gas Well.—A bore-hole made about two years ago to a depth of 52 meters into the older Devonian strata near Burgbrohl, on the Rhine, yields a large and steady supply of carbonic acid gas, with water, which is variously utilized. In a recent paper to the *Niederrheinische Gesellschaft in Bonn*, Herr Heusler says that the normal quantity of gas amounts to about 2160 cubic meters in twenty-four hours. The supply having proved constant, a compressing apparatus was set up last fall, the gas being taken directly over the bore-hole. The present system produces per minute from 500 liters of gaseous CO₂, 1 liter of liquid, weighing 1 kilogram. As the liquefaction depends on the external air temperature, and is impossible at a temperature over 30.9 C.—the critical point—it is necessary in high temperatures to cool the apparatus; and the water of the spring—which keeps at 12 degrees—serves for this. The pressure employed ranges from about 50 to 70 atmospheres. The wrought-iron vessels for dispatch of the liquid contain about 8 liters, and are tested to about 250 atmospheres; they very rarely explode. The enormous expansion of carbonic acid with rise of temperature yields a pressure which, *Nature* says, is utilized for compression of steel and other casts, and Messrs. Krupp, at Essen, have thus got, for example, a pressure of 1200 atmospheres for a temperature rise of 200 degrees C. Among other uses are preservation of beer, impregnation of natural water, apparatus for fire extinction, and motor force for torpedoes.

BOOKS RECEIVED.

[In sending books for notice, will publishers, for their own sake and for that of book buyers, give the retail price!]

(United States Geological Survey. J. W. Powell, Director.) *Contributions to the Mineralogy of the Rocky Mountains*. By Whitman Cross and W. F. Hillebrand. Washington: Government Printing-Office, 1885. 8vo, pages 114, one full-page plate, full Table of Contents, and Index. Paper covers. (This is Bulletin No. 20 of the United States Geological Survey, and will be included in Vol. III.) With this was sent a four-page pamphlet, entitled, *Wide-spread Occurrence of Allanite as an Accessory Constituent of Many Rocks*. By Joseph P. Iddings and Whitman Cross. (Reprinted from the *American Journal of Science*, Vol. XXX., August, 1885.)

American Money. By John George Hertwig. Equal Rights to All, in all Matters of Public Concern. Washington, D. C. 1885. 8vo, pages 23. Paper covers, 15 cents.

There is no equality between the standard silver dollar and the gold dollar, between the government bond and the United States note, between the gold certificate and the silver certificate. The standard silver dollar is not a "correct" silver dollar. On September 25th, 1885, the standard silver dollar, as bullion, was, according to the latest quotation of silver in London, worth only 80.5 cents in gold. The United States note and the silver certificate are based upon this depreciated standard silver dollar. The author would have Congress change the standard silver dollar so that its bullion value and its face or nominal value might agree, or that it might become correct, containing a gold dollar's worth of fine or pure silver, according to the current price of silver in the markets of the world. The silver dollar should become a true counterpart of the gold dollar. It should be the duty of Congress annually to look into this matter, and remedy any discrepancy in value by recoinage of the silver dollar. The essay is devoted to the suggestion of methods for readjusting and harmonizing the currency and pecuniary obligations of the government, after the silver dollar has been brought up to a value equal to that of the gold dollar. The pamphlet may be obtained by addressing the author, P.O. Box 706, Washington, D. C.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

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

GRANTED NOVEMBER 17TH, 1885.

- 330,367. Fastener for Meeting-Rails of Sashes. James M. Atwood, Plymouth, Mass.
- 330,376. Rock-Drilling Machine. William H. Clark, What Cheer, Iowa.
- 330,381. Process of Drying Air for Metallurgical Operations. John H. Cremer, Brad-dock's, Pa.
- 330,408. Ore-Crusher. Stephen R. Krom, Plainfield, New Jersey.
- 330,415. Open-Hearth Furnace for Iron and Steel. Oscar Murisier, Alexandrowsky St. Petersburg, Russia, and Percy C. Gilchrist, Palace Chambers, Westminster, England; said Murisier Assignor to said Gilchrist.
- 330,442. Water-Circulation for Tuyeres, Blast-Furnaces, etc. Edward A. Mehling, Bethlehem, Pa.
- 330,454. Process of Precipitating Nickel and Cobalt from Solutions containing the same. Charles H. Aaron, Nogales, Ariz.
- 330,460. Device for Preventing Incrustation. James H. Blessing, Albany, New York.
- 330,489. Rock-Drill. Sylvanus Hussey, Silver Creek, New York.
- 330,539. Valve for Air and Gas-Compressors. William H. Worthen, Brooklyn, New York, Assignor to Guild & Garrison, same place.
- 330,540. Combined Water-Pump and Air-Compressor. C. C. Worthington, Irvington, New York.
- 330,561. Apparatus for Grinding Rolls. Harvey B. Chess, Pittsburg, Pa.
- 330,617. Tunnel Excavator. Charles C. Quinn, Fargo, Dak.
- 330,624. Tube-Joint for Gas-Conduits. W. Lucien Scaife, Alleghany, Pa.
- 330,637. Process of Purifying Petroleum. Julius H. Tiemann, Brooklyn, New York.
- 330,691. Clay Cutter and Pulverizer. Willis A. Graves, St. Louis, Mo., Assignor of one half to the Hydraulic Press Brick Company, same place.
- 330,731. Process of Manufacturing Coke. Henry M. Pierce, Nashville, Tenn.
- 330,732. Furnace for the Manufacture of Coke. Henry M. Pierce, Nashville, Tenn.
- 330,747. Process of Producing Illuminating Gas. Roland B. Smith, Pittsburg, Pa.
- 330,778. Apparatus for Making Gas. Walter P. Elliott, New Brunswick, New Jersey.
- 330,817. Amalgamator and Concentrator for Stamp-Mills. Lorenzo M. Boardman, Minneapolis, Minn., Assignor of one half to Sumner Ladd, same place.

FURNACE, MILL, AND FACTORY.

The great superiority of American over European mining machinery is illustrated in the case of the famous El Callao mines, in Venezuela. A couple of years ago, that company purchased a compressor and rock-drills in Europe, but after a trial threw them out and put in Ingersoll compressors and twelve Ingersoll drills. Recently, eight more of these drills have been ordered, the first lot having given great satisfaction. Our readers will remember that the new hoisting-engines of the Callao Company were furnished by the Dickson Company, Scranton, Pa., and were illustrated in the *ENGINEERING AND MINING JOURNAL* a few months ago.

The Business Men's Association of Ashland, Wis., is considering the advisability of taking steps to have a blast-furnace added to the industries of that city.

The Deer Lake Company's furnace, near Ishpening, Mich., went into blast on the 20th inst.

Mr. J. P. Witherow, of Pittsburg, Pa., has purchased, at receiver's sale, the greater part of the machinery of the Gorringer ship-yard, at Philadelphia, and will place it in new works that he is erecting in New Castle, for the manufacture of the Heine water-tube boiler. This boiler closely resembles that made by the Babcock & Wilcox Company. Mr. Witherow has a contract to erect ten of these boilers, of 200 horse-power each, for use at the three blast-furnaces that the Troy Steel and Iron Company is erecting at Troy, New York.

The Cartwright Iron and Steel Company, Steubenville, Ohio, which has a capital stock of \$50,000, is just beginning operations, having bought a plant at Allikanna, a suburb of Steubenville. The officers are James Cartwright President, and Frank B. Davis Vice-President and Secretary.

According to reports, Mr. Alfred Davy, the English inventor, will return to America next spring, and erect the experimental steel plant at Sharon, Ohio. The matter has hitherto been held in abeyance, pending the hearing of the application for United States patents on his steel-making inventions. These patents, it is stated, have been granted, and now nothing remains in the way of introducing the process into this country.

The Beaver Falls (Pa.) Hinge and Chain-Works, which were recently destroyed by fire, have been rebuilt, and are running double turn in all departments.

Proposals will be received by Thomas Reynolds, Chairman of Committee on Extensions and Distributions of the Board of Public Works of Jersey City, New Jersey, until November 30th, for furnishing about 750 lengths of 6-inch cast-iron water-pipe and 250 lengths of 8-inch.

The Chester Pipe and Tube-Works, at Chester, Pa., resumed operations on the 23d inst., having been idle for two years.

John W. Henion, Superintendent of Water-Works, Minneapolis, Minn., will receive proposals for cast-iron water-pipe, until December 3d, as follows: 51,781 feet of 6-inch cast-iron pipe to weigh 35 pounds to the lineal foot; 38,507 feet of 8-inch cast-iron pipe, 50 pounds to lineal foot; 5424 feet of 10-inch cast-iron pipe, 70 pounds to the lineal foot; 16,290 feet of 12-inch pipe, 90 pounds to the lineal foot; 9172 feet of 16-inch pipe, 130 pounds to the lineal foot; 6254 feet of 24-inch pipe, 250 pounds to the lineal foot.

It is reported in Chicago that the works of the Calumet Iron and Steel Company will soon resume operations, although it is not expected that the company will pay the card demanded by the Nailers' Union, which was fixed at 31 cents a keg. The mills have been idle since June 15th.

The Lochiel Rolling-Mill, Harrisburg, Pa., which has been idle for several years, has been leased for five years by E. S. Gerhardt, C. W. Eckmann, A. Creveling, and Charles H. Reynolds, of Danville. The new firm will soon begin operations, and will manufacture skelp iron for the Middletown Tube Mill, which will use all the material that can be made by the establishment. The Belleville Steel and Iron Nail-Works have been organized at Belleville, Ill., to manufacture iron and steel nails; capital stock, \$45,000; incorporators, James M. Hay, Peter Standor, and William White.

A. W. Van Vliet, of Fishkill-on-the-Hudson, New York, invites correspondence with builders of water-works, concerning the supply of two towns with water.

The old Glenwood Steel-Works property, at the end

of Second avenue, on the Baltimore & Ohio road, Pittsburg, Pa., is offered for sale by the Freehold Bank.

Judge Brewer, of the United States Circuit Court, at Des Moines, Iowa, has rendered an important decision in the case of Washburn & Moen vs. the Grinnell Barbed Wire Company. A decision was made last spring, sustaining the validity of the Glidden patent and the right of plaintiffs to control it. It was decided, at that time, that the master in chancery should determine the amount of damages to be paid. He fixed the sum at \$41,850. The defendants excepted and argued the case at the last term of the Federal Court in Des Moines. Judge Brewer, in his decision now, reduces the amount from \$41,850 to about \$24,000, stating in his opinion that, while that estimate for damages was probably too low, he would fix the royalty that the company should pay hereafter at a figure that should be large enough to compensate.

The Columbia Iron and Steel Company will soon begin the erection of a steel and iron-works at Uniontown, Pa.

The Sturtevant mill is meeting with much favor. Many orders are received by the company, whose address is No. 89 Mason Building, Boston, Mass.

LABOR AND WAGES.

A report from Woods's Run, fourth pool, Pa., on the 27th, states that a riot is in progress between the striking and non-union miners. Several are reported fatally injured.

It is stated in Pittsburg, Pa., that the Eastern nail manufacturers are contributing money to the striking nailers of the West, and have agreed to do so until the end of the strike.

The General Superintendent of the Philadelphia & Reading Coal and Iron Company, at Pottsville, Pa., on the 24th inst., issued a circular to the district superintendents directing them to notify the men at the various collieries of the company that the wages to be paid for November, as well, probably, as for December, will be upon the \$2.50 basis.

The Secretary of the Western Nail Association, at Wheeling, West Va., reports that 638 machines are now in operation at the manufacturers' 17-cent scale. This is an increase of 30 machines over the report of last week, and of 80 over that of two weeks ago.

A joint convention of the Miners' Amalgamated Association and the Knights of Labor met in Pottsville, Pa., on the 26th inst. The sessions were secret. A resolution was adopted providing for the enforcement of the eight-hour law on May 1st, 1888. The convention also decided to allow no miner after January 1st to take more than one job of work, and prohibited, after that date, any work being done by contract. They also served notice upon the mine inspectors that the new timber law must be enforced, and declared that all violations would result in prosecution.

On the 22d inst., the miners at Nelsonville, Ohio, discussed the resolutions of the operators giving the terms of arbitration, and after a little wrangling, President McBride gave in and sent out the order for the miners to go to work on the 23d in all places, and the wages will be settled by the arbitrating board.

The trouble between the non-union coal miners who are at work in the Fourth Pool and the striking miners in the Monongahela Valley, Pa., is not yet over.

TRANSPORTATION NOTES.

A joint freight tariff has been issued giving rates on business to and from points in Montana and Idaho on the Union Pacific road. The rates between Chicago and St. Paul, Minneapolis, Council Bluffs, or Kansas City are as follows: First class, 60 cents; second, 45; third, 35; fourth, 22½; rails, steel or iron for steam or street railroad, or pig-iron, c. l., 12 gr. tons, per gr. ton, \$2.50; nut locks, splices, spikes and bolts, nuts, links, and pins, also rough railroad castings (parts of cars), c. l., 24,000 pounds or over, per 100 pounds, 12½ cents; ore, copper, pig, or matte, valuation not exceeding \$100 a ton, c. l., 24,000 pounds, per 100 pounds, 12½; base bullion, valuation not exceeding \$100 per ton, c. l., 24,000 pounds, per 100 pounds, 15.

The following new rates are announced to Davenport, Rock Island, and Moline, applying upon business originating at Baltimore, Philadelphia, New York, and Boston, and points common therewith, including all traffic subject up to Chicago to the official classification of westward-bound freight: From Chicago,

Milwaukee, and common points: First class, 30 cents; second class, 25 cents; third class, 20 cents; fourth class, 15 cents; special class, 12½ cents. On business originating at Chicago, Milwaukee, and common points, the rates will be: First class, 30 cents; second class, 25 cents; third class, 20 cents; fourth class, 15 cents; fifth class, 12½ cents; sixth class, 10 cents; coal mined east of Indiana, and coke, \$1.56 a ton; oil, coal, or carbon, 55 cents.

Work has begun on the line of the Colorado Midland Railroad, which will run from Colorado Springs to Leadville and Aspen. It is also the intention of the company to build its line from Glenwood Springs into Utah and on to the Pacific coast. This railroad will connect at Colorado Springs, with the Missouri Pacific, which is to be constructed from its present terminus in Western Kansas to Colorado Springs, making a continuous through route to the East. It will also connect with the Denver & Rio Grande and the Atchison, Topeka & Santa Fé and the Denver & New Orleans at the same point.

The public auction sale of the New York, West Shore & Buffalo Railroad, which was brought about by the foreclosure of the \$50,000,000 mortgage held against the property by the United States Trust Company, took place at Newburg, New York, on the 24th inst. It was purchased in the interest of the New York Central Railroad by J. Pierpont Morgan, Chauncey M. Depew, and Ashbel Green for \$22,000,000. There was only one bid.

The water was drawn from the Delaware & Hudson Canal on the 27th inst. It is said that there is some probability of the abandonment of this canal in favor of a railroad track to be laid along its bed. The Canal Company has made affidavit to the assessors of the Rondout end of the canal, that the canal is a burden and "does not pay running expenses." The canal cost \$6,500,000, has been in operation since 1829, and fifteen years ago paid 140 per cent premium, the stock selling at \$240 a share.

COAL TRADE NOTES.

ARKANSAS.

The Pennsylvania Coal and Iron Company has purchased over 19,000 acres of coal and iron lands in the mineral regions west of Hot Springs. Operations toward opening mines will soon begin. The coal-fields extending from Hot Springs west of the Indian Territory, are said to be extensive and rich in many places. The coal produces from the surface, and is of fine quality.

MARYLAND.

At a special meeting of the stockholders of the Thomas Mining Company last week, it was determined to take steps looking to the immediate development of the property, and preparations are making with the purpose of beginning coal shipments during the latter part of winter or early spring. The coal lands of the company lie about a mile northeast of Frostburg.

NEVADA.

The discovery of coal is reported at Verdi, on the line of the Central Pacific Railroad, ten miles west of Reno. A tunnel run in from the level of the Truckee River, at a distance of 200 feet is said to have exposed two strata—one three feet and the other two feet in width, separated by a sandstone wall 12 inches thick. A car-load has been shipped to San Francisco to have it thoroughly tested.

OHIO.

The Rush Run Coal-Works, over which there has been considerable litigation in the courts, were sold on the 23d inst. at sheriff's sale to William P. Hays, for \$5943, two thirds of the appraisal. The works were owned by Thomas Nutridge and others, of Pittsburg.

PENNSYLVANIA.

Thirty-three mine bosses were given certificates after an examination by the Board of Examiners on the 23d inst. They are as follows: George Crouch, Matthew Creery, Peter Lamp, William Penn, Aaron Watson, Thomas Burtoff, A. E. Kirkland, Julius C. Esmial, William Stevenson, W. W. Carter, Frank Cornell, John B. Stone, William Young, John Patterson, David Boden, John Neish, John Harr, Alexander Thompson, Dominick McCreedy, Silas McGraw, W. P. McMasters, Charles A. Wilhelm, Thomas Gray, William Winford, Jacob Hearley, Jacob Gilliland, Hugh McMurray, Thomas Renshaw, Charles Warner, Harvey Thompson, B. B. McDowell, George Valkert, Michael Mulherron, C. P. Mayer, T. T. Williams, William Henry, Peter Stinner.

Over fifty men were examined for positions as fire-bosses, but three fourths failed to pass.

ANTHRACITE.

The coroner's jury investigating the cause of the recent explosion in shaft 2 of the Delaware & Hudson Coal Company's mine in Plymouth, whereby several men lost their lives and a number were injured, rendered a verdict on the 25th inst., throwing the responsibility for the disaster on the company and its officials, claiming that the shaft was not properly ventilated. They also censure G. M. Williams, the mine inspector, for allowing work to be carried on under unsafe conditions.

The Mine Inspectors' report for October is as follows:

Pottsville District—Samuel Gay, Inspector: Accidents, 7; killed, 1; injured, 6; total number of employes, 7530; average number of days employed, 24½; number of tons of coal shipped, 233,285-17.

Shenandoah District—William Stein, Inspector: Accidents, 10; killed, 2; injured, 8; total number of employes, 13,698; number of days employed, 25; number of tons of coal shipped, 498,295-02.

Shamokin District—James Ryan, Inspector: Accidents, 27; killed, 7; injured, 20; total number of employes, 13,596; average number of days employed, 24½; number of tons of coal shipped, 411,767-10.

The famous land case of the Deeringers against Eckley B. Coxe, of Drifton, which has been in litigation for the last thirteen years, was called at Wilkes-Barre on the 23d inst., and, after considerable arguments by both sides, was continued to the February term because of the death of Charles S. Coxe, one of the defendants. The suit involves the title to 2000 acres of land, valued at about \$1,000,000, and the real ownership is to be tested for the third time. Mr. Coxe claims to own the land by reason of an alleged default in taxes by the Deeringers in 1834, and the case is complicated by the absence of important records. Colonel Deeringer now has in his possession newly discovered evidence that he will not make public.

The heaviest snow-storm of years was raging throughout the coal region on the 24th inst., impeding railroad travel and rendering work at a number of collieries impossible. Should warmer weather immediately follow, many of the collieries will be drowned out.

A vein of coal resembling anthracite is said to have been found at a depth of 150 feet on a small spur of Jack's Mountain, Brady township. Operations there are to begin at once.

BITUMINOUS.

The Manor Valley Gas Coal Company has begun shipments of gas coal from its property.

COKE.

The Imperial Coal Company is considering the introduction of the new form of English coke-oven, and work on the experimental ovens will be begun at once. The one in question has for its object the saving of every component part of the coal. The products, in the shape of tar, ammonia, and coal oil, are carried off and purified.

It is reported that the Cambria Iron Company has purchased the Mahoning coke-works, near Dunbar. They consist of 100 coke-ovens and a tract of coal land.

The Connellsville Coke Syndicate has ordered another 10 per cent of its ovens to resume. There is now 80 per cent of the ovens in blast, and it is expected that the remaining 20 per cent will be ordered in blast in a few days.

NEW MEXICO.

Press dispatches announce that a vein of coal has been found extending through the mountains at White Oaks, about 140 miles northeast of El Paso. The vein averages six feet in thickness, and is clear of shale. The quality is said to be equal to anthracite in heating properties. Large deposits of beautiful black marble have also been discovered in the same vicinity. It is reported that Eastern capitalists are contemplating the building of a railroad from White Oaks to El Paso, Texas, where the minerals will find an outlet.

GAS AND PETROLEUM NOTES.

Exports of refined, crude, and naphtha from the following ports, from January 1st to November 21st:

	1885.	1884.
	Gallons.	Gallons.
From Boston	8,013,302	6,622,402
Philadelphia	138,397,537	100,423,277
Baltimore	10,520,087	12,781,275
New York	333,056,988	346,036,933
Total exports	468,990,914	465,863,887

COLORADO.

Mr. D. G. Peabody, of the Colorado Oil Company, which was recently organized at the East with a capital stock of \$100,000, to work the Arkansas Valley oil region, has just begun the work of sinking thirty additional wells at Florence, thirty miles west of Pueblo. Work will be pushed rapidly to completion.

PENNSYLVANIA.

An important meeting of Sharon capitalists and Franklin parties was held on the 24th inst. at Sharon, when a local company was talked of for the purpose of piping gas from Franklin to Sharon. It was reported that a 10-inch main from Franklin would cost \$300,000.

A charter has been issued to the People's Natural Gas and Pipeage Company, of Pittsburg, with a capital of \$100,000.

An explosion occurred last week at the Pittsburg Producers' Wild-Cat Oil Well, near Mars station, which destroyed the derrick and rigging and severely burnt four men.

It is said that the flow of gas in the Bridgewater Company's well, in the New Sheffield District, surpasses that of any well yet drilled in that locality.

The Harrison Natural Gas Company, with a capital stock of \$2500, has been chartered. It will supply gas in Harrison and Fawn townships and Tarentum.

The new process of converting natural gas into an illuminant has been so successfully tried, it is said, at the National Tube-Works of McKeesport, that the firm proposes furnishing the town with the new illuminant.

WYOMING.

At an informal meeting of oil prospectors at Lander on the 13th inst., it was demonstrated beyond a doubt that there is still in the vicinity of the Bonanza oil springs of Messrs. Conant & Anten an undiscovered oil deposit fully as large and valuable as the Bonanzas themselves. All the prospecting possible will be done this winter.

GENERAL MINING NEWS.

ARIZONA.

PIMA COUNTY.

Mr. Hugh White, the manager, is purchasing the necessary machinery for the smelting-works at Nogales. The contract for the building has been let.

SAN XAVIER.—An effort will be made to lease this company's smelter, near Benson station, for the treatment of the ores of Pima District.

CALIFORNIA.

MONO COUNTY—BODIE DISTRICT.

Reports for week ended November 16th:

BULWER.—In the south drift on the Stonewall ledge from cross-cut No. 1, 20 feet, the vein carried 20 inches of fair milling ore. On Ralston No. 2 ledge, south, they are now drifting north to connect with the Bulwer stopes. This vein carries some very good ore, and is improving as they go south and also in the uprise.

CONSOLIDATED PACIFIC.—The vein has improved materially during the week. Winze No. 2 has reached the depth from which they will start a drift to connect with the bottom of the winze in the upper tunnel. No. 3 vein looks well.

CHEROKEE.—The property of this company, says the *Greenville Bulletin*, is advertised for sale under foreclosure of mortgage. It should be owned by the Green Mountain Company. The lower tunnel of this mine would tap the Cherokee claims at a great depth, thus avoiding the great expense of hoisting ore, an item that has prevented the successful operation of the Cherokee in the past.

INDIAN VALLEY.—Important developments are reported. In the bottom of the shaft, now 680 feet deep, the ore found is said to be rich.

NEVADA COUNTY.

MENLO GOLD QUARTZ COMPANY.—The receiver of this company, Mr. Bartow S. Weeks, will present at a special term of the Supreme Court in this city, on the 30th, at half-past ten o'clock A.M., an account of all his proceedings as receiver.

SAN BERNARDINO COUNTY.

ORO GRANDE.—The company's mill at Oro Grande has been leased to Denver capitalists for six months, with the privilege of purchasing.

SAN FRANCISCO COUNTY.

SELBY SMELTING AND LEAD COMPANY.—At a special meeting of the directors, it was resolved to call a special meeting of the stockholders on January 22d, at two P.M., at the company's office, 416 Montgomery

street, to take into consideration and decide upon the proposition to increase the capital stock of the corporation from \$200,000, divided into 2000 shares of the par value of \$100 each (the present capital stock), to \$600,000, to be divided into 6000 shares of the par value of \$100 each.

SIERRA COUNTY.

ALASKA.—The annual report of this company, whose claim is at Pike City, shows a production in eleven months of \$175,427, 46 per cent of which amount has been placed to the credit of shareholders—8 per cent on the total capitalization. The statements presented show that the cost of mining is \$5.70 a ton, and of milling \$6.64 a ton. The mine has been systematically opened, equipped, and supplied. A year ago, they had three temporary pumps at work removing the water that had flooded the mine for a long time. After the shaft was cleared up to the fifth level, it was determined that permanent pumping machinery should be placed in the mine. In June last, the flow was at the rate of from 550 to 600 gallons a minute. A compound duplex mine pumping-engine, 18½ inches by 59 inches by 12 inches by 18 inches, has been erected, having a daily capacity of 1,000,000 gallons at lowest speed. Its cost, including freight, fittings, and setting, was \$12,650.

CANADA.

PROVINCE OF QUEBEC.

Phosphate shipments from Montreal for October amounted, according to the *Canadian Mining Review*, to 3133 tons; total for the year to October 31st, 20,986 tons. One shilling for 75 per cent, with a fifth of a penny rise, has been the ruling price for Canadian phosphate in the London market during the past three months, and no variation from these figures is reported.

THE ANGLO-CANADIAN ASBESTOS COMPANY, LIMITED.—This company has been formed in England, to take over the freehold asbestos properties called the Eureka and Emelie estates, containing about 325 acres, some seventy miles from Quebec, but only two miles from a station on the Quebec Central Railroad. The vendors are Messrs. Irwin, Hopper & Co., of Montreal. In 1881, crude Canadian asbestos of the first quality sold for £10 a ton; but since that year, it has steadily advanced, until it is now £17 a ton. The capital stock is £50,000, in 25,000 shares. Of this, 17,500 shares of £2 each are offered. The purchase-money is £35,000, of which £15,000 is taken in shares, and the vendors express their readiness to extend the amount paid in shares to £30,000, at the option of the directors.

COLORADO.

CUSTER COUNTY.

BULL-DOMINGO.—In the coroner's investigation into the cause of this mine explosion, the jury found that the deceased came to their death by reason of the criminal negligence of H. W. Foss, superintendent of the mine, in failing to find means for the prevention of said fire, and the criminal negligence of said Foss in failing to provide means of exit from the mine." Foss was arrested and held in \$3000 bail.

DOLORES COUNTY.

PASADENA.—The smelter at Rico has shipped eighty-five cars of bullion by way of Durango during the past eleven months. The bullion yielded the company \$425,000.

GILPIN COUNTY.

ROCKY MOUNTAIN.—Work has been resumed on this property, formerly owned by the old Rocky Mountain Mining Company, on the Bates lode, in Gregory Gulch. The property has been in litigation for some time.

GUNNISON COUNTY.

JUMBO.—The capacity of this smelting plant is to be increased from 50 to 150 tons daily. The castings for the new 100-ton furnace have been purchased at Pueblo.

TOMICHI VALLEY.—The gift of the land asked for by this smelting company has been assured at a meeting of the Chamber of Commerce at Gunnison.

LAKE COUNTY.

The Leadville *Herald* reports the following: CHRYSOLITE.—Considerable high-grade ore is shipped from the body opened up four weeks ago. The production of ore from other portions of the mine is about up to the average of the past few months. The mill is running regularly on low-grade free-milling ore not adapted to the smelting process.

COLONEL SELLERS.—The building for the concentrating mill is about completed. The engine and boilers, which arrived some time ago, have been set in

place, and other work is making satisfactory headway. Six car-loads of machinery have arrived, and the remainder of the mill's equipment is on the way.

ROBERT E. LEE.—The large Knowles sinking-pump in this shaft was started up and is doing very satisfactory work. The mine now has a 12-inch Cornish pump and a steam-pump with a 6-inch discharge column at work.

SILVER CORD.—The present plan of development-work is rapidly opening up extensive bodies of sulphide ore. The American Mining and Smelting Company is negotiating with this company for the use of the Ruby shaft. The shaft is desired by the American people to work their Imes lode through.

PARK COUNTY.

GREAT WEST.—The granting of an injunction and the appointment of a receiver for this mine was recently confirmed by Judge Harrison, at Colorado Springs. It is stated that a lot of ore, valued at \$4000, was shipped to Leadville after the granting of the injunction. The greater part of it was recovered, and those who took it off are threatened with prosecution.

PITKIN COUNTY.

LATE ACQUISITION.—In the chancery of the United States Court at Denver, on the 18th inst., in the case of the Late Acquisition Mining Company, the defendant holds the Late Acquisition mine and is taking ore from it. Bradley claims the property, and has sued to recover possession. He asked for an injunction restraining the defendant from working in the mine during the pending of the suit. This Judge Hallett has denied. It was ordered, however, that the defendant should make monthly reports to the court of the amount of ore taken from the mine, the amount sold, money received therefor, etc.

CALUMET & HECLA.—Mr. Agassiz is reported to have said that his company was seriously contemplating the erection of factories at Lake Linden, wherein the copper mined by the Calumet & Hecla could be made up into marketable goods on the spot, and thus secure fair pay for the metal. "When copper fetches 11 cents," Mr. Agassiz is reported as saying, "there is no decline in the price of goods into which this mineral enters so largely, and I feel that it will pay us to make up goods right here, put them on the market at a fair price, and thus realize an interest on our investment. There is no difficulty in the way whatever, and the establishment of such factories as we contemplate will give employment to a large additional number of men." The Calumet & Hecla Company has not fully decided as regards this departure.

DAKOTA.

LAWRENCE COUNTY.

CALEDONIA.—The bullion product for October was \$36,149.05. Superintendent's drafts, for expenses, were \$17,000. Net product, \$19,149.05. Dividend payable November 25th, \$10,000. Surplus over dividend, \$9,149.05. The superintendent's report for the week ended the 16th inst. shows 1252 tons of ore produced, and states there is no change to note in the appearance of the mine.

FATHER DE SMET.—The official letter of the superintendent shows that the receipt of bar No. 219 contains 1326.10 ounces of gold, the result of the clean-up of the mill for the last half of October, making a total of 2151.61 ounces for the month's yield. The condition of the mine remains good. The large stopes in the Eureka open cut continue to produce a good class of ore, and are holding out remarkably well as to quantity. Operations in other stopes throughout the mine show no change in character of ore; and altogether, the outlook is encouraging. Owing to bad weather coming on now, we shall probably have to work more from the Golden Gate cut and third level, but think the average can be kept up to about present rates. The total yield for the week ended November 15th was 2100 tons.

ILLINOIS.

PURITAN GOLD AND SILVER MINING COMPANY.—This company has been organized at East St. Louis, with a capital stock of \$1,500,000, for the purpose of doing a general mining business; incorporators, J. Monroe Pattee, George W. Woodworth, and W. C. Johnson.

MEXICO.

The Mexican *Financier* reports the following: A correspondent at Jesus Maria, Canton Rayon, State of Chihuahua, writes: There is nothing new in mining matters here at present. Most of the mills in this vicinity, especially those depending upon water

for their power, were compelled to suspend operations temporarily on account of the scarcity of water during October. The winter rainy season sets in this month, when the supply of water will be plentiful.

Our advices from northern mineral districts are to the effect that many of the mines are doing well, although the scarcity of labor and lack of capital to buy improved machinery retard development.

A smelting furnace, with a capacity of ten tons a day, is to be put up at Tejuplco in the mineral district of Temascaltepec, State of Mexico, by Chicago parties.

CUSHIUILACHIC.—At the annual meeting of this company, to be held in New York City, on December 12th, a plan is to be adopted for receiving subscriptions to bonds of the company, to be issued for the purpose of providing for the payment of the company's debts.

DE BALDO.—This mine at Pachuca does not seem to be doing a good business, and there is much reticence, considering the condition of the property.

EL ORO.—The mine is doing well. The entire force employed by the company, exclusive of the woodcutters, is 1000 men.

ENRIQUE.—Mr. A. Muñoz de la Cámara denies in a public letter the reports published some time ago, and mentioned in our issue of October 31st, that American miners had been molested at Las Cruces, in the Sierra Carmen Mountains. He declares that these miners have never been troubled in any way, and Governor Cervantes, of the State of Coahuila, also joins in denying these reports.

MICHIGAN.

COPPER MINES.

OSCEOLA.—The machinery in the new dressing-works of this company, on Torch Lake, has started up on regular work, the Hancock & Calumet Railroad delivering rock to the mill. A part of the mine force has been called in from the railroad, and work underground resumed, but it is not expected that the full force will be at work before the first of the month.

TAMARACK.—One head of stamps in the Osceola mill is to be run on Tamarack ore.

IRON MINES.

The following statement, published by the *Marquette Mining Journal*, shows the amount of iron ore and pig-iron shipped from the lake ports of that district for the season, up to and including November 18th:

	Gross tons.
Marquette—Iron ore.....	744,632
L'Anse—Iron ore.....	30,027
Pig-iron.....	8,643
St. Ignace—Iron ore.....	91,388
Pig-iron.....	11,610
Escanaba—Iron ore.....	1,190,412
	2,066,712

CHAPIN.—The mine management has decided on a new course with reference to the future workings of the property, brought on by late and serious slides of ground. The mine will be worked as an open one, and stripping, with this intention, is already in progress. By this method, a large body of ore will be secured that, in the present condition of the mine, could not be taken out, an immense amount having been left as supporting pillars. Shafts are sinking in the country on the hanging, for the purpose of underground work, which will be prosecuted from a point where it is no longer practicable to operate the open cut. These shafts will entail a big expense to the mine, as they and the drifts to the ore will all be in barren ground. The mine will be protected in its new underground workings by filling with rock as fast as the ore is taken out. This plan is now in execution between Nos. 6 and 7 shafts on the sixth level, and will extend through the whole mine as soon as the new workings are sufficiently advanced to permit of it. This method will cost little if any more than timbering, and will render the mine free from the calamities of slides that have proved so disastrous to its successful operation.

GRAND RAPIDS.—The Fourth National Bank of Grand Rapids obtained a judgment on the 21st inst. in a suit against this company, owning property in Marquette County, for \$4375. In July, 1882, the mining company executed a bond for \$15,000, to secure the bank for various loans, and considerable money was borrowed and notes given, the amount unpaid being represented in judgment.

MINNESOTA.

For the week ended the 18th inst., the Minnesota Iron Company's shipments of iron ore from the port of Two Harbors amounted to but 2280 gross tons, making the company's shipments for the season, up to and

including that date, 219,317 tons. The shipments of ore from the mines at Vermilion, up to the 14th inst., aggregated 219,300 gross tons. The mines of the Vermilion range have about finished shipping for the season.

MONTANA.

LEWIS & CLARKE COUNTY.

BOSTON & MONTANA.—At the Gloster mine, the property of this company, many improvements have been made, particularly in the way of machinery, the latest addition being in the shape of an O'Neil cut-off engine of large size. The company's mine is down 400 feet, and has a vein of high-grade milling ore, from six to twelve feet in width, which produces about 160 tons daily. The new sixty-stamp mill is running steadily.

SILVER BOW COUNTY.

MARGARET ANN.—This company's property was sold at sheriff's sale on the 18th inst. The mine was purchased by Dennis Driscoll for \$15,500, and the personal property in connection with it brought enough to make the sum realized \$16,744.

MOULTON.—The company's extensive water-works furnish Butte with a good portion of its water supply. When the company concluded to build a mill, the question of obtaining water became a serious one, and it was finally determined to bring it in a line of boxes from Yankee Doodle Creek. There is an eight-inch square box running full of water, a distance of seven miles, and buried about three feet under ground. At the head of the flume, an immense reservoir has been built by damming the cañon, thus affording a large reserve supply of water. At the end of the box, on the hill by the Moulton works, there has been a 40,000-gallon tank and a new one of 25,000 has just been completed. In addition to meeting its own wants, the company is enabled to furnish the residents of Walkerville and Centerville with water, and also to turn a good-sized head into the pipes of the Butte Water Company. The works have already cost about \$60,000, and it is the intention to put in a mile more of boxes to secure a larger quantity of water to meet the demands that will certainly be made during next summer, necessitating the expenditure of about \$5000 more. This investment is said to be paying handsomely.

NEVADA.

ESMERALDA COUNTY.

STATE LINE.—The mill has been started up on 500 tons of ore lying on the dump, and a force is engaged in extracting a sufficient quantity to keep the mill running all winter.

EUREKA COUNTY.

ALBION VS. RICHMOND.—The Albion, of Eureka, sued the Richmond for several hundred thousand dollars damages for ores extracted from the Albion mine. The jury found a verdict for the Albion for about \$11,000. The Albion applied for a new trial upon the ground that the damages were not sufficient, and that the jury had been tampered with. The District Court granted a new trial, and the Richmond appealed from its decision. Now the Supreme Court has affirmed the order of the Eureka Court, and the case, unless compromised, will be tried again.

LINCOLN COUNTY.

BAALBEC.—Work has been temporarily suspended on this mine at Fabranagat until adequate milling facilities are procured.

STOREY COUNTY—COMSTOCK LODGE.

The shipments of ore from the Comstock to the mills on the Carson River average 840 tons daily. This ore mills on an average \$15 a ton, according to the returns made by the management. The shipments will soon reach the old standard of 1000 tons daily.

BULLION.—It is stated that the company has decided to resume sinking the Ward shaft to the 3000 level. The depth now is 2450 feet. The management has formed a combination with other mining companies, and they have jointly decided to get steam up at the Ward hoisting-works within the next sixty days. A powerful hydraulic pump is to be erected at the 2450 level.

CONSOLIDATED CALIFORNIA & VIRGINIA.—The report for the week ended November 14th shows that the northwest drift on the 1650 level is advancing in the direction of the old stopes in the north end of the California ground, for the purpose of getting out the low-grade ore passed by in bonanza days. This drift was bulkheaded last spring 124 feet in from the uprise driven from the roof of the south drift on the 1700 level, on account of the tapping of a current of foul air and gas, which had been lingering there ever since the

fire in the old workings. The gas has since escaped through the various openings to the surface. From the old stopes above the northwest drift on the 1750 level, 821 tons of ore were extracted during the week. During the same period, 726 tons were shipped to the Morgan mill. The ore crushed gave an average value of \$18.92 a ton, according to battery assays. From between the 1200 and 1400 levels, 605 tons of ore were extracted under the Jones contract during the same period, and 600 tons were shipped to the Eureka mill. The value of the ore crushed is stated at \$16.40 a ton.

HALE & NORCROSS.—Operations have been in repairing and retimbering the various openings and preparing for a general advance all along the line on the 3100 level.

SOUTH AMERICA.

PERU.

Dispatches from Santiago state that Señor Goll, the owner of rich silver mines in Butica, is about to sell them to a German company for a large sum, said to be \$5,000,000.

UTAH.

BEAVER COUNTY.

HORN-SILVER.—There continues the same dead lull in all intelligence from the mine. Local dealers at Salt Lake have been purchasing recently through the Deseret National at figures varying from \$1.90 to \$2.05.

TOOELE COUNTY.

The first shipment from the Calumet mine under the new régime has arrived in Salt Lake City, and assayed forty ounces silver and from 50 to 60 per cent lead. The Messrs. Niedringhaus, of St. Louis, who recently purchased this and other mines in the vicinity, have begun the erection of hoisting-works, and have otherwise begun operating in good earnest. In the spring, it is said that they will build extensive works.

VERMONT.

Under license from the Probate Court, the following property, belonging to the estate of the late Smith Ely, will be sold at public auction by Roswell Farnham, administrator, in West Fairlee on the 8th of December, at ten o'clock A.M.: Forty-eight thousand shares of the capital stock of the Vermont Copper Mining Company. About 5 acres of land in Vershire, called the Maxfield land. A claim against Ely, Goddard & Cazin, for \$100. A claim against Ely, Goddard & Cazin, for about \$6000. And other claims and property not necessary to mention.

BULLION PRODUCTION FOR 1885—SPECIAL OFFICIAL REPORTS.

MINES.	States.	Month of October.	Year from Jan. 1st, 1885.
Adams, s. L.	Colo.	25,000	310,103
Alice, g. s.	Mont.		855,248
Belmont.	Nev.		10,003
Bodie, e.	Cal.		**17,967
Boston & Montana, g.	Mont.	55,112	462,722
Caledonia, e.	Dak.	36,149	36,149
Christy, s.	Utah.		108,507
Chrysolite, s.	Colo.	23,245	77,972
Colorado Central, s.	Colo.	26,751	210,871
Consolidated Bobtail, g.	Colo.		41,228
Deadwood-Terra, g.	Dak.		328,783
Derbec Blue Gravel, g. s.	Cal.	16,815	125,314
Essex, g. s.	N. S.		6,474
Eureka Consolidated, s. L.	Nev.		180,619
Father de Smet, g.	Dak.	35,263	312,671
Freeland, g. s. c.	Colo.	26,141	287,751
Graud Prize, s. g.	Nev.	12,319	236,192
Granite Mountain, s.	Mont.	91,842	879,860
Hall-Anderson, g.	N. S.		7,741
Head Center & Tranquillity.	Ariz.		85,396
Hecla Consolidated, g. s. L. C.	Mont.	**69,453	732,308
Helena, g. s. L. C.	Mont.	100,000	846,584
Homestake, g.	Dak.		954,042
Hope, s.	Mont.		107,446
Iron Silver, s. L.	Colo.		465,355
Kentuck, s.	Nev.	1873	4,435
Lexington, g. s.	Mont.	74,182	734,386
Montana, Limited, s. g.	Mont.	71,400	722,438
Moulton, s. g.	Mont.		310,792
Mount Diablo, s.	Nev.		325,231
Navajo, s.	Nev.		82,894
New Hoover Hill, g. s.	N. C.	3,250	61,009
New Pittsburg, s.	Colo.		14,594
North Belle Isle, s.	Nev.		2,118
Ontario, s.	Utah.		1,516,727
Oxford, g.	N. S.		14,697
Plymouth Consolidated, g.	Cal.		724,651
Rooks, g.	W.		28,383
South Yuba, g.	Cal.		3,083
Standard Consolidated, g.	Cal.	15,696	152,614
Stormont, s.	Utah.	19,472	147,040
Syndicate, g.	Cal.		**82,327
Tombstone, g. s. L.	Ariz.		403,873
Total.			13,018,991

G., gold; S., silver; L., lead; C., copper. Silver valued by the different companies from \$1 to \$1.29 per ounce to \$1.05; gold, \$20.67. *Not including value of lead and copper. †Royalty. ‡Net. — No shipments during month mentioned. ** Not official.

WISCONSIN.

BESSEMER IRON MINING COMPANY.—This company, which has been organized at Milwaukee under the laws of Wisconsin with a capital stock of \$500,000, will conduct a general iron mining business. The incorporators are J. E. Burton, Josiah Barfield, and H. C. Hopkins.

ASHLAND COUNTY.

An iron mine has been discovered within 1½ miles of the Wisconsin Central Railroad, on Penokee range, and a few miles from Bad River station. It yields hard magnetic ore, running from 48 to 69 per cent metallic iron. Chicago parties have a six months' option on the mine at a given royalty, and will test the value of the find.

WYOMING.

CARISA MINING AND MILLING COMPANY.—This company has bought from Dr. George H. Raught six claims near Miners' Delight for \$5000. Mr. William Pepkin, of South Pass, has also made a large transfer to this company. In addition, it has sent into the county clerk's office amendments to a great many old locations, proposing to patent as soon as the necessary formalities are complied with.

MARKETS.

NEW YORK, Friday Evening, Nov. 27.

Silver.

DATE.	London.	N. Y.	DATE.	London.	N. Y.
	Pence.	Cents.		Pence.	Cents.
Nov. 21	47 5-16	102½	Nov. 25	47 7-16	102¾
23	47 7-16	102¾	26		
24	47 7-16	103¼	27	47½	102¾

* 47 7-16@4 7½.

The market abroad is a little better, but it now hinges upon the policy that may be adopted by our Congress with reference to the standard dollar coinage.

According to a cable report, dated Brussels, November 22d, the adhesion of Belgium to the Latin Union has been arranged.

Last week, \$2,700,000 were imported into New York; \$1,748,000 by the Eider and Main, arrived from Bremen on November 14th; and \$945,700 by the Normandie, arrived from Havre on November 16th.

Copper.—The copper market here is decidedly stronger than for some weeks, and prices have slightly advanced. We quote Lake quiet 11@11½c.; Orford is held firm at 10½c., and even 10¼c. is asked; Baltimore, 10@10½c., at which figure some 300,000 pounds were sold during the week. It is said that the Calumet & Hecla declines to quote for next year's delivery. The Parrot Company, which recently opened its refining-works at Bridgeport, Conn., is said to be a free seller of P. S. C. brand at 10c., even in small quantities. What this course is due to is merely conjectured.

One of the large Butte, Montana, works has contracted for its entire next year's output of matte, to be shipped abroad, unless the market here should advance considerably. The price obtained is said to be considerably above the rates now ruling. The prospect for the supply of furnace material for our works during the coming year is very poor, and prices of copper must advance considerably here to keep our furnace material on this side.

The London market, which was wildly fluctuating when we went to press a week ago, dropped off from £44 as the top figure on the 20th to £43 on 21st, £41 15s. on 23d, £41 17s. 6d., £42 on 24th and 25th. Yesterday, a reaction set in, and to-day cables to the Metal Exchange quote Chili Bars £43 15s., and Best Selected £47, which is an advance in this brand of £2 during the week. The market has become steadier, and the advance being more gradual and being shared by other metals, appears likely to be better sustained. There is a general expectation that prices will advance considerably and permanently on the other side and on this, as indeed is indicated in the contract just mentioned for Montana matte for the whole of next year.

Tin.—The London tin market, which a week ago was quoted £94 5s., advanced to £94 15s. on the 23d, from which it declined to £93 10s. to-day for spot, and £94 5s. for three months. Here, the price is from 20 65@21c., or for small lots a little higher.

Lead.—The strong statistical condition of our lead market, which was the solid foundation for the advance in lead some months ago, continues; and though the effort to "bear" the market after the recent combination had sold its stocks effected a temporary decline in price, yet the active consumptive demand and total absence of stocks throughout the country, and a better feeling in business circles, have had their natural effect, and the price has again advanced: 4'35c. has been obtained here, and 4'40c. is asked for near futures, and 4½c. is asked for spot common, which is extremely scarce.

It is said there is quite a large short interest in the market that apparently will suffer. Producers are holding off, and show no anxiety to sell. Three hundred and fifty tons of Richmond lead to arrive by sail, March delivery, have been sold at 4'20c.

Private cables this afternoon quote Soft Spanish £12 15s., which would be equivalent to nearly 4½ cents here. It is said that stocks in Europe are also very light, and some anxiety is shown as to the effect of possible Spanish revolutions upon the price.

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

The market is rising, excited, and unsteady, and it is difficult to give exact quotations. The stocks in hands of holders are limited. Offerings are very light, and there is a general disposition to buy. Holders, anticipating better prices, have withdrawn from the market at present, and refuse to make sales for future delivery at present prices, as bullion continues very scarce. Sales early in the week were 300 tons at 4'05c., and later 400 tons at 4'10c., for December and January.

Spelter and Zinc.—This market is without interest or noteworthy feature. We continue to quote Domestic 4'40@4½c., according to brand, and 5 cents for foreign. In London, the price to-day was £14 for Silesian.

Sheet-Zinc remains unchanged at 5'65@5¾c. for Domestic.

Antimony.—The price has advanced in London to £36 for Hallett's, being an advance of £1 during the week. This market is quiet and practically unchanged at 8¾@9c.

Nickel.—This market is held by our own producers only by keeping the price down to 70 cents a pound, and this price is freely shaded.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Nov. 27.

Iron Ore.—The uncertainty as to the rates for freights and the difficulty in getting vessels interfere greatly with the foreign iron ore trade. Large contracts have been and are being made; but prices are unsettled, and while 8½ cents per unit was a good price a week ago, we now hear 9@10 cents quoted ex ship Philadelphia or Baltimore, which are the principal ore markets. John H. Thompson & Co. report having sold 50 per cent ore from Southern Spain at 9½ cents, and now ask 10 cents; but we hear of much higher grade ore selling at the same figures or less. We have been shown some very fine hematite ore from Greece, two cargoes of which have come here. It is said to carry 46 per cent of iron and from .022@.029 phosphorus.

Bessemer ores, whether domestic or foreign, are in good demand.

Pig-Iron.—The pig-iron market is very active and strong, with an advancing tendency, though prices nominally remain as quoted last week—namely, \$18 @ \$18.50 for No. 1 X; \$16@ \$17 for No. 2 X; and \$15@ \$15.50 for Forge, standard Lehigh brands. Chickies and a few extra brands command from 50c. to 75c. a ton above these prices, and there are some less esteemed brands that can be bought a good deal below our quotations. The feeling at present in the market is, that there will be an advance of perhaps two dollars a ton for the opening of the year; but during winter, stocks usually accumulate, and so many furnaces have recently been blown in or are ready to blow in the moment any such advance is made in prices that there is but little hope of being able to maintain, for any length of time, an advance of \$2 a ton. The nominal price at which contractors buy for season's delivery from any of the strong producers has no real meaning; for the moment the market declines, the contractors are given the benefit of it, whatever the

NEW YORK MINING STOCKS.

Table with columns for 'DIVIDEND-PAYING MINES' and 'NON-DIVIDEND-PAYING MINES'. Each section lists company names and locations, followed by highest and lowest prices per share for various dates (Nov. 21-27) and sales figures.

Dividend shares sold, 27,170. Non-dividend shares sold, 49,175.

OUR USUAL TABLE GIVING CAPITAL, ASSESSMENTS, AND DIVIDENDS OF ABOUT 250 MINES, IS OMITTED THIS WEEK.

until after the Reading election, which will take place on January 11th. It must be discovered who will control that company next year before negotiations can be begun looking to the regulation of the business of 1886.

From present appearances, the anthracite coal production this year will not differ much from that of 1883, which was the largest in the history of the trade.

That a much larger quantity of coal could be mined and sent to market, if the market would take it, there can be no question, and unless the production is regulated to the requirements of the market, it is certain that prices will be so low that none of the companies can meet fixed charges.

The question now is, Will the trade be regulated, or will it, through a series of disastrous years, be permitted to work out its own salvation and settle to a natural basis?

If such is to be the case, the questions involved should be taken in hand instantly and promptly disposed of, that the trade may not suffer the enormous loss that always accompanies the discussion of a new combination.

having the matter in hand has been approximately adopted. Let the inevitable be accepted promptly.

Bituminous.

The scarcity of cars continues, and to this cause, and it only, is it due that there is a little more stiffness in prices. We do not learn of an actual change in prices, although we think that the better grades of coal, which have been held at higher prices, are a little more easily sold.

Our Boston correspondent last week made reference to a rumor of a case of spontaneous combustion in true George's Creek Cumberland coal at a Massachusetts cotton mill. We have looked into the matter, and find the rumor entirely unfounded.

The New York, Lake Erie & Western Railroad carried 6,137,242 tons of coal during the fiscal year ended September 30th, which was 238,077 tons less than during the previous year.

The Lehigh and Schuylkill coal exchanges have advanced the line and city and harbor prices of pea coal twenty-five cents a ton for next month.

in excess of orders now on hand. Prices are represented as firmly maintained.

Buffalo. Nov. 25.

[From our Special Correspondent.]

The attendance of our coal men at the Merchants' Exchange has been very light for the past few days. One of their number gave as a reason: "All of our big men have gone to New York, where the producers are having a meeting; we 'small fry' have to remain at home to watch the peddling business."

"No news is good news," says the axiom. In the absence of any thing noteworthy to communicate in the hard and soft coal trade or in the coke trade, I give you the opinions of several persons on the late advance in the retail prices of anthracite coal.

No. 1. "The rise is a natural sequence of the advance in wholesale prices; the advance should have been established at the same time; but as some of the members of the Coal Exchange had contracts, that body waited until they had run out." No. 2. "Dealers have left themselves a smaller margin now than they had before, on account of the small advance in chestnut; but I do not anticipate that any further rise will take place."

The shops of the Buffalo Car Company, which have been closed for some months, will be reopened December 1st, and run to their full capacity on an order for 900 coal cars from the Buffalo, Rochester & Pittsburgh Railroad.

The Storm King Bridge across the Hudson, which our canal men have been fighting so long, is to be built at once, but on the cantilever principle, which will take away the objectionable features of the old plan.

Chartering has been active for the past week; ship-

COAL STOCKS.

Table with columns for NAME OF COMPANY, Par value of shares, Quotations of New York stocks (Nov. 21-27), Philadelphia prices, and Sales from Nov. 1st to Nov. 27th inclusive. Includes companies like Barclay Coal, Cameron Coal, etc.

* Of the sales of this stock, 16,123 shares were in Philadelphia and 16,430 in New York. Total sales, 300,844. † The quotations for these stocks are not percentage, but actual price. ‡ Ex-dividend.

pers would have liked to send more coal to Chicago and Milwaukee, but they would not pay more than \$1 a ton for freight. Vessel owners would not carry any more at that rate so late in the season...

Since Monday, bad weather has prevailed; heavy snow, then frost; followed by more snow; to-day, navigation to the upper lakes practically closes.

The shipments of coal from Buffalo from November 19th to 25th, both days inclusive, were 47,700 tons, as follows: 19,950 to Chicago, 1500 to Duluth, 20,050 to Milwaukee, 5200 to Toledo, and 1000 to Bay City.

The freight engagements were at the following rates: \$1@\$.10@\$.125 to Chicago and Milwaukee; \$1 to Duluth; 50c. to Bay City and Toledo.

Canal shipments for the week, none. This week closes the lake and canal movement for the season. The aggregate figures will be sent you next week.

The receipts of coal at Duluth for the week ended November 21st were 15,267 tons.

It is reported that several leading insurance companies will withdraw from transacting lake business after the close of this season, for the reason that underwriting on hulls and cargoes has ceased to be profitable.

Boston. Nov. 25.

[From our Special Correspondent.]

The anthracite coal market hangs at about \$4 f. o. b. for stove coal at New York, and other sizes at their relative positions. On this basis, stove coal may be had readily, and the price is cut as frequently as it is improved upon.

The bituminous branch of the Boston market is as uneventful as usual in November. Delivered prices remain at \$3.40@\$.3.60.

The feeling in freights has been very strong, and it

has been almost impossible to obtain a vessel from New York at less than \$1.15, on account of the rush of shippers at the behest of our Eastern purchasers. A slight decrease is looked for. We quote:

New York, \$1.15@\$.1.20; Philadelphia, \$1.35@\$.1.40; Baltimore, \$1.50; Newport News, \$1.40; Richmond, \$1.40@\$.1.45; Cape Breton, \$1.60@\$.1.75; Bay of Fundy, \$1.40@\$.1.50.

The retail trade shows no special activity. The low rates heretofore quoted still rule. We quote:

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

FINANCIAL.

NEW YORK, Friday Evening, Nov. 27.

The business at the Mining Exchange has been active, and larger than for some weeks, considering the intervening holiday, and prices have generally ruled lower. The total transactions are 76,345 shares, showing an increase of 3943 shares, as compared with the preceding week.

Sutro Tunnel, which at certain periods always has a little boom of its own, has again arrived at this point, and the week shows sales of 31,575 shares ranging from 17@25c., closing at 19c. Consolidated California & Virginia has been lower at from \$1.40@\$.1.30. The same may be said of Hale & Norcross, which was quoted at from \$3.80@3.75. The other Comstock shares call for no special mention. Ten shares of Eureka sold at \$3 a share. Navajo has advanced to 55c. and 60c.

The financial statement of Bulwer, dated November 16th, shows a cash balance of \$3472.47, exclusive of the assessment recently levied. The stock has ruled at from 30@28c.; the sales were 1550 shares. Bodie continues its downward course, selling at from \$2.10@\$.1.80. Standard shows a few sales at from \$1.15@\$.1.10. Consolidated Pacific, which opened at 35c., went as high as \$1.25 during the week, closing at 90c. Quicksilver Common shows small sales at from \$8.50@\$.7.75.

There is but little doing in Colorado stocks, and prices show but a small variation from those of last week. Chrysolite has been active and lower, at from \$1.10@95c. Robinson Consolidated is quoted 73@90c. Breece, 28@29c. Little Pittsburg, 23@18c. Little Chief, 28@30c. Leadville, 33@35c. Lacrosse, 10 and 12c.

A slight advance is shown in Horn-Silver, which went from \$2.05@\$.2.20. Stormont, 18c.

Caledonia was firm at \$2.75. Father de Smet, at \$4.50. Alice at from \$1.85@\$.1.80.

A complete summary of the market will be found elsewhere.

The following shares were sold at auction in this city on the 25th inst.: 100 shares Baltimore & Montgomery Mining Company, \$11,000 for lot; 180 shares Jackson Iron Company, \$350.

Coal Stocks.

The attitude of the Baltimore & Ohio, its new move in controlling the Staten Island Rapid Transit Company, and the injunction against the New York Central to prevent it from carrying through its lease, caused a very sharp break of from five to six per cent on Monday. On Tuesday, the powers that have been engineering all the large deals came to the rescue of the market, and the loss was in many cases quite recovered.

The sales of Lackawanna aggregate 187,050 shares at \$123@\$.119, and it closed at \$120. Delaware and Hudson, with transactions of 7863 shares, sold at \$99 1/2@\$.97, and closed at \$97 1/2 ex dividend. New Jersey Central was dealt in to the extent of 90,416 shares at \$47@\$.40 1/2, and closed at \$45 1/2. Reading sold at \$25@\$.22, and closed at \$24 1/2. The transactions aggregated 32,553 shares.

Dividends.

Charleston Mining and Manufacturing Company, South Carolina, announces a quarterly dividend of three dollars and fifty cents a share, payable December 1st.

Delaware & Hudson Canal Company has declared a dividend of one and a half per cent on the capital stock, payable at the National Bank of Commerce, of this city, on the 10th inst.

Helena Mining and Reduction Company, of Montana, has declared a dividend of \$20,000, payable this month.

Honorine Mining Company, of Utah, has declared a dividend of five cents a share, payable November 25th.

Lehigh Coal and Navigation Company, of Pennsylvania, has declared a dividend of two and a half per cent on the capital stock, payable on and after December 8th.

Long Valley Coal Company gives notice that the following bonds of the company, Nos. 2, 17, 37, 38, 47, 51, 55, 56, 58, 61, of \$1000 each, have been drawn for payment and cancellation, and will be paid by the Treasurer of the Barclay Coal Company, at No. 154 South Fourth street, Philadelphia, December 31st, 1895, with the interest due January 1st, 1896, after which date the interest will cease.

Philadelphia & Reading Railroad receivers have made arrangements with Messrs. Drexel & Co. to purchase the coupons and registered interest on the 6 and 7 per cent consolidated mortgage bonds of the company maturing December 1st. The amount of this interest is \$617,575.

ASSESSMENTS.

Table with columns for COMPANY, No., When levied, Delinquent in office, Day of sale, Amount. Lists companies like Baker Divide, Booker Cons., etc.

* Assessment postponed until above date.

† Upon the failure of any stockholder to pay the above assessment on or before five o'clock p.m. of the 14th December, said stock or any part thereof upon which said assessment shall remain unpaid as aforesaid, will be declared forfeited for the benefit of the company.

Meetings.

Meetings of the following companies will be held at the time mentioned:

New Central Coal Company, Nos. 6 and 6½ Trinity Building, New York City, December 8th, from twelve to two o'clock P.M., annual meeting.

San Andreas Copper Mining Company, Camden, New Jersey, December 10th, at twelve o'clock M., annual meeting.

Pipe Line Certificates.

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

The oil market during the past week has been subjected to a severe panic. On Wednesday, November 18th, the market sold at \$1.11, and by Monday of this week it had broken to 89½c. On this latter day, it sold down from \$1 to 89½c., or a break of over ten cents during the day on top of a break of 11 cents on the three preceding business days. The cause of this panic was the opening of the Clemminger well at Kane, twenty-five miles from Bradford. It was reported to have the Bradford sand, but this is not true. It is a mongrel sand and a cross between the black sand of Bradford and white sand. It is in new territory, no dry hole being nearer than one and a quarter miles, and as it was shown to have oil, say from 75 to 100 barrels a day, it was at once surmised or feared that it might open up a new pool. It will require deeper drilling and further evidence to confirm these fears; meanwhile, it seems probable that, in view of the steady decline in the old districts, the break in the market has more than discounted the importance of the well.

Another disturbing feature was the increased production of the Anchor No. 1, at Kinzua. It was drilled deeper and started off, making 1200 barrels the first twenty-four hours. The present production is about 300 barrels. It is in flashy territory, and neighboring wells have proved small affairs. A regular panic, as this was, is unreasoning; but when once under way, sellers come in from fear or compulsion, and thus the downward movement is accelerated.

Oil is now held in good hands, and although it may go lower while the present demoralization continues, the market has reached a point where we should think well-protected purchasers ought to show a good profit soon.

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

	Opening.	Higher.	Lowest.	Closing.	Sales.
Nov. 21	1.05	1.05½	99¾	99¾	12,812,000
23	99¾	1.00	89¾	92	27,240,000
24	92	96	80	95½	11,083,000
25	96½	98	93¾	95¾	9,311,000
27	95½	95½	93	93¾	6,979,000
Total sales.					67,425,000

Boston Copper and Silver Stocks.

[From our Special Correspondent.]

BOSTON, Nov. 25.

The market has been fairly active this week, with something in the nature of a boom. There is a good demand for the better class of mining stocks, and prices show considerable advance over the closing of last week. In copper stocks, this is due in some degree to the firmer market for ingot copper both here and abroad, and we anticipate still higher prices in the near future. The speculative element also begins to show itself in the demand for some of the low-priced old-time favorites, which may develop into an active market for this class of stocks. Calumet & Hecla has barely held its own, with moderate sales at \$209½, against \$210, the highest figure of last week; only 63 shares changed hands. In Tamarack, 50 shares only have been sold at \$83, an advance of \$1 over last week, and closes at \$82 bid. Quincy has been exceptionally strong, advancing from \$40@ \$45, with but little stock offering in the market, the advance only bringing out 138 shares. Quite an active demand has developed for Franklin, which we have considered one of the cheapest stocks in the market, and sales of 1650 shares are recorded for the week, at \$10@ \$10½, closing strong at \$10 bid. Osceola advanced from \$12½@ \$13½, on the improved condition of matters at the mine, with sales of 550 shares. Atlantic is in good demand, and advanced from \$7@ \$8, with later sales at \$7½, closing, however, at \$8 bid, \$8½ asked to-day; sales, 450 shares. In the low-priced non-dividend-paying stocks, we note sales 250 Pewabic at \$2, an advance of \$1 a share over last sale, November 6th. Ridge, 50 shares, sold at 75c. Allouez, 400

San Francisco Mining Stock Quotations.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS.					
	Nov. 20.	Nov. 21.	Nov. 23.	Nov. 24.	Nov. 25.	Nov. 26.
Albion						
Alpha						
Alta	.25		.30	.30	.30	
Argenta						
Bechtel						
Belcher	1.37½	1.37½	1.31½	1.37½	1.37½	
Belle Isle						
Best & Belcher	1.25	1.12½	1.12½	1.12½	1.12½	
Bodie	2.12½	2.12½	2.00	1.87½	1.75	
Bullion						
Bulwer						
Chollar	.60		1.00	1.00	1.00	
Con. Pacific	1.00	.90	1.12½	1.00	1.00	
Con. Cal. & Va.	1.25	1.25	1.25	1.25	1.25	
Crown Point	1.62½	1.62½	1.75	1.75		
Day						
Elko Cons.						
Eureka Cons.	2.50			2.75		
Exchequer						
Gould & Curry	.75	.75	.75	.75	.70	
Grand Prize						
Hale & Norcross	3.75	3.75	3.75	3.62½	3.62½	
Independence						
Martin White						
Mexican	.80	.75	.70	.70	.65	
Mono	5.50	5.62½	4.75	4.12½	2.75	
Mount Diablo	2.62½		2.62½			
Navajo	.30	.30	.25	.30	.30	
Northern Belle						
North Belle Isle						
Oppir	1.00	1.00	1.00	.95	.95	
Overman						
Potosi	.45	.50	.45	.45	.45	
Savage	1.75	1.75	1.75	1.62½	1.62½	
Scorpion						
Sierra Nevada	.80	.80	.80	.75	.75	
Silver King						
Tip-Top						
Union Cons.	.50		.45	.45	.45	
Utah			.65			
Wales Cons.						
Yellow Jacket	1.75	1.75	1.62½	1.62½	1.62½	

shares at 75c. @ 80c. Total sales of copper stocks for the week (for five days), 3606 shares, as compared with 2203 shares last week, six days.

The silver stocks are also beginning to feel the improvement in the general market, although at present confined to a few specialties. Catalpa has been in active demand, and advanced rapidly from 25@42½c., with sales of 8150 shares up to-day noon. Dunkin sold at 25c. (400 shares). Napa Quicksilver, at \$1 (300 shares). Bonanza, at \$1½ (600 shares); making a total of 9450 shares.

At the Mining Exchange, sales of the above stocks are made at about the same quotations, with Bowman Silver in fair demand at 13@14c. Breece, at 27@30c. Crescent, at 16c. Amie, at 5c. Cusi, at 90c. @ \$1.

3 P.M.—At the afternoon Board, sales of Calumet & Hecla, at \$210. Osceola, at \$14. Atlantic, at \$8.50. Quincy, at \$45@ \$44. Ridge, at \$1. Napa, at \$1. Catalpa, 4400 shares, at 42½@45c. Total sales this afternoon, 5000 shares. Closing prices: Allouez, 80c. bid. Atlantic, \$8.25@ \$8.75. Bonanza, \$1.12½@ \$1.25. Franklin, \$10.12½@ \$11. Osceola, \$13.75@ \$14. Pewabic, \$3. Quincy, \$45.25@ \$47. Tamarack, \$85.

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25 "	17.96	68.62	8584
30 "	11.65	52.54	8676

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MAPS.

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

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

COLORADO.—Topographical and Township Map of the State. Compiled from U. S. Government Surveys and other authentic sources, by Louis Nell, Civil Engineer. By means of symbols, the following mass of facts is graphically shown: Railroads in operation; Railroads chartered or in progress; Wagon-roads; Wagon-roads proposed; Trails; Drainage dry during the greater part of the season; County-seats; Post-offices; Villages; Townships subdivided; Townships surveyed in outlines; Contour-lines, with vertical intervals of 1000 feet; Altitudes in feet above sea-level, by barometer observations and by spirit-levels; Private grants; Military reservations; Indian reservations ceded to the U. S. Government; Arable land, with irrigation. Tables of Areas of Counties; Astronomical Positions; Arable Land. Scale, 1 inch: 10½ miles. Size, 31x40 inches. Pocket form, \$1.50 on thick paper.

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

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

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

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

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

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