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AND

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CONTENTS.

ON the seventh instant, the Manhès converter for Bessemerizing copper matte, built under the direction of Dr. E. D. PETERS, Jr., the well-known copper metallurgist, was started at the works of the Parrot Silver and Copper Company, at Butte City, Montana. We understand that it has been running admirably, beyond the most sanguine expectations of the projectors, and that the first lot of blister copper, made in twenty minutes on an average from 70 per cent matte from the cupola, assayed 98·9 per cent of copper. This is certainly a very encouraging result, and Dr. PETERS, M. MANHÈS, and the leading spirits in the company, among whom is Mr. FRANKLIN FARREL, are certainly to be congratulated.

THE following brief dispatch from London is remarkable for the number of errors crowded into a few words: "The tin and copper mining industry in the west of England feels encouraged on account of the belief that the newly elected Congress in the United States will take measures to remove the existing duties on metal imports. Probably this belief is unfounded." For the "encouraged tin and copper miners of the west of England," it may be simply stated that there is no duty on tin, and that the duty on copper is a dead-letter. So long as the English consumers can hold up under the shipments of copper we are now sending and shall in the future send them, the taking off or putting on of any duty will not help the English miners or trouble the American producers to any extent.

WE have been favored with some additional details concerning the National Inventions Exhibition in London, to which we alluded last week. There will be two divisions, one for inventions, and the other for music, the former, of course, being the one in which our readers are more particularly interested. Exhibitors will be required to show by reference to a specification or patent that their personal exhibit comes within the term invention, and it is preferred that their work should be illustrated by models, samples of raw material or finished products being admitted only when they are required for the full demonstration of the process to be shown. Exhibits will be arranged under thirty different groups, among which we notice mining and metallurgy; engineering construction and architecture; prime movers and means of distributing their power; machine tools and machinery; fuel, furnaces, etc.; apparatus, processes, and appliances connected with applied chemistry and physics; fire-arms and explosives; and philosophical instruments. There is every prospect that the exhibition will be extensive and varied, and we feel convinced that American inventive genius will be fitly represented.

INTERNATIONAL "pools" are becoming the craze in Europe. Not long since, the steel rail makers staggered even their friends by their wonderful harmony, and now the manufacturers of dynamite are following suit. Some time since, the German dynamite manufacturers made an agreement among themselves for a year. Now the representatives of all the works that have thus far done export business have met at Paris, and have entered into an agreement by which the price is fixed for every market, depending on local conditions. The following Nobel companies, representing a share capital of twenty millions of francs and a market value of thirty millions, are members of the pool: Nobel's Explosive Company, Glasgow; Dynamit Actien Gesellschaft, Hamburg; Société Dynamite Nobel, Isleten; and Société Générale pour la Fabrication de la Dynamite, Paris. The outside concerns that have joined are the following: Rheinische Dynamit Fabrik, Opladen; Sprengstoff Actien Gesellschaft, Hamburg; Kölner Dynamit Fabrik, Kalk; Alliance Explosives Company, London; Société Mexicaine, Société Brésilienne, and Société du Pacifique de la Dynamite Nobel. Presumably the mining industries of all the countries afflicted will be taxed all they can bear.

Now that the winter season is approaching, the prospectors and the miners in the smaller districts are beginning to gather in the great mining camps, in quest of employment or of an opportunity to accumulate funds for next summer's prospecting. These men—and their number is large—will find that conditions have changed somewhat during the past year. Silver, lead, and copper are lower than formerly, and they will have to face the fact, with their brethren now at work, that the owners of mines are not able to pay them what they did formerly. This is particularly the case in Butte City, where, as a correspondent clearly shows in this issue, low prices of copper are crowding producers very hard. But it is true also of other districts, among them Leadville, where a movement is now in contemplation to ask the miners to accept lower wages. We do not believe that there is much hardship to the men in this demand, since the cost of living in the leading camps has come down considerably, as compared with what it used to be. The managers of most of the mines apparently believe in the policy of increasing output to make up for lower returns on the product. We do not now sympathize nor have we sympathized with this policy in many special instances, because we are convinced that it is folly to exhaust good reserves that in time would realize better profits. However, since there is a race for great capacity, the men would do better to lighten the burdens of those who are bearing the brunt of the battle, or they may find that a straw, in the form of a decline of a fraction of a cent in the market value of the metals, has broken the camel's back. Our Western miners will do well to choose the wiser course of quietly submitting to a reduction.

THE statement is given out that the Lake companies have contracted for the sale abroad of 15,000,000 pounds of ingot copper. This statement has arisen, we believe, from the fact that the French line of steamers refuse to take any more copper other than Lake, which has been construed into a discrimination on the part of the steamship company in favor of Lake copper, to the prejudice of other brands, thus practically cutting them out of the French market. As we understand them, from good authority, the facts in the case are, that the Lake companies have for some time been heavy sellers abroad, at the rate

of about 1000 tons a month. and that the dullness present, and prospective, with our iron manufacturers, makes it probable that a continuance of these shipments will be necessary. We are unable to learn, nor do we believe, that any such large blocks as have been mentioned have been actually sold, but it does seem certain that arrangements have been made to secure favorable freight rates in anticipation of future heavy exports. Well-informed gentlemen in the trade estimate that the output of the mines during the current year will not fall short of 150,000,000 pounds of copper, and that the exports in the form of ore, matte, black copper, and Western and Lake ingot will reach fully 80,000,000 pounds, leaving 70,000,000 pounds for home consumption. The Lake companies are certainly doing their share in keeping our market clear; in fact, the fear is sometimes expressed that some fine day consumers may wake up to find the market jumping upward abroad, and rushing in the same direction here with increased force, because we shall be practically bare of copper. Should this occur in the winter, the Lake companies would have the advantage, since they could supply the demand by drawing upon accumulating supplies on the lake, which otherwise await the season of cheaper water transportation before being moved. The difference of cost between the water and overland transportation, which was formerly about one cent a pound, is now only about one half that sum.

FIRING SHOTS IN BITUMINOUS COAL MINES.

Representatives of the mine-owners and miners of South Wales, Great Britain, had an interview recently with Sir WILLIAM HARCOURT, Home Secretary, to protest against a proposed addition to the rules regulating the working of collieries in that district. It appears that the Home Office, alarmed by the recent Penycraig explosion, which was attributed by the local mine inspector to the firing of shots, made inquiries, through the mine inspectors in the different parts of the kingdom, as to the methods employed in blasting in fiery mines. The reports, generally drawn up by experienced mining inspectors, justified the opinion that one of the greatest sources of danger in fiery mines was shot firing. Accordingly, the Home Office drew up a rule, which it proposes to enforce, that blasting must only be done between shifts, and that while it is in progress only those men actually engaged in the operation shall be permitted to be in the mine. A number of prominent colliery proprietors and mine-owners protested vigorously against this measure, which, they urged, would necessarily force the practical abandonment of some mines, and would seriously injure the interests of the miners.

As proposed, the measure may be somewhat too sweeping, since blasting may really be a source of great danger in one mine and be comparatively harmless in others. Recent experiments made in Germany by the Fire-Damp Commission may be quoted as aptly illustrating this point, and they may at the same time be cited as throwing considerable light on the possible cause of the Pocahontas disaster. They show strikingly how blasting may cause a very dangerous explosion even in a mine comparatively free from fire-damp, provided there is an accumulation of fine coal-dust in the galleries of the mine.

At the instance of Direktor Hilt, of Aachen, a drift was constructed at the Koenig Colliery, Neunkirchen, near Saarbruecken. It is 167 feet long, in an old rock dump, timbered with double T-iron and lagged with two-inch planks. All but the upper part of this drift, if it may so be called, was covered, the exposed part being provided with thirty small bull's eyes, thus making it possible to examine what was going on in the drift during an explosion. In order to imitate as closely as possible the action of shots fired underground, the head of the drift was formed by a heavy block of masonry in which seven small cast-iron mortar guns were fixed so that two were close to the roof, pointing in such a manner that they would strike the floor 33 feet from the head; three in the middle of the face, so that they hit the floor at a distance of about 16 feet; and two somewhat above the floor. These guns were fired by electricity and over two hundred artifical explosions.

Among them we may quote the following from an account given in *Glück Auf:* First, a gun was fired into the drift with an 8-ounce charge of powder, and with clay tamping, which gave a length of flame in ordinary atmosphere of 10 feet. Then the same charge was fired with a tamping of fine coal, and the length of the flame grew to 26 feet. Then the floor of the drift was covered for a distance from the face of 131 feet with a 1½-inch layer of dry fine coal from the Union Colliery near Aachen. When the guns were fired with clay tamping, the flames were 18 feet, and with coal tamping 31 feet long, thus showing that the presence of that particular coal-dust did not increase the effect of the shots as measured by the length of the flame. When, however, the floor was covered in the same manner with dust from the Pluto Colliery in Westphalia, which has a sad record, and the guns were again fired, a very heavy explosion occurred, which projected a flame 23 feet beyond the mouth of the drift, and was therefore fully 190 feet long. A repetition of the experiment gave the same result. An iron coal-car weighing about 700 pounds, standing on a track, was pushed on 24 feet by the concussion. When it is considered that there was not a trace of fire-damp in the air of the drift at the time, it will be conceded that, with certain classes of coal, the firing of shots is dangerous in the extreme. In spite of the negative results reached in many instances, notably by the French Commission, the Saarbruecken experiments, so far as they have gone, have demonstrated beyond a doubt that, with certain kinds of bituminous coal, the mere ignition of finely divided dust by the firing of shots is highly perilous. We feel convinced that the German Commission will not rest content with having demonstrated it in one case. With their exceptional thoroughness, they will probably test the dust from every group of mines in Germany; and a comparison of their action with their chemical composition, notably the percentage of bituminous matter, may reveal some laws that will be of general application.

We may mention here that some very interesting experiments have also been made on the ignition of fire-damp by the firing of shots. Carbureted hydrogen was piped to the surface from a blower in the conglomerate above the Goolman seam of the Koenig Colliery. It was conveyed into a gas-holder from which it could be forced into the drift. A chamber having a capacity of 700 cubic feet was bratticed off near the head of the drift and filled with a mixture of air and 5 per cent of carbureted hydrogen. When fired without the presence of coal-dust, it showed a length of flame of 36 feet, against 10 feet without fire-damp. But when 65 feet of the floor was covered with Pluto coal-dust, and the fire-damp was fired by shots again, an explosion took place, accompanied with a flame, and throwing the 700-pound coal-cars off the track for a distance of about 40 feet.

With these experiments before them, we believe it to be the duty of the managers of the Welsh, as well as of all bituminous mines the world over, to proceed with the greatest caution in permitting the firing of shots wherever the mine is a dusty one, and particularly so when the coal is highly bituminous.

CORRESPONDENCE.

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Retorting Amalgam in Vacuo.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: With regard to the foot-note by Mr. Stetefeldt, to my article on retorting *in vacuo* in your issue of November 1st, I will state that I have not myself seen his apparatus, and the reasons I gave why it did not work are only my surmises. I readily grant that some points in my plant remain to be tried. As I give it as a free suggestion, not secured by patent, I may expect that the parties who put it to trial assume some of the risks. If I had been more explicit in describing how I would construct a Liebig cooler for a retort, Mr. Stetefeldt's objection in that respect would perhaps be less positive. The concession made by Mr. Stetefeldt that he has no doubt that my apparatus is practicable and will work, I consider, under the circumstances, as very fair and honest, such as one may expect from the writer. Respectfully, F. GUTZKOW.

SAN FRANCISCO, Nov. 9.

Cost of Copper in the United States.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The question how cheaply fine copper can be produced in the United States, to stand the world's competition, is a vital one. Formerly, the production in this country was comparatively small, and was controlled by a few mines, especially the Calumet & Hecla on Lake Superior. Then the price of fine copper, protected by a high tariff, kept about four cents a pound above the world's market price. Three years since, assisted by this protection, production increased rapidly, new mines were opened, expensive plants for reduction were built, and the output of copper assumed such dimensions that it depressed the domestic market to the point of equalizing prices here and in Europe. This the following figures will show: Present quotations of copper in London, per ton of 2240 pounds, are: Best Selected, £57, less discount of 2½ per cent, equal to 11⅛ cents a pound. Wallaroo and Burra, £59, less 2½ per cent discount, equal to 12⅝ cents a pound. Our quotations here this week were: 12½ cents for Lake copper; 12 cents for copper made of pure Arizona ores; 11½ cents for copper made of Montana ores. Lake copper was sold here in November, 1880, at 19 cents; Baltimore copper, 18½ cents. In November, 1881, these grades were respectively 19 cents and 18½ cents. The London quotations in November, 1880, for Best Selected, were £67, or 14 cents: and in November, 1881, £70, or 14⅝ cents. A duty of 4 cents a pound imported thus excluded all importations and foreign competition in the home market.

Prices at present, both here and in Europe, are the lowest that have ever ruled. Several producers already claim that there is not much profit inthe business, if any at all. It is a fact that some of our largest mining concerns have lately passed their dividends, and it needs a very close search to find those that pay any dividends at all. Advices from Europe state that Chili bars and regulus could be produced, although without any profits, even with Chili at £50, and Spain has to counterbalance the low price by an increased production.

Let us see, now, how long our prominent American mines will be able to stand the low prices of copper.

The Calumet & Hecla and Quincy mines on Lake Superior, it is claimed, could lay down here the pound of copper at 9 cents, or at least should be able to do so.

Other large copper mining centers are in Arizona and Montana.

In examining the reports of different Arizona mines, such as the Copper Queen, the Old Dominion, and the Arizona Copper Company (formerly

Longfellow), we feel justified in saying that the pound of copper laid down here does not cost them more than from 8¼ cents to 9¼ cents—probably less—although they have to pay ridiculously high prices for coke and heavy freight on their shipments of copper. For instance, the Old Dominion Company pays about $60 a ton for coke, and uses one ton of coke to the ton of black copper, equal to three cents on each pound of fine copper. If a railroad branch should be built to Globe, coke could be delivered at perhaps from $20 to $25, causing a saving of from 1¼ to 2 cents per pound of copper, and the cost of copper would further be reduced by similar freight reductions on the copper material. Evidently, the Arizona mines are in shape to compete effectively with the Lake Superior and foreign mines, and even to beat them. Their ores require only one process to make black copper of about 97¼ per cent copper contents. How long this cheap production will go on depends entirely on the ore reserves and the quantity of deposits of carbonates in this region. Searching for such pockets is, of course, a weary, expensive job.

It is different with Montana, especially with the Butte mines. These have true fissure-veins, carrying mostly low-grade arsenical copper ores. Occasionally, pockets of high-grade copper ore are found, but they are not frequent, and are limited. Some mines are blessed with copper ores containing silver, about one ounce to the per cent of copper and upward, which, of course, brings better returns, the silver paying extraction if there are about 40 ounces and upward to the ton of 60 per cent matte. As a general rule, there is not enough silver in the ores to make it pay for itself. It requires many processes to extract the copper, and at present the lowest cost is: Mining, hauling, crushing, dressing, calcining, and smelting into a matte of from 60 to 65 per cent, 6¼ cents a pound fine copper; freight to New York, about 1¾ cents a pound fine copper; matte refining in Baltimore, about 3 cents a pound fine copper; laid down at New York at 11 cents.

This does not include the loss of interest between the time of mining and the period of receiving the copper ingots, neither is any account taken of the interest on the extensive plants necessary to concentrate these Montana ores, the manifold repairing of furnaces, calciners, and the wear and tear of machinery. For these Montana mines, as well as for the Arizona and Lake Superior mines, it is necessary also to take into account heavy costs for additional machinery while sinking and making further developments. Probably the cost price of 11 cents can be cut down, by cheaper refining and other savings, to a small extent, say to 10¾ or 10½ cents; but nevertheless it is clear that it is impossible for those Butte mines that carry simply copper ores to compete with other copper producers even then, and to make any profits. It can be only a matter of time when they will be compelled either to shut down or to reduce wages, and to try to obtain lower freight rates on their products. Then, possibly, they may weather the storm. So far as wages are concerned, they are just as high to-day as they were five years ago, when all merchandise, articles of luxury, etc., had to be hauled by bull or mule teams 300 miles from the terminus of the Utah Northern Railroad at exorbitant and outrageous rates. To-day, the railroad runs up to Butte. All merchandise, etc., is obtained 50 per cent cheaper than formerly. Even copper has gone down from 24½ cents a pound in the spring of 1880, to 11½ cents, and yet no change has occurred in wages. Undoubtedly, such a state of things is abnormal and can not be sustained, and in their own interest the workingmen should agree to a reasonable and gradual reduction, and not slowly kill the goose that lays the golden egg. The Union Pacific and Northern Pacific railroads should also earnestly consider the advisability of assisting the mine-owners by largely reducing the freight rate on the copper material; otherwise, they may see their tonnage drop off suddenly. They ought to understand that the expensive branch to Butte and the large improvements they made at Butte and neighborhood will become worthless in case the Butte copper mines find it necessary by continual losses to shut down their works. The Butte business men, house and lot-owners, and newspapers should understand that it is their duty and interest to insist on the necessity of reductions on these two factors, the wages of the workingmen and the freights on the railroads, and this without delay.

It is to be hoped that the present depression of the copper market will cease; but so far, it does not look like it, if several of our mining companies carry into effect the contemplated increase of their production to counterbalance the effects of lower prices. Latest advices from England plead already that any advantage derived from a larger production will be more than neutralized by still lower prices obtainable for the product. The consumption is larger than formerly, but has not increased, and will not increase, at the same rate as the production, and even now we are suffering with sufficient severity from a too heavy overproduction on both sides of the Atlantic.

Let mine-owners beware. Mines are very often worked without profit to the owners, even sometimes for a time with a loss; but this time is limited, especially for non-assessable concerns. Yours truly, S. R.

COST OF THE HOCKING VALLEY STRIKE.—The Columbus Board of Trade has received reports from a committee appointed to investigate the losses sustained by the strike in the Hocking Valley since June 27th. The loss of trade to members of the Board and to the coal companies has been $1,620,000. The loss to business men outside of the Board has been $350,000. The loss of freight to railroads centering here, $1,100,000. The loss to furnaces in the valley, $225,000. The aggregate losses are $4,011,000. Of this, it is estimated that the loss to the city of Columbus is $3,511,000.

THE ALUMINIUM CAP FOR THE WASHINGTON MONUMENT.—Arrangements have been made for the exhibition in New York City next week of the huge metal cap that will be placed on top of the Washington Monument at the national capital. This cap, which has been manufactured at Philadelphia by order of the government, is of the hitherto rare metal aluminium, and weighs only 117½ ounces. It will be burnished, and as the metal does not corrode by exposure to the elements, it will, when in position, shine like polished silver forever. The lightning-rod with which the monument will be provided will be jointed to the aluminium cap, and as the latter metal is the best known conductor of electricity save silver, the rod will not be required to project from the top of the cap. The metal is now produced at Philadelphia in commercial quantities.

ZINC MINING IN SPAIN.—I.*

By G. Prus.

Spain has been for a number of years one of the principal producers of zinc ore in Europe. Its importance in this respect has, however, largely decreased, although there are still several interesting mines in operation.

I. THE PROVINCE OF SANTANDER.—The principal zinc mines of Spain are in the province of Santander, which furnishes more than 60 per cent of the total output.

1. *The Picos de Europa Mines.*—The most remarkable deposits, geologically and as producers, are the mines of the Picos de Europa. The mountains after which they are called attain a hight of 8900 feet, and are the result of an upheaval of carboniferous limestone. They contain many deposits of zinc ore, of which that of Andosa is the most interesting. It is composed of series of parallel veins coursing southeast and northwest, which have been traced for over a mile, and are distributed over a zone more than half a mile wide. Their thickness varies considerably, reaching 32 feet in several points, and pinching down at others to a few inches. The zinc is principally found as carbonate ores carrying from 40 to 45 per cent of metal, the ore being white or slightly colored by oxide of iron. It is generally compact, but sometimes has a lamellar structure or is filled with holes. Blende containing from 58 to 65 per cent of zinc is also sometimes found.

The mines are located at an altitude of from 6500 to 7500 feet, and are covered with snow one half of the year. The ore, extracted by underground workings, is carted to the calcining-furnaces located at an altitude of 3300 feet below the snow-line. The lump ore is calcined in piles resting on a bed of wood from 40 to 50 feet in diameter, and 6·5 feet high, and is thus converted into an oxide carrying from 58 to 60 per cent of metal. The fines are calcined in reverberatory furnaces, fired with wood, the product containing on an average 52 per cent of zinc. Adjoining forests furnish an abundance of wood. The calcined ore is carted to the port of Tina Mayor, 67 miles from the mines, of which 29 miles are in the mountain district. The blende, which is exported in the crude state, goes to Tina Mayor directly from the mines. The ore is sent to Belgium in sailing vessels carrying on an average 200 tons.

Six miles west of Andosa, but separated from that group by a deep gorge, is the Aliva deposit, similar in character to the former, but more irregular and less extensive. The predominating ore is the blende, but carbonate is also found, which, after calcination, carries as high as 70 per cent of zinc.

The cost price of these ores is about 75 francs a ton delivered in storehouse at Tina Mayor, this high figure being due to the long distance which it must be carted and the special circumstances affecting the working of the mines.

The Providencia Company, which works these mines, some of which are owned by it and others leased, produces from 6000 to 8000 tons of crude carbonate ore and from 1000 to 2000 tons of blende during a campaign of five months. It gives employment to about 600 men. The ores are exported to Belgium and are sold to the Vieille-Montagne Company.

Near Aliva, a number of deposits of less importance have been worked, among which the Llordes, Grainas, and the Lon may be named. The distance from the coast, which is as much as 130 miles in the case of some of them, and the low price of zinc, make it impossible to work them at a profit in spite of the high grade of the ores. The Llordes mine was the only one working in 1882, producing 550 tons of blende.

The ores of the Picos District rank with those of Laurium, Greece, as the richest known. During the past twenty years, about 100,000 tons of ore have been taken from the mines of this district.

2. *The Cretaceous Deposits.*—The Cretaceous formation covers the entire eastern part of the province of Santander and a wide zone along the coast in its western part. It contains many deposits of zinc ore.

The most important deposit in the province, and one of the most extensive in Europe, is that of Reocin. The mine, which belongs to the Société Royale Asturienne, is situated 6·5 miles northeast of Torrelavega, and 16 miles from the small port Requejada. The country-rock is cretaceous limestone, which forms a basin nearly five miles long, stretching in a east-westerly direction, and the width of which varies from a few feet to about 1000 feet. The basin incloses dolomitic rocks between which the ore is bedded. Sometimes the calamine is found in fissures in the dolomite; sometimes, in generally small fragments, disseminated in an argillaceous and ferruginous earth that in great bodies surrounds the dolomite. Often thick beds of argillaceous sand are interbedded with the ore-layers. The ore deposited in the basin is covered with a layer of vegetable mold, the thickness of which increases rapidly toward the west. The depth of the deposit is not exactly known, but it is undoubtedly great.

The ore is mined by open cut, which is advanced in four terraces from east to west. On every level, the barren earth is carried by inclines beyond the basin. The solid ore is taken to the calcining-furnaces, and the fine ore, or earth containing particles of calamine, is conveyed to the washers. The entire transportation service is now done very economically by means of locomotives, the distance being from three to five miles. It is estimated that out of the total of material moved, ten per cent is ore-bearing. The washers recently built are very well designed, and treat the finest ores. They produce about 40 per cent of washed material. The lump-ore is calcined in seven shaft furnaces, and the fines in fourteen reverberatories. As these ores contain a good deal of iron, the lump ores are hand-sorted. For the earthy material, a Siemens electro-magnetic is used, which draws out the iron previously converted into magnetic oxide by the calcination. The calcined ore is transported to the port of Requejada by a special railroad 16 miles long. Two steamers carry the ore to Dunkerke, or Avilès, where the Société Royale Asturienne has reduction-works.

About 75 per cent of the total ore mined goes to the washers and dressing-works. Out of a production of 24,000 tons of calcined stuff, 18,000 tons come from the washers, equivalent to about 24,000 tons of crude calamine, or 60,000 tons of rich "earth," extracted from the mine, represent-

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ing a total extraction of 600,000 tons. The cost may, therefore, be estimated as follows :

	Francs.
Mining (1 franc per ton on 600,000 tons) or on 18,000 tons	33·33
Washing and dressing	7·00
Calcining in reverberatories	8·00
Separating the iron	2·00
Transportation and loading	1·00
Royalty, 2·50 francs per ton of crude ore	3·46
General expenses	3·21
Total per ton of calcined ore	58·00

The cost of the rock ore is much less, and should not be higher than 45 francs, f.o.b. at Requejada. The calcined rock ore from the Reocin mines carries from 55 to 58 per cent of zinc, and the "earth ore" from 45 to 58 per cent. The annual production is from 20,000 to 24,000 tons, but it could be easily increased if the zinc-works required a larger quantity. The mine has produced during the twenty years in which it has been worked between 400,000 and 500,000 tons of calcined calamine.

Although M. Maistre has referred the territory in which the Mercadal mine is located to the Triassic, the origin of the deposit is so evidently analogous to and contemporaneous with that of Reocin that it will be described at once. Like Reocin, Mercadal is a deposit at the contact of dolomites in a basin of limestone. It is separated from Reocin only by a ridge of limestone hardly 1000 feet wide. It seems probable that the mineral-bearing solutions coming from the west filled the small Mercadal basin and then overflowed to the much larger Reocin basin. However that may be, the Mercadal deposit, besides being smaller, is filled with dolomites that are more compact than those of Reocin, and have smaller interstices containing the calamine. This deposit is now almost exhausted.

Three miles to the westward, there is a large bed carrying calamine between dolomite and strata of bluish marl. This deposit, only recently worked, does not seem to be very extensive. The Mercadal deposit is worked by open cut, the ore and the barren material being conveyed out of it by inclined planes. The other is opened by underground workings, and the ore is carted to the highway. The rich "earth" is passed through washers and is calcined in reverberatory furnaces, the iron being then extracted by means of a Siemens machine. The rock ore is calcined in shaft-furnaces. The grade is the same as that from the Reocin mine. The output of Mercadal has varied during the last twenty years between 2000 and 3000 tons of calcined ore annually, and tends to decrease in consequence of the exhaustion of the principal deposit. The ores are carted to Requejada, and are exported to Belgium, where they are sold to the Vieille-Montagne Company.

The Udias and Oreña group is a series of zinc deposits that extend along the coast in the Cretaceous formation between Torrelavega and San Vicente. They are very irregular masses in limestone near its contact with dolomite. The calamine is less ferruginous than at Reocin. The principal mines at Udias and near Comillas belong to the Société de Santander et Quiros, which has extracted from them for a long time from 5000 to 6000 tons of calcined ore per annum. They are now being rapidly exhausted, and their output is very small. The Société Royale Asturienne has also some mines at Udias that yielded 315 tons in 1882. Finally, there are near Oreña a number of outcrops on the dolomite that have led to a good deal of unsuccessful prospecting. The ores from Udias are calcined at the mine and are transported to the small port of Comillas, constructed and maintained specially for the purpose of shipping them by the Société de Santander et Quiros.

The Florida mines are located near the limits of the Cretaceous, at a great altitude south of the village of Treceño. They work three parallel beds in the dolomite, striking east and west and dipping 45 degrees. Their thickness ranges between 5 and 6·5 feet. They are worked by the Société de Santander et Quiros, and yield about 1500 tons of calcined ore per annum. The ores are carted to the San Vicente River, and are boated to the calcining-furnaces, located 27 miles from the mines at the entry of the port.

The Rasines mines form a small group in the eastern part of the province of Santander, the conditions affecting them being similar to those of the Udias mines. They are almost completely abandoned, and their production is insignificant.

In a general way, it may be stated that the zinc mines of the province of Santander are declining, and in a few years only Reocin and Picos will be working, unless the price of zinc improves.

THE MECHANICAL PROPERTIES OF IRON AND STEEL AT CRITICAL TEMPERATURES.

We understood Professor Egleston, when speaking before the recent meeting of the American Society of Mechanical Engineers, to claim that he had been surprised to observe, in testing steel at an English works, that it invariably broke at a temperature corresponding to the blue color. This statement was certainly received by many of those present with the astonishment with which a novelty is generally hailed. Our attention has been called to the fact, by a gentleman who closely follows progress in the metallurgy of iron and steel, that no less an authority than Mr. Daniel Adamson, of Manchester, has called attention to the same matter in a paper on the Mechanical and other Properties of Iron and Mild Steel, read before the Iron and Steel Institute of Great Britain, and published in its transactions in 1878. Mr. Adamson says, page 396 : "Few or no malleable metals, such as wrought-iron or mild steel, can be found in the open market that possess a range of endurance at all varying temperatures, say from cold up to red heat ; but nearly all ordinary bar or boiler iron and mild steels will endure considerable percussive force when cold, and up to 450 degrees Fahr., after which, after the heat is increased, probably to nearly 700 degrees, they are all more or less treacherous and liable to break up suddenly by percussive action. The poorer class of metals, at this temperature, which may be called color heat, varying from a light straw to a purple and dark blue, are simply rotten. Some of these peculiar properties are illustrated by a series of tests of various qualities of metal. . . .

"The same unfortunate element is exhibited by the mild class of Bessemer and Martin-Siemens steel, with this difference, that they bend better cold, and more pleasantly when hot ; but both break up by percussive action at the medium temperature above named, the Martin-Siemens enduring somewhat better than the Bessemer class under these tests. . . .

"During several years of observation, the writer has come to the conclusion that no metal containing much above a trace of sulphur can endure breaking at this color heat, while, at the same time, the phosphorus must be low ; in fact, such endurance can only be obtained by a comparatively pure iron unalloyed by other ingredients. . . .

"The color heat tests ought to be impressed upon all workmen, to prevent the hammering of metals when half cold, or the heating of iron by red-hot iron for some final adjustment : when hammering is required, it would be a better and wiser policy to only heat the iron with boiling water, or by applying steam against the surface a short time.

"Finishing forgings or smith's work by hammering at a black heat at all times proves highly injurious, unless great care is afterward used in annealing, and it is questionable then whether the full measure of the strength of metal in many cases is ultimately restored.

"This dangerous temperature can also be produced by allowing engine shafts, railroad carriages, axles, and such articles to become hot, and boil off the grease or tallow, and for want of lubricants attain a temperature at which they are most liable to break down. In all such practical operations, the work should be stopped and the metal left to cool. . . .

"The strength of the purest iron, no doubt, is seriously interfered with at about 600 degrees of heat Fahr., and especially its power to resist percussive force ; but in what way the cohesion of the particles is disorganized at a temperature midway between a cold bar and a moderate working heat, may not be easy to describe. Such, however, being the fact, the greatest care should be exercised in all such ordinary practical operations."

IMPROVED ORE-ROASTING FURNACE.*

By George D. Colby, Port Leyden, New York.

The subject of roasting and desulphurizing iron ores previously to charging them into the blast-furnace is one of great interest and importance to those connected with the manufacture of charcoal pig-iron. Its importance as affecting the actual working of the blast-furnace, as well as the cost, quantity, and quality of the iron produced, is, perhaps, not always fully appreciated, and the experience of the writer with ores at the Katahdin Iron-Works, Maine, and elsewhere may be of some interest to the members of the United States Association of Charcoal Iron Workers.

The writer became connected with the Katahdin Iron-Works in 1874 as furnace manager. The ore at that time in use, of which the following is an analysis, was roasted in heaps, piled on wood, which had been laid on the ground for this purpose :

ANALYSIS OF KATAHDIN (OLD BED) ORE.

Sesquioxide of iron	76·87
Silica	1·10
Lime	·52
Sulphur	1·24
Phosphorus	0·09
Water, etc	20·18
Metallic iron	53·81

The result, of course, depended very much upon the quantity and quality of wood used and the manner in which both wood and ore were piled, as well as upon the condition of the weather during the entire operation, and it very often happened that the ore was roasted in a very unsatisfactory manner. In some cases, it would become badly loüped, while in others much of the ore would be but partly roasted or not roasted at all, and necessitated the extra expense of removing and replacing on wood for another trial. As an improvement on this method, and to keep the fire under control, as well as to reduce the cost of roasting, a series of arches was constructed, formed by piers of bricks and stone, with pigs of iron, laid from pier to pier for grates ; ore was piled on these piers and grates to the depth of about three feet six inches, and, when the piles were completed, fires were started under the grates and kept up until the ore was well roasted. This method proved to be a great improvement over the old one of roasting in heaps on the ground, as it gave us uniformly well-roasted ore, which, in turn, resulted in much more satisfactory work in the blast-furnace. This plan was employed for nearly three years, or until the ore above described became exhausted, and it became necessary to use an ore different in physical character and containing a much larger amount of sulphur. The following is an analysis of a fair average of the ore we were at this time called upon to treat :

ANALYSIS OF KATAHDIN (NEW BED) ORE.

Protoxide of manganese	0·25
Magnesia	1·12
Lime	1·19
Alumina	1·60
Silica	6·93
Iron	47·76
Sulphur	3·90
Phosphorus	0·03
Water, etc	20·00

This ore rapidly disintegrates on being raised to a red heat, and this characteristic proved a very serious obstacle to its successful treatment. The blast-furnace, on being charged with this ore, worked very irregularly and unsatisfactorily, showing the presence of much sulphur and yielding a very inferior iron. A chemical examination of the ore showed the portion of it directly over the fires, and which had been exposed to an intense oxidizing heat, to be entirely free from sulphur. This portion extended about one foot above the grates. Beyond that point, the ore was found to contain from 1 per cent to 4 per cent of sulphur, varying in amount in proportion to its distance from the fire. The ore in the extreme top of the pile was invariably coated with free sulphur, which had been liberated by the heat below, and condensed on coming in contact with the air and cold ore at the top of the heap. This ore, and much beneath it, were always laid back on the grates for another roasting ; but, under the most favorable conditions, this method of roasting our new ore failed to give desirable results. Other methods were studied, and in 1877 a small experimental kiln was con-

* Read at the Fifth Annual Meeting of the United States Association of Charcoal Iron Workers, at St. Louis, Missouri, September 30th, 1884.

structed, having a hight of ten feet, a diameter of 6 feet, with boshes, which also answered the purpose of grates, formed by long pigs of iron, the upper ends of which rested against the sides of the kiln, the lower ends on a round iron frame, which, in turn, rested on four iron columns, the ore being drawn out through the center of the iron frame, and the fire so arranged as to come in direct contact with the ore on all sides. Steam was introduced into the center of the kiln, for the purpose of carrying off the liberated sulphur, and also to increase the draught. The ore was quite well roasted in this kiln; but in spite of all efforts, much free sulphur was brought down by ore that had become coated with it in the upper and cooler part of the kiln. To get rid of this free sulphur as much as possible, the ore, while red-hot, was drawn out into a tank of water, and the water allowed to drain off while at a boiling temperature.

As before stated, the ore was very well roasted, and it seemed nearly impossible, judging from its appearance after having passed through the kiln and operation above described, that it should contain a large amount of sulphur. But while the quality of the ore was somewhat improved by the use of ore roasted in this kiln, the working of the blast-furnace was still far from satisfactory, and the pig-iron not up to the desired standard, and as it could be sold for but little more than the price of common iron, it became evident that something must be done to greatly improve the quality of the iron or cease operations.

Mr. O. W. Davis, Jr., the Treasurer of the Katahdin Iron Company, and the writer, now began to consider the advisability of building a roasting-kiln that had long been in successful use in Sweden (namely, the Westman kiln), and which it was thought would not be altogether an experiment.

Mr. Ernst Sjostedt, a graduate of the School of Mines of Stockholm, Sweden, who was familiar with Westman's kiln and with its workings in Sweden, was engaged to superintend its erection. The kiln was modified somewhat from the usual Swedish form, to admit of the use of wood instead of furnace gas, the latter being the fuel generally used in Sweden. It was, when finished, 22 feet high, 4 feet inside diameter at top and 7 feet inside diameter at the bottom, had 5 drawing-out doors and 10 fire-arches.*

When completed, the kiln was dried out, filled with ore, and fires started in each of the 10 fire-arches, and again trouble began. The best of seasoned wood was used in the fire-arches, and every possible effort made to thoroughly roast and desulphurize the ore, but without success. As the ore became heated, it separated into small parts, which crushed compactly together by the weight of the ore above, and it became impossible for the heat to penetrate for more than a foot from the fire-arches. To that distance it was well roasted, but, when drawn out, the raw ore from the center of the kiln became mixed with that which was roasted, and, as much of the raw ore was very fine, it became impossible to separate it from the roasted, and considerable was charged into the blast-furnace, carrying much sulphur with it. The ore was also often coated with free sulphur, as had been the case with the other kiln.

We then added 35 feet to the hight of the chimney, hoping to overcome the difficulty by means of greater draught, but did not succeed, the disintegrating character of the ore defeating all our efforts. So far, the Westman kiln had proved a decided failure, giving no better results than either of our old methods, and we were about to abandon it when the idea of a central flue occurred to the writer, and a temporary one, made from a 16-inch wrought-iron pipe, was placed in the kiln. The result for a few days was very encouraging, but the wrought-iron flue would not stand the great heat, and was replaced by one of bricks. The kiln, however, was too small to admit of a central flue of sufficient size and strength for our purpose, if built of bricks, and after becoming convinced that we had at last found a way out of our difficulties, the Westman kiln was taken down and a Davis-Colby roaster erected in its stead. This roaster was constructed to admit of a good-sized central flue for the use of either gas or wood as fuel. The distance from the fire-arches to the central flue was 24 inches, so that, in roasting the ore, the heat passed through but 24 inches of it, and then was drawn directly into the central flue, carrying with it the liberated sulphur, thus preventing condensation of that element in the upper part of the roaster. The hight of this roaster was the same as the Westman, namely, 22 feet. The blast-furnace was put on ore calcined by this roaster, and at once showed a very marked improvement in its working, the product was increased fully 33 per cent, and the consumption of fuel decreased an equal amount. The roaster has been in successful operation for four years, requiring no repairs, and roasting all the ores used in the blast-furnace during that time. Concerning the improvement in the quality of the iron effected by the use of this roaster, which simply thoroughly roasted the ore, it will be sufficient to say that the product of the furnace has found ready sale as a first-class car-wheel and malleable iron. The works of the Katahdin Iron Company were destroyed by fire last November, and the writer soon after that time became connected with the Gere Iron and Mining Company as manager at its works at Port Leyden, New York, where a Davis-Colby roaster was put in operation last May, and continued during the past summer to give results fully as satisfactory as those at the Katahdin Iron-Works, although the ore used is of an entirely different character, being the hard red hematite that is so abundant in Northern New York.

The cold center, which is a great disadvantage in the Westman kiln, is overcome by the use of a central pier or flue. It can be easily adapted to any particular ore, whether coarse or fine, hard or soft, as the annular space can be made large or small as the character of the ore to be treated may require. It can also be arranged to give a preliminary roasting in the upper part of the roaster to such ores as may require such treatment before receiving the intense heat that accompanies the final roasting at the bottom. For ores that require but one roasting, the upper fire-arches and gas-flue would not be needed. None of the ores passing through this roaster can escape the intense heat that is continually passing from the fire-arches to the central flue, and, as a result, it is all thoroughly and uniformly calcined, requiring no roasting after being drawn from the roaster. Sufficient heat passes upward to thoroughly heat and prepare the ore for the roasting it receives in front of the fire-arches, thereby overcoming the objection of a small pre-heating chamber.

The roaster at Port Leyden is run by gas furnished by two small Langdon gas-producers. Two and a half tons of pea coal are consumed per day to roast from 40 to 50 tons of ore. At the Katahdin Iron-Works, where wood was employed as fuel, the entire cost of roasting the ore in this apparatus was about 45 cents a ton; and the cost at Port Leyden for the past summer was about 35 cents a ton, the use of gas saving some labor.

* At the first annual meeting of this Association, Mr. Owen W. Davis, Jr., read a paper on the Desulphurization of Ore by the Westman Kiln at the Katahdin Iron-Works, Maine, which was published in the *Journal*, Vol. I., No. 3, pages 43 to 50.

THE CURR TRAM-PLATES FOR UNDERGROUND TRACKS.

The economical conveyance of minerals underground, especially at the present time, is of primary importance. Of late years, improvements have taken place, but it is considered that even the existing system is capable of being improved upon. One of the principal objects to be obtained is in the minimizing of friction, which resists the motion of all carriages running over rails on wheels, which includes the contact of the periphery of the wheel with the rail, the attraction of the axle, and the oscillation of the load. From experiments made by an eminent mining engineer, it appears, says the London *Mining Journal*, that, on an ordinary railroad connected with a mine on the surface, the resistance in some instances did not exceed the $\frac{1}{240}$ part of the load; while, on the best constructed railroads, it is not more than $\frac{1}{300}$ part of the load. On the other hand, on underground railroads, with the road in good condition, the friction has been found to be something like $\frac{1}{110}$ part of the weight, and with rails worn at the top, and the road in ordinary condition, the friction was found to be about $\frac{1}{82}$ part of the weight. For a great many years, Curr's tram-plates, which superseded the wooden ways and broad wheels, were in the ascendant. They were introduced by Mr. Curr at the Duke of Norfolk's coal mines, near Sheffield, along with the sharp-edged wheels, and these diminished the resistance of friction. These, however, have had to give way to round top rails with the broad flanged wheels, being lighter and stronger, and now in use at most first-class mines. It has been found that the friction of the flanges is very much less than that of the sharp-edged wheels with Curr's plates, while the rails can be made much stronger and more durable and with the same weight of material. At many mines, two iron rails are laid down, while it is admitted that those made of steel are by far the cheapest in the long run; the same is also admitted to be the case with respect to wheels. In connection with the rails, self-acting and inclined planes can be most advantageously adopted where the minerals have to pass a considerable distance down the gradients having a fall of from 1 to 30 to 1 to 40. On most parts of the continent, inclined planes are made to serve two or three of the faces, especially where the formations are steeply inclined. These are laid with four rails, on the outer part of which there is a tram with a horizontal platform on which the tub goes along. On the inner pair of rails, there is another long, heavy, and narrow tram, which performs the duty and acts as a counterbalance, and is so constructed that it can pass underneath the first one when they meet. The trams are attached to ropes coiled upon a drum at the top of the incline, and when the weight of the full tubs in descending raises the counterbalance, the latter pulls up the empty tubs. Underground railroads, indeed, are more costly than many persons are aware of, and how to increase their durability is a most interesting problem for the mining engineer to solve, and we feel assured that it can be done.

NOTE ON THE ESTIMATION OF ANTIMONY.

By George T. Dougherty, Chemist and Assayer Chicago Smelting and Refining Company.

In smelting-works like ours, the chemist is frequently called upon in the course of his work to determine antimony in ores, hard leads, antimony slags, and other products or by-products of the smelting and refining process. Great accuracy in the assay of this metal is attainable only by resort to a complete chemical analysis, which, as all of us know, takes quite a long time. The management usually cares for quick and approximately correct returns on antimony.

The method that will best answer these desiderata for the present is to be done half in the fire, and afterward completed with wet or chemical agents. Where the substance tested is an oxide, we may reduce the metals together into a button by means of charcoal or red argol. If there is any sulphur present, it would be better to dispense with the common method of reduction with argol and iron wire, but, instead, to decompose with a mixture of equal parts of potassium cyanide and sodium carbonate. The button of lead and antimony thus produced will be clean and free from lumps of iron matte, which are often very difficult to remove by hammering without losing particles of the brittle alloy.

If assayed for lead and antimony, the button may be weighed, and, after hammering thin or cutting into small pieces, put into a small porcelain dish; nitric acid (diluted with its volume of water) is poured over it, and is allowed to boil down with no replenishing of acid until very shallow, when the alloy will have been completely decomposed. All the lead goes into solution, while the antimony is converted into a white precipitate, which, after diluting the solution, may be filtered, dried, ignited, and weighed as antimony tetroxide (Sb_2O_4). The difference between the weight of the button and that of antimony in that button gives the amount of lead. If the button has been too impure, the lead may be determined in the filtrate from the antimonic acid as a sulphate. Ten grams is a most convenient quantity to work on in assaying for those metals by this method.

It had been no easy matter to many of us before in attempting to cut up such an alloy in solution quickly. One of the standard works on assaying, which is high in authority, and has always enjoyed deference of opinion among men of our profession, directs the use of "concentrated" nitric acid for dissolving. I have repeatedly tried with it; but it always has a very slow action on buttons of a similar composition, even when boiling, and taxes our patience heavily; for it takes not hours but good days to finish its prescribed work. With weaker acid (half acid and half water), the button can be separated completely within thirty or forty-five minutes.

A NEW ROCK-DRILL.*

By Frederick A. Halsey, New York.

In the invention and design of this machine, it was the writer's object to obtain a better steam distribution than had before prevailed in machines of this class. The chief resulting differences between this machine and others are as follows:

1. In the machines in general use, the motion of the piston is arrested at the conclusion of the return or inboard stroke, by a live steam† cushion, obtained by giving the valve a great degree of "lead." In this machine, the piston is stopped (so far as is possible so to do) by an exhaust-steam cushion, obtained by closing the exhaust-port soon after the return stroke has commenced, and the steam thus compressed forms a portion of that used to effect the succeeding striking stroke.

2. In the machines in general use, the steam is used without expansion. In this machine, expansion is introduced to any desired extent.

3. The machines in general use strike a cushioned blow. This machine strikes an uncushioned blow.

The cushioned blow is a necessity with the valve-gears heretofore usually employed—this necessity arising from the following circumstances: The length of stroke of a rock-drill is an uncertain quantity, since, as the drill-hole progresses in depth, the cylinder must be correspondingly fed forward, but to effect this feed with perfect regularity is found to be an impossibility. The effect of an irregular feed of the cylinder is to vary the point marking the end of the stroke of the piston—the approach of the piston to the lower cylinder-head varying from stroke to stroke. Moreover, in starting a hole, and under certain other circumstances, it is occasionally desirable to be able to feed the cylinder forward, so as to shorten the stroke still more than is actually necessary to accommodate the usual irregularity of feed. In brief, the machine must be able to take strokes of considerably less than normal length, without failure to trip its valve, in order to continue in uninterrupted action. This circumstance has usually been provided for by simply giving the valve a greater degree of lead at the *lower* end of the cylinder, tripping the valve at a point previously decided upon as the end of the shortest stroke to be allowed, and then submitting from necessity to the loss of power due to the cushion thus introduced into all strokes of usual length. In the machine about to be described, provision has been made for this irregular feed and length of stroke, but nevertheless, when full-length strokes are made, the valve does not move nor is steam admitted below the piston, until the actual delivery of the blow.

Figures 1, 2, 3, and 4 are longitudinal sections taken on the broken line *A B C D* of figure 5, the piston and valve being shown in a number of successive positions. Figure 5 is a cross-section on the line *E F* of Figure 1.

In Figure 1, the piston has just completed its striking stroke and is ready to commence its return stroke. The steam that effected the preceding striking stroke was exhausted through the opening *h*, which forms the only exhaust-port for the upper or left hand end of the cylinder. Steam enters at the supply-nozzle *a*, flows through the longitudinal groove *b*‡ in the cylinder (seen also in Figure 5), to the broad, shallow circumferential groove *c* in the piston. This circumferential groove *c* forms, in effect, the steam-chest of the machine, and from it the steam is distributed alternately to the opposite ends of the cylinder. Through the passage *d*, steam pressure is maintained in the lower end of the valve-chest, firmly holding the valve in the position shown. Steam flows through the passage *e e*, and from this through the neck *f* of the valve to the passage *g g*, which in turn leads it to the lower end of the cylinder. The piston now starts upward, and presently takes the position shown in Figure 2. In passing from the position of Figure 1 to that of Figure 2, the piston has closed the ports *d*, *e*, *h*, and opened *i*, *j*. Closing *h* confines the exhaust-steam in the upper end of the cylinder, forming an exhaust-cushion before the piston, and accomplishes the first improvement named above. Closing *d* merely isolates the steam already in the end of the valve-chest. Closing *e* cuts off the supply of steam to the lower end of the cylinder, and for that end effects the second improvement aimed at. Opening *i* has no effect, as its upper end is still closed by the valve. Opening *j* establishes communication between the lower ends of cylinder and valve-chest, and hence, as expansion goes on from the cut-off, the pressure acting on the end of the *valve* will gradually fall. In Figure 3, the piston has ascended still farther, and uncovered the port *k*, admitting steam through the passages *l* and *n* respectively, to the upper end of the cylinder and valve-chest. The former completes the work of stopping the motion of the piston; the latter, being opposed only by expanded steam at the lower end of the valve, as just explained, shifts the valve downward, thus establishing communication between the port *g g* and the exhaust passage *o*. The piston now commences its descent, and closes and opens the various ports in the reverse order to that just explained. Closing *k* has no effect, as *i* being now open the steam can pass through it to the upper end of the cylinder. Closing *i* effects the cut-off for the upper end of the cylinder, exactly as closing *e* did for the lower end. Opening *e* has no effect, its upper end being now closed by the valve. Opening *h* effects the exhaust.§ In figure 4, the piston has just uncovered the port *d* leading to the lower end of the valve-chest, and it has thus established the condition that will reverse the valve, and insure the next upward stroke. As the port *d* is *just* uncovered, and no more, the piston is at the point marking the termination of its shortest working stroke. Should the piston stop short of the position shown (by reason of excessive feed), the port *d* would not be uncovered, the valve would not reverse, and the machine would stop. As will be seen, the piston is at some distance from the lower cylinder-head, this distance representing the latitude of irregularity permitted in the feed. The piston may stop anywhere between the end of the cylinder and the position of Figure 4, and the action will continue. In order to effect the third improvement (the uncushioned blow), it is necessary to provide an arrangement that, notwithstanding the passage *d* is always opened at the position shown in Figure 4, shall yet, when full-length strokes are made, permit the piston to pass on and complete its stroke without the movement of the valve actually taking place until the delivery of the blow. This is effected by simply constricting a portion of this passage *d*—making it of such small size that the passage through it of the steam necessary to move the valve shall be delayed until the piston has had time to pass on and complete its stroke. In the machine as actually made, most of the ports opening into the cylinder are arranged in pairs, and diametrically opposite one another, to obviate side pressure on the piston.

Figures 6 and 7 are indicator diagrams* photographically reproduced from the original pencil lines, and, being taken at working pressure, with wide-open throttle, unrestricted speed, and full-length stroke, illustrate the action of the machine. Figure 6 is from the upper end, representing the striking stroke, and figure 7 from the lower end, representing the return stroke. At *p*, Figure 6, the piston is in the position of Figure 1. At *q*, the exhaust-port *h* is closed and compression begins; at *r*, the port *k* is opened, full-pressure steam enters, stops the piston at *s* and reverses the valve; at *t*, the port *i* is closed, and expansion begins; at *u*, the port *h* is opened, and exhaust takes place. At the lower end of the cylinder, there is no gradual rise of pressure like that from *q* to *r* of Figure 6. At this end, the rise of pressure is practically instantaneous, and the result is the undulations of Figure 7. While, however, the upper side of Figure 7 is about valueless, the lower side renders clear the action that it is desired to show. As stated, the machine was running its full stroke—as near to its lower head as was considered safe—nevertheless, there is no lead whatever shown. At *v*, the exhaust from the upper end of the cylinder occurs, and the crossing of the two exhausts produces the flutter shown. The port *d* is also opened at *v*, but it is clear that steam is not admitted until the end of the stroke is reached.

It will be observed that the point of cut-off depends upon the position of the ports *e*, *i*, lengthways in the cylinder, and can be varied at will in the design and in the two ends of the cylinder independently. It is freely recognized that fuel is but one of many items of expense, and that in many situations speed of execution far outweighs any economy in fuel that might be realized through the use of the expansion principle. To meet both situations—those where economy and capacity, respectively, are leading objects, two classes of machines are made—one having cut-off on both strokes, and the other on the up-stroke only, and giving the effect of the uncushioned blow entirely to increased power. The first is named the "Economizer," and the second the "Slugger," and either is furnished as the situation requires.†

* A paper read before the American Society of Mechanical Engineers.

† For the sake of brevity, the word "steam" will be used throughout this paper to designate the driving medium. It will be understood that the devices described are equally adapted to use with compressed air.

‡ The longitudinal groove *b* is of such length as to maintain constant communication between the nozzle *a* and the circumferential groove *c*. Its office is to lessen the otherwise inconvenient length of the circumferential groove *c*. This in turn diminishes the length of piston and cylinder, and hence weight of machine.

§ In the actual machine, a covered passage leads the exhaust-steam from the port *h* to the passage *o*, so that the exhaust from the two ends of the cylinder escapes to the air through a single outlet *w*, of Figure 5.

* Taken with the machine operated by compressed air.

† They are manufactured by the Rand Drill Company, of this city.—EDITOR ENGINEERING AND MINING JOURNAL.

THE NEW CREMATORY TEMPLE.—Last Wednesday, the corner-stone was laid at Mount Olivet, Long Island, for the crematory temple of the United States Cremation Company. With good luck, the company expects to cremate its first body next February in the largest retort in America. It is improved in many respects over the Le Moyne furnace in Pennsylvania. Twenty dead bodies are now awaiting its completion to be reduced to ashes. The cost of cremation in each case will be from $10 to $25. The cost of the building will be about $1900. The land cost $2800. The edifice is designed as a modified Grecian temple of brick and marble, 40 by 72 feet. The basement will contain, in the rear, the furnace, which will be constructed chiefly of fire-brick, and will be adapted to coke, with a regenerator. The incinerating chambers will consist of retorts, which will exclude all fuel and flame from contact with the body and from which the volatile products of the incineration will be carried into the furnace for recombustion. Incineration will take place at a temperature of about 2500 degrees Fahrenheit. It will require about 40 minutes per hundred pounds of the subject, and will leave about four per cent in weight of a pure pearly ash. No smoke will be visible and no odor perceptible during incineration. The basement will also contain a *refrigidarium* where bodies may be kept when desired awaiting the arrival of friends from a distance; also a *calidarium* for cases of possibly suspended animation, the high temperature of which will induce speedy evidences of life or death, as the case may be. There will be, also, in the basement an *œdicularium*, or urn-room, and an atelier. This last will be used, also, for making autopsies, which will be required in all cases wherein it is not clear that death is the result of natural causes. The body of the building, or the ground floor, will be fitted up as a chapel, where any service desired may be held. In the central aisle of this chapel, directly in front of the lectern, will be a permanent catafalque, within which the body will be placed and hidden from view by a pall falling from a frame above. Thence the body will descend by an elevator to the incinerating room, and the service and the incineration will proceed simultaneously. The office and reception-rooms will be on the main floor, in front of the auditorium and on each side of the vestibule.

MINERAL ENTRIES DURING THE FISCAL YEAR 1883–1884.—Mr. McFarland, Commissioner of the General Land-Office, makes the following statement in his annual report: One thousand nine hundred and eighty mineral entries of the public lands and twenty mineral entries of the Ute Indian lands were made during the fiscal year, embracing 29,683·41 acres and 919·10 acres, respectively, a total of 2000 entries and 30,602·51 acres. There were 1760 mineral applications filed on the public lands and 42 on the Ute lands, a total of 1802 applications. One hundred and eighty-four adverse claims were filed against entries of the public mineral lands, and eight against Ute lands. There were 50 coal entries of public lands and 10 of Ute lands, a total of 60 entries, embracing 5669·24 acres and 1449·49 acres, respectively, a total of 7118·73 acres. There were also 585 public coal land filings and 26 Ute, a total of 611 filings. The above shows a decrease, as compared with 1883, of 112 entries and 917·67 acres of mineral lands, 43 entries and 8494·09 acres of coal lands, 510 mineral applications, and 198 adverse claims, and an increase of 115 coal filings.

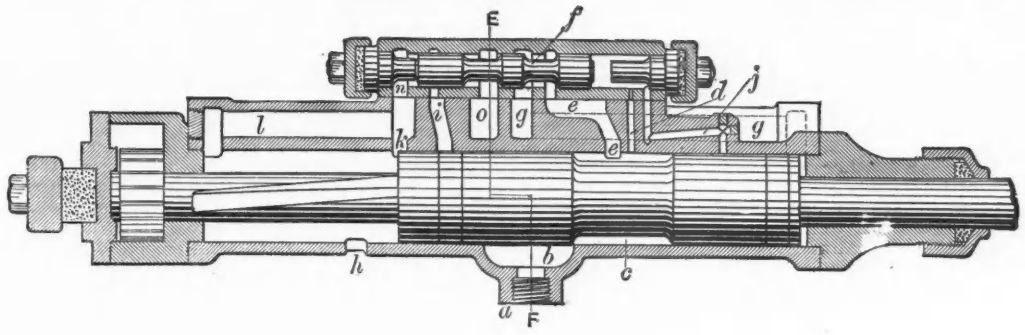

FIG. 1.

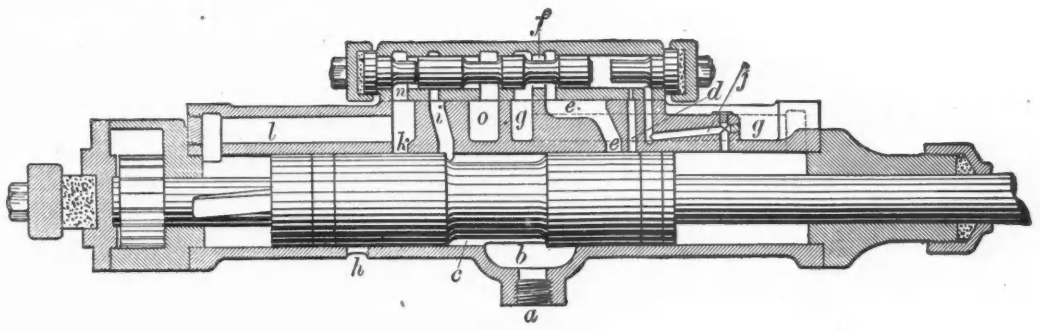

FIG. 2.

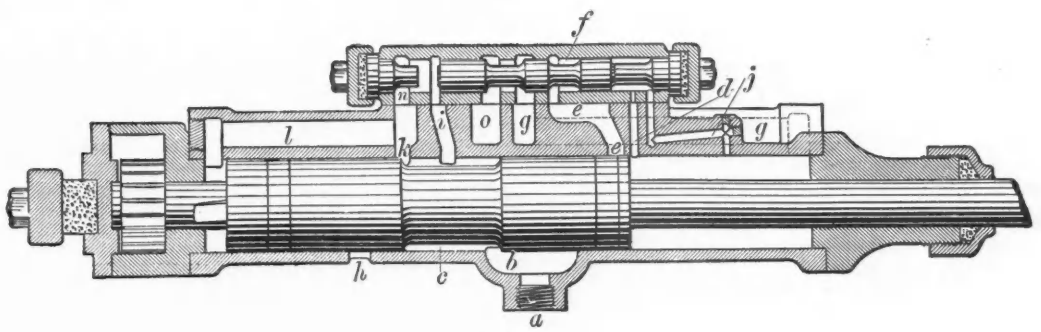

FIG. 3.

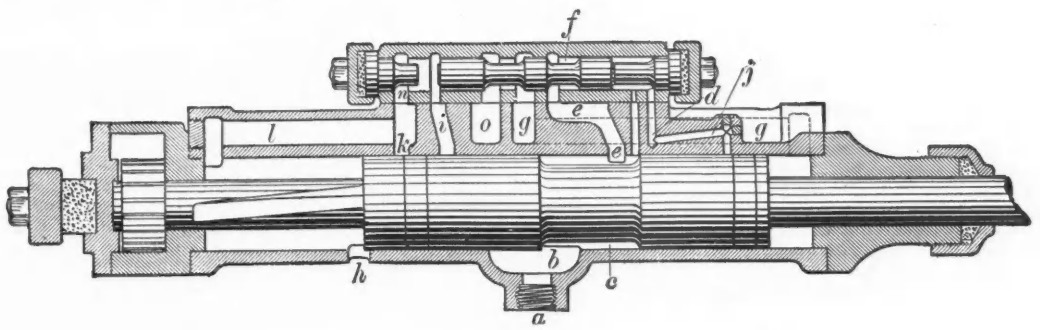

FIG. 4.

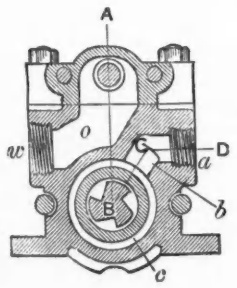

FIG. 5.

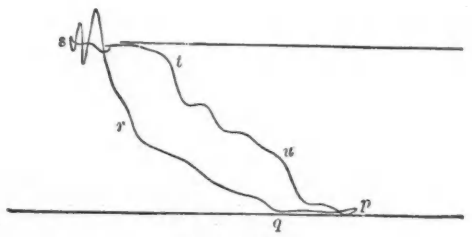

FIG. 6.

Upper end striking stroke.

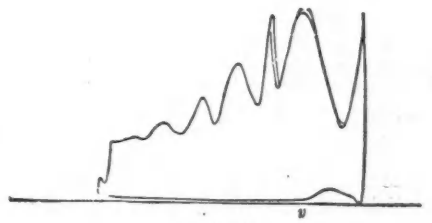

FIG. 7.

Lower end return stroke.

INDICATOR DIAGRAMS FROM THE ECONOMIZER ROCK-DRILL.

Air pressure, 55 pounds (gauge pressure).
Throttle-valve wide open.
Speed, approximately 400 blows a minute.
Scale of spring, 60 pounds to the inch.

A NEW ROCK-DRILL.

INFERIOR COKE IN THE BLAST-FURNACE.

Messrs. Taws & Hartman, of Philadelphia, have furnished the following communication to the *Bulletin* of the American Iron and Steel Association:

During last May, June, and July, there was a large quantity of inferior coke placed on the market, and its evil effects were felt from the Lehigh to Chicago. In one instance where this coke was used, the furnace scaffolded and had to go out. In another instance, 600 pounds more fuel had to be used to the ton of iron. The general result was inferior iron and a smaller quantity of it. This coke carried a heavy percentage of sulphur. In one case, it carried 17 per cent of ash and 3 per cent of sulphur. The sulphur gave a close-grained mottled or white iron.

When an ore and coke mixture contains over 27 pounds of sulphur to the ton of iron, it will be found difficult to make a good No. 1 iron. The sulphur is mostly taken up by the lime, and each pound of sulphur requires five pounds of limestone to make a strong basic cinder. Coke containing less than 85 per cent of carbon will not pay for transportation to the Lehigh.

We found one instance in which a coke containing 60 per cent of fixed carbon and 20 per cent of ash was used in working 59 per cent ores. The furnace made No. 1 iron. The ores were pure, and there was but little sulphur in the coke. Fire-brick stoves were used, and the high heat of the blast from them made up for the deficiency of heat from the poor coke. With a poor coke, the intensity of the heat can not be maintained in the hearth to make No. 1 iron, unless a high blast heat is used.

The table given below shows what amount of coke with different percentages of carbon will be required to do the same work that 2000 pounds (or one ton) of regular Connellsville coke will do:

Percentage of carbon in coke.	Pounds of coke required to do same work as 1 ton of Connellsville coke.	Percentage of carbon in coke.	Pounds of coke required to do same work as 1 ton of Connellsville coke.
75	2700	84	2101
76	2625	85	2051
77	2550	86, Connellsville coke for basis	2000
78	2476	87	1960
79	2402	88	1920
80	2327	89	1880
81	2252	90	1840
82	2202	91, Durham English coke, average	1800
83	2151		

DELTA METAL.

The second and latest example of the successful addition of iron to bronze is afforded by delta metal, which was brought out by Mr. Alexander Dick in 1883. And here it may be as well to explain how this alloy came to receive its name. It is because it was one of the first inquiries addressed to the inventor, and because he has several times been asked the question, and whether the invention had any reference to the delta of rivers. It need hardly be said that it has no such reference. The name "delta" was given to it by Mr. Dick simply for the purpose of connecting it with his own name, delta being the Greek for the letter D, the initial of the inventor's surname. In his researches and early experiments, and, in fact, in the development of delta metal into practical form, Mr. Dick was influenced by the circumstance that some twenty years since Aich and Baron Rosthorn, of Vienna, introduced a small percentage of iron into copper-zinc alloys, with the view of improving them. The results obtained, which are tabulated by Dr. Percy in his work on *Iron and Steel*, show that the alloys possessed very remarkable strength and tenacity, and it seemed strange to Mr. Dick that, having such valuable qualities, they did not come into general use. A London brass-founder, who used to manufacture these alloys, informed Mr. Dick that at times he obtained excellent results with bearings and other parts of machinery made from them, and then again the results were the very reverse, in spite of his taking the greatest care in manufacturing, as he thought, in identically the same way. Unable to account for the different results, he and several other manufacturers were obliged to abandon these alloys, in spite of their promising features.

Mr. Dick endeavored to ascertain the cause of the uncertainty of these results, and he produced various quantities of the alloy, apparently in exactly the same way, by dissolving wrought-iron in molten copper, according to the Austrian method. The qualities of the resulting alloys, however, varied very much, simply because the amount of iron dissolved varied in each parcel. His first object, therefore, was to find a method by which he was enabled to introduce a known and definite quantity of iron, which he succeeded in doing by dissolving the iron in molten zinc to saturation, and adding it, with or without pure zinc, to the molten copper. The desired quantity of iron can be introduced with great nicety. In consequence of the metals partly oxidizing during the process of remelting, the castings, however, again varied in character, the oxides being dissolved in the alloy and destroying its tenacity and strength. This second difficulty was overcome by adding a small percentage of phosphorus in combination with copper. In some cases, Mr. Dick also introduces tin, manganese, or lead into the alloy, to impart special qualities to it. By a series of experiments, the most useful combinations were then ascertained, and alloys of definite compositions, and possessing special and very valuable qualities, are now produced under the name of delta metal.

The specific gravity of delta metal is 8·4, its melting-point 1800 degrees. In color, it resembles gold alloyed with silver. It can be worked hot and cold. When melted, it runs freely, and the castings produced from it are sound and of a fine close grain. Like all copper alloys, it does not weld, but can be brazed like copper or brass, and if the object is of sufficient thickness, it can be "burned" with great facility. Cast in sand, it has a breaking strain of over 21 tons per square inch. When forged at a dark-red heat, the breaking strain is raised to from 33 to 35 tons; and when hammered or rolled cold, it will stand a strain of more than 40 tons per square inch. The varieties destined for working cold can be drawn into tubes and wire, or rolled into sheets and rods, while those intended for working hot not only can be rolled with great facility when heated to about 1600 degrees Fahr., but are also capable of being stamped or punched, similarly to wrought-iron and steel, into a great variety of articles that have hitherto been cast in bronze or brass. This quality of delta metal is important, as the possibility of hot stamping offers great advantages over castings; the articles are turned out much cheaper, they are of perfect soundness, and possess three times the strength of brass castings. Blow-holes, which frequently can only be detected after expending time and labor, are impossible, besides which a great saving is effected in the finishing of such articles, as, unlike castings, the stampings leave the die almost perfect, requiring little or no tooling, but ready to be polished. Experiments are making at the present time to utilize the semi-plastic state of heated delta metal to press it by hydraulic pressure into tubes and rods of round, hexagonal, and other sections in a way similar to that in which lead tubes are pressed.

It is interesting to know that the iron introduced by Mr. Dick's process is really chemically combined. This is proved by the alloy not rusting when exposed to the moist atmosphere, and also by its having no influence whatever on the magnetic needle. Experiments have shown that, by suspending a piece of delta metal on a thread, and at various angles between the ends of a powerful electro-magnet, no oscillations of the suspended metal could be observed, which evidently proved that the iron contained in it had lost its magnetic properties.

MINT CHARGES.

From a paper by John Biddulph Martin before the London Institute of Bankers, we take the following on the conditions under which coinage is carried on in England:

Our Royal Mint is nominally free to all comers, and we are in the habit of saying that every one who carries standard gold to the Mint is entitled to receive back the exact weight of his bullion in coin of the realm. But in practice this is hardly the case, and no owner of a parcel of gold-dust or of a nugget would dream of adopting this course. Various regulations must be observed, notice must be given, the bullion must be tendered on certain days, the importer's assay must be checked and approved, deficiencies in quality must be made good, disputes as to the assay must be settled, and finally the owner must wait his turn, and at an uncertain period of time he will receive notice that his gold, in the shape of coin, is ready for delivery to him. Should the Mint be in full work for account of the bank, its chief customer in this respect, or should it happen, as it did lately, that the Mint is at a stand-still for repairs, a long delay might ensue, and all the while the owner is losing the interest of his capital. Under these conditions, it is not surprising that private "importers" of bullion to the Mint are a species almost unknown; owners of bullion invariably, by themselves or through a bullion dealer, sell their gold to the Bank of England. This they can do at the rate of £3 17s. 9d. per standard ounce, and they receive a very substantial payment at once, the balance being settled on adjustment of the assays, for which the holder pays at the rate of 4s. 6d. per ingot of 200 ounces (say ¼d. per ounce). The exact cost to the importer is given by the late Mr. Ernest Seyd in his very instructive pamphlet *Seigniorage and Charge for Coining* (Effingham Wilson, 1868, p. 22) as follows:

½d. per ounce	£1·605	per mille.
Difference in assay	·651	"
Turn of scale	·062	"
	£2·318	"
Cost of melting	·245	"
Cost of assay	·265	"
	£2·828	"

or £2828 per £1,000,000. But in a memorandum of the Master of the Mint, May 5th, 1852 (Report Intern. Coinage Comm., 1868, p. 325), the first three items only are claimed as the profit of the Mint, and the figures do not precisely tally. They are:

1¼d. per ounce	£1·600	per mille.
Assay fraction	·650	"
Turn of scale	·070	"
	£2·320	"

or a profit of £2320 per £1,000,000. This means practically that the bank issues £1,002,320 in notes or gold against every £1,000,000 that it pays for bullion. If it were merely a question of note issue, the profit would be almost net; but seeing that the coinage of the country is supplied by the gold "imported" to the Mint by the Bank of England, and that the bank must depend on the efficiency and freedom of the Mint to execute its orders, the question of delay in coining comes in again. The above figure of £2320 is equal to interest at a little over six per cent for fourteen days, and from this basis the greater or less profit may be estimated according as the delay is less or greater.

This is the consideration on which emphasis is laid by those who contend that ours is not a free mint, and much subtlety may be exercised in proving that the delay attendant on the conversion of bullion into coin at the Mint, or the difference between the buying and selling price of bullion at the bank is in effect a brassage or seigniorage respectively. With no less laborious ingenuity may it be argued that the charges attendant on converting bullion into coin at the bank are more onerous than those levied, for instance, in France, where a charge of 6·70 frs. per kilo (= ·0025) is avowedly made by way of brassage. It may be incidentally remarked that this is, roughly speaking, equivalent to ¼d. per pound, as against the estimated cost of minting in England given above, at $\frac{3}{10}$d. per pound; but in default of exact knowledge of the comparative cost in England and France respectively—a comparison that would require, moreover, that the accounts should be made up in the same way, it would be rash to assume that the apparent difference in either country must represent a charge for seigniorage. With regard to the objection that the delay inseparable from the coinage of the money at the Mint deprives that department of the character of a "free" mint, it is difficult to imagine how, as a matter of practice, some delay in any case could be avoided. The operation of minting is one of extreme delicacy, but at the same time of extreme accuracy, and the mechanical and chemical processes must necessarily take at least some time. Moreover, the demand for coin by individuals, were the intermediacy of the Bank of England to fall into desuetude, would be fitful and intermittent, and it would hardly be reasonable to require, as did the late Mr. E. Seyd, that an expensive government establishment should be kept constantly in readi-

TABLE A.—SHOWING THE CHARGE FOR THE COINAGE OF BULLION IN THE PRINCIPAL STATES OF EUROPE.

State.	Standard.	Mint charge.	Remarks.
"Latin" Monetary Union: France, Italy, Belgium, Switzerland.	Double standard of gold and silver.	*Gold.*—6 fr. 70 c. per kilo. of gold, 900 fine. (The charge is *deducted* from the bullion imported for coinage.)	The *bons de monnaie* delivered to importers of gold bullion are payable in coin in ten days from the date of importation. The Convention of 1878 between these powers suspended the coinage of silver standard pieces. Formerly the charge for the coinage of silver was 1 fr. 50 c. per kilo. of silver, 900 fine.
Germany	Single gold standard.	*Gold.*—3 marks per pound (500 grams) of pure gold. The pound is coined into 1395 marks, of which 1392 marks only are returned to the importer.	
Austria-Hungary	Double standard of gold and silver.	*Gold.*—Ducats, ½ per cent. Eight-florin pieces, 3-10 per cent. *Silver.* Florins, 1 per cent. Maria Theresa dollars (for Eastern trade), 1½ per cent.	
Netherlands	Double standard of gold and silver.	*Gold.*—Double ducat, 983 fine, 6 florins per kilo. Ducat, 983 fine, 7 florins per kilo. Ten-florin pieces 900 fine, 5 firs. per kilo.	The coinage of silver standard coins for private persons is entirely suspended.
Scandinavian Monetary Union: Sweden, Norway, Denmark.	Single gold standard.	*Gold.*—Twenty-crown pieces, ¼ per cent. Ten-crown pieces, ½ per cent.	Five-crown gold pieces (hitherto only coined in Sweden), and silver coins, are only struck on account of the government.
Spain	Double standard of gold and silver.	*Gold.*—There has been no charge for the coinage of bullion since 1868.	Since 1876, the coinage of standard silver pieces has been reserved to the crown.
Portugal	Single gold standard.	*Gold.*—1000 reis, or 53½d., per kilo. of gold, 916·6 fine.—(4500 reis = £1.)	

United States of America.—The charge for the coinage of gold, under the Act of 1873, is one fifth per cent. Standard silver dollars are only coined on account of the United States government.

ness to meet the requirements of an occasional and uncertain demand. On the other hand, the mint profit arising from the difference between the buying and selling price of bullion at the bank, plus cost of assay, etc., amounts to within a minute fraction of the estimated cost of manufacture. It is difficult to see how terms more equitable to the holder of bullion could well be arranged.

In the preceding remarks, no reference has been made to the alternative ways in which the mint charge may be levied, one of which is of the nature of leveling up, the other of leveling down. Assuming a tax on coining of one per cent, a given weight of bullion may be converted into coin, either by minting it into 100 coins, of which ninety-nine are returned to the importer, and one is retained by the Mint, or by coining it into 101 coins of less fineness and returning 100 to the importer, the Mint, as before, retaining one coin. There is a fractional difference in the result to the bullion owner, since he will in one case receive back in coin $\frac{99}{100}$ parts of his bullion, and in the other $\frac{100}{101}$ parts, and the tax would not, therefore, be in both cases exactly one per cent; but we may disregard this minute fraction, the illustration being sufficient to show that, whichever system is adopted, both are applicable to either brassage or seigniorage. In a matter where the very terms are, as before mentioned, vague and ill-defined, it is well not to complicate matters by ambiguous meanings, and the tendency to attach the term brassage to the system under which the quantity of the coin is reduced, and seigniorage to the one under which its quality is debased, is to be deprecated as incorrect, even if it be convenient. In either case, the Mint would retain for its own recoupment or profit one coin of almost identical quality; but the result would be that the total circulation of the country would in one case be augmented in volume by one per cent above that which it would have in the other. Theoretically, therefore, prices would be affected to a similar extent; but in practice it has been a matter of history that prices do not by any means vary concomitantly with the depreciation of the coinage. This has been the experience of England in the past, and more recently of India, as regards its home trade, in the case of the silver rupee, and it is not likely that a mint charge of any reasonable amount would directly alter the general range of the price of commodities.

In the hypothetical case suggested above, it was assumed that, in suddenly imposing a seigniorage of fifty per cent by way of debasement of the purity of the coin, the government had the power to replace at a stroke the old coinage by the new; as a matter of fact, this would be an operation of extreme difficulty, if not an absolute impossibility. No less impossible must it always be to maintain in circulation at the same time two coins of nominal equality, but of differing intrinsic value; the action of Gresham's law, to which reference has more than once already been made, will certainly drive out the better coin and substitute the worse. It is true that, in transactions of daily life, a sovereign of 122¼ grains would be indistinguishable from one of 123¼ grains, and, as is well known, about half of our current coin does not exceed the former weight; but our coins, as we commonly use them, are but little better than counters. It is for the purpose of settling international transactions that gold, or the command of gold, is essential, and in all such transactions any alteration of the standard must inevitably make itself felt. Even if we succeeded in establishing side by side sovereigns of two classes, weighing 123¼ and 122¼ grains respectively, and in settling therewith our domestic monetary dealings, we should certainly discover, as soon as the exchanges were against us, and we had, for want of purchasers to our exports, to settle our differences in cash, that the purchasing power of the two coins was by no means identical, and that the inferior coin must assuredly involve a reduction in the par of exchange.

In submitting the above considerations on the question of mint charges, I am aware of having undertaken somewhat presumptuously a task that is at once difficult, comprehensive, and perhaps, after all, mainly theoretical. Enough has been said to show that the very terms and definitions of the controversy are unsettled, the propositions in which it can be stated perplexing, and that nothing can be advanced theoretically (and even practically) and supported by good authority that is not met by contradictions on authority equally respectable. But if a discussion on this subject appears, at first sight, unpractical and academic, it must be borne in mind that the conditions under which the state is supplied with its metallic currency are of the greatest importance and interest. The state of our gold currency is, at the present time, a matter of serious consideration, not to bankers only, but to the whole trading community and to the nation at large; the position of silver, as regards its use as money, has of late years undergone a serious modification, and our paper currency, resting on a quasi-metallic basis, is by some considered to be not yet altogether beyond the reach of improvement or reform. Under these circumstances, I venture to think that a little time devoted to the consideration of the functions of the state as regards its prerogative in coining operations, of the position which it assumes toward the holder of bullion, and of the consequences which would attend any deviation from what appear to be sound principles or established practice, will not have been altogether thrown away.

APPENDIX.

By the kindness of the Deputy-Master of the Mint, I am enabled to supplement the foregoing paper by the accompanying table A, showing the manner in which the mint charge is levied in the various countries of Europe. To this I have added a separate table B, showing the standard degree of fineness of each coinage, together with the amount of mint charge, reduced to four places of decimals. For such of the figures in this table as were not deducible from Table A, I am indebted to the work of M. Ottomar Haupt—*Arbitrages et Parités*—ed. 1883.

TABLE B.—SHOWING THE MILLESIMAL FINENESS, AND PERCENTAGE OF MINT CHARGE, IN THE PRINCIPAL STATES OF EUROPE.

State.	Gold coin.	Par of exchange.	Fineness.	Mint charge per cent.
"Latin" League: France, Italy, Belgium, Switzerland,	20 francs	£1 = Fr. 25·20	·900	0·25
Germany	20 reichsmarks	£1 = Rm. 20·43	·900	0·22
Austrian-Hungary	Ducat	——	·985	0·50
Netherlands	8 florins	£1 = Fl. 10	·900	0·30
	Double ducat	——	·983	0·45
	Ducat	——	·983	0·52
Scandinavian Union: Sweden, Norway, Denmark.	10 florins	£1 = Fl. 12·1	·900	0·38
	20 krone	£1 = Kr. 18·0	·899.6	0·25
	10 "	——	·899.6	0·33
Spain	Alphonso	£1 = Alp. 25·22	·900	0·00
Portugal	——	£1 = Mr. 4·505	·916.6	0·21

Closing of Collieries in Yorkshire, England.—The last ten years will doubtless be marked in history as one of the most important periods ever known in connection with the coal trade of Yorkshire and other counties. The returns issued by Mr. F. R. Wardel, Government Inspector of Mines for Yorkshire, show that since 1874 no fewer than 155 collieries have been abandoned in Yorkshire, many of which caused considerable loss to the owners. In the six years between 1870 and 1876, there was an increase of 146 collieries in the country, the number in the latter year being 562. The low prices of coal that followed the period of prosperity seem to have played sad havoc with collieries working the thin seam, while some of the larger concerns have had to be worked at a loss. In the past nine or ten years, no fewer than fifty-two collieries have been abandoned in the Leeds District, nineteen of these having been closed during the past three years. A careful analysis of the reports shows that nine collieries were abandoned in 1874, fifteen in 1875, twenty-two in 1876, thirty in 1877, twenty-one in 1878, ten in 1879, thirteen in 1880–81, fourteen in 1882, and thirteen last year. As previously stated, fifty-two were closed in the Leeds District, seventeen in Huddersfield, sixteen in Sheffield, fifteen in Wakefield, twelve in Barnsley, ten in Bradford, eight in Dewsbury, six each in Halifax and Mirfield, four each in Birstal and Northerham, two in Holmforth, and one each in Robertown, Batley, and Heckmondwike districts. Since 1880, three only have been abandoned in the Barnsley District, and these were small concerns. Notwithstanding the decrease in the number of collieries, the output has materially increased. In 1870, the quantity raised was only 10,606,604 tons, whereas ten years later it had increased to 17,468,536 tons. In the previous ten years, between 1860 and 1870, the progress made was very slight. In the former year, 387 collieries in Yorkshire produced 9,284,000, while in 1870, 416 collieries raised 1,322,604 tons more coal.

CANADIAN ANTHRACITE.—Mr. C. Schreiber, Chief Engineer of the Dominion Government Railroads, has completed an inspection of the Canadian Pacific Railroad, and has published a report on the subject. With reference to the traffic on the line, he mentions that, when passing Laggan station, near the summit of the Rockies, he was informed that large and valuable seams of anthracite coal had been discovered immediately alongside the railroad. He was rather skeptical as to the truth of this; but it so happened that on reaching Winnipeg he met Dr. Selwyn, the Government Director of the Geological Survey, who assured him of the truthfulness of these reports. Dr. Selwyn stated that beds of very valuable anthracite existed in the locality named. This being the case, and fuel being much needed in the Northwest, Mr. Schreiber is of opinion that a large traffic in coal may be relied upon. He points out that the development of the coal industry and mineral resources generally means the employment of a large number of men; hence, incidentally to those enterprises, a considerable traffic in merchandise may be expected.

THE WEIGHT OF WATER PUMPED FROM FRENCH COLLIERIES.—It would be both interesting and instructive, says Mr. G. Andrè in the *Colliery Guardian*, to compare the quantity of water raised from a coal mine with the output of coal. Such a comparison would enable us to estimate more accurately the work expended in production and to ascertain with greater precision the degree of economy reached in any given case. Moreover, the record would be valuable as indicating the character of the strata worked in, and as evidence of the changes that take place as the workings are extended and the drainage continued. I have for some time past occupied myself, whenever opportunity offered, in collecting records of facts relating to this matter, and I have enriched my note-book with a goodly array of figures that may enable me some day to make the comparison alluded to for certain districts. It appears that others have perceived the advantages of collecting statistics of this nature; for I find that the French government engineers have just issued a report in which they give the quantity of water raised, alongside that of the coal output for each of the collieries in the basin of the Loire. From this report, it appears that in the St. Etienne District the mean is 2·54 cubic meters of water per ton of coal, the maximum being 5·4 cubic meters. In the Rive-de-Gier District, there is more water to be dealt with, and here the mean is given as 7·3 cubic meters per ton of coal. The maximum in this district is very high—no less than 14 cubic meters of water per ton of coal. The practical value of these figures would be enhanced if the means of lifting the water were in each case indicated, and the cost per cubic meter of lifting given. In this locality, pumps are generally used; but in the north, nearly the whole of the water is drawn by the winding-engine during the night. It has been stated that this method of draining a mine is considerably less costly than that of pumping. But there are questions of convenience to be taken into account as well as the question of cost. In the north, it is held that the drawing system is advantageous in every way.

FURNACE, MILL AND FACTORY.

Pres. E. D. Shelton, of the Shelton Tack Company, Birmingham, has said, according to the New York *Tribune*, that the great tack nail-making monopoly is now nearly broken. The combination must burst very soon, and all go into the market on an equal footing. At present, there is a large tack factory building in Cleveland, Ohio, which is in the center of the Western trade of this combination. This does not look encouraging. Business is dull in the tack trade. Mr. Shelton says that the cause is overproduction, there being three times too much machinery; and finally he attributes much of the dullness to the combination of tack-making concerns that for years foolishly spent money in purchasing small manufactories for the purpose of controlling the market.

Carr & Hobson, Limited, manufacturers of agricultural implements at No. 47 Cliff street, New York City, and at Bergen Point, New Jersey, have made an assignment without preference. Their statement on January 14th, 1884, showed assets $357,736, and liabilities $110,937.

E. A. Wheeler, of the Wheeler Iron Company, in Sharon, Ohio, has leased the chain-works and rolling-mill at West Middlesex, and will start them soon. The works will give employment to 150 men.

A stack at the Andover Iron Company's furnaces at Phillipsburg, New Jersey, was started November 14th, after repairs and an idleness of some months. The men were informed that the furnace would not be started if they were unwilling to accept a reduction of about 10 per cent all around. Laborers will receive 90 cents, furnace-men $1.25, and keepers $1.60 a day.

The Colorado Iron-Works, at Denver, have just furnished the Pueblo Smelting and Refining Company a set of 36-inch rolls; also, an 11 by 15 Dodge crusher for crushing matte.

The Cummer Engine Company reports that the Jonathan Mills flour-dresser, manufactured by it, is meeting with excellent success. It is selling a great many of them, and is receiving a large number of repeated orders. It is also quietly placing a number of the "Finch" rolls, which are looked upon by all who have investigated them as very superior rolls. The company has just been awarded the contract for the refrigerating plant for the brewery of Rothaker Brothers & Thomas, of Philadelphia. This comprises two of its improved refrigerating machines, two condensers, etc. It has also entered into contract with Henry Zeltner, of Morrisania, New York, for a large refrigerating plant, including two machines, two condensers, one of its 67 horse-power engines, etc., and has received an order for an engine of the same size from the Montgomery Milling Company, Montgomery, Mo. Among the recent shipments of the company are: A 95 horse-power engine for the flouring mills of Amos Brothers, Syracuse, New York; two engines, 67 horse-power each, for the Citizens' Electric Light Company, of Akron, Ohio; a 130 horse-power engine for the Upton Manufacturing Company, Port Huron, Mich.; one of 170 horse-power for the cotton mills of the Hadley Company, Holyoke, Mass.; an engine of 287 horse-power for the railroad shops of the New York, West Shore & Buffalo Railroad Company at Frankfort, New York; and a 170 horse-power engine for the cotton mills of W. H. Cherry & Co., Mountain Mills, Ala.

The Cleveland (O.) rolling-mill has started up in all the departments, except that of the soft steel and the brick rod mill. Work will thus be furnished, for a while at least, to nearly 3500 men.

The Australian colony of Victoria offers a reward of $1250 for a reaping-machine adapted to the uses of the colony, and invites American competition.

The Capital Iron-Works, at Topeka, Kan., have made an assignment. The liabilities are estimated at $18,754.

Jay Gould is said to have lately contracted for 25,000 tons of steel rails, to be delivered at St. Louis during the coming year, to be laid on the roads composing the Southwestern system, making a total of 35,000 tons that have recently been contracted for to be laid on those roads.

The Elba Iron-Works, at Pittsburg, Pa., which have been idle for some time, resumed operations November 18th, on single turns, giving employment to several hundred men.

The mills of the Sharon Iron Company, at Sharon, Pa., were closed on November 15th, because of lack of orders. They employed 500 men.

The stockholders of Frick & Co.'s Agricultural Works, of Waynesboro', Pa., have voted to increase the capital stock by $100,000 to $1,000,000, and to incorporate the company under the name of the Frick Company.

Ellis & Lessig's Steel and Iron Company, Limited, is building a rolling-mill and nail factory at Pottsville, Pa., for the production of steel nails. The plant, which will be completed in the spring, will consist of three heating-furnaces, a train of 22-inch rolls, and fifty nail machines.

At the MacDonald Forge and Iron-Works, St. Louis, Mo., a recent test was made of the smoke-consuming device invented by Michael Kearney, the master-mechanic of the Frisco road. The fire-box of a new heating-furnace was filled at seven A.M., and at eleven A.M. a large quantity of fuel was still unconsumed. A pure white flame poured through the furnace from one end to the other, and thence to one of the boilers, where the tail end of the flame kept up a pressure of 100 pounds of steam. It is stated that the stack of this furnace gave no hint of smoke or vapor.

RAILROAD NEWS.

The New York, Lake Erie & Western Railroad has carried the coal shipments of the Pennsylvania Coal Company from Hawley to Newburg for twenty years. The shipments last year amounted to nearly 2,000,000 tons. The branch of the Erie from Hawley to the main line at Lackawaxen was built by the Pennsylvania Coal Company. The mines of the Pennsylvania Coal Company extend from Dunmore down the Lackawanna Valley to Pittston. The mine nearest to Hawley is thirty miles distant. Ever since the company began operations in 1850, its mines have been connected with Hawley by a gravity road. The gravity road having a gauge of only 4 feet 3 inches, it has always been necessary to transfer its coal to the Erie cars at Hawley, requiring the use of hundreds of thousands of dollars' worth of machinery, miles of switches, acres of yard room, and an army of employés. The Erie & Wyoming extension was primarily intended to do away with all this. It runs directly to all the mines of this company—which is a large owner of this extension—and the entire product is now to be shipped without transfer from Pittston and intermediate points to the docks at Newburg. This change in the company's mode of business will lead to the abandonment of its gravity system, which has been one of the attractions of tourists in this country. The abandonment of the gravity road will change the industries of a wide region, and materially affect the labor interests of Hawley. The first regular train of coal cars was run over the new Erie & Wyoming Extension November 11th.

The Supreme Court, at Pittsburg, Pa., has granted the application of the Pennsylvania Railroad Company and the Pennsylvania Company for an injunction to restrain the Pittsburg, Fort Wayne & Chicago Railroad Company from seizing its line now leased by the Pennsylvania Company under a claim of forfeiture, in consequence of the latter's retaining $50,000 rent now due, and other rent as it occurs.

The Baltimore & Ohio Railroad Company's annual report gives the following statement concerning the coal tonnage of that company:

	1883–1884.	1882–1883.	Increase or decrease.	Per cent.
Main Stem, Co.'s use	439,912	409,695	I. 30,217	7·5
" " revenue	2,828,609	2,171,862	I. 656,747	30·2
Total Main Stem	3,268,521	2,581,557	I. 686,964	26·6
Pittsburg Division	2,157,606	2,402,130	D. 244,524	10·2
Trans-Ohio lines	966,548	684,696	I. 281,852	41·1
Total coal	6,392,675	5,668,383	I. 724,292	12·8

The report says: "The bituminous coals, for steam purposes, of the Cumberland, George's Creek, and Elk Garden regions, which are more readily mined and with less labor than the coals of the Clearfield and other competing sections, and which reach tide-water at Baltimore by a shorter route than that of our rivals, have measurably regained that position in the coal markets of the country to which their established standing and superior quality entitle them. In order to protect the coal interests on its lines in Maryland and West Virginia from the underhand method of rebates, private contracts, and the cutting of rates adopted by the Clearfield and competing regions, this company, even although the rates were low, and in some cases unremunerative, fully met all such reduction, no matter in what form made; and notwithstanding the general business depression, the semi-bituminous coal trade, under this policy, shows an increase for the year of 653,293 tons. Should it again become necessary, the company will pursue the same resolute policy of protection to the large and important coal interests on its lines. One thousand and eighty-two iron cars of the largest class have been added during the year to the coal-car equipment."

Ex-President Gowen, representing the directors of the Philadelphia & Reading Railroad Company, petitioned the United States Court at Philadelphia November 20th, to compel the receivers of the Reading road to pay the dividend due the stockholders of the Central Railroad of New Jersey on December 1st. The receivers take the ground that the Central has not earned the money, and they have no right to pay.

Pittsburg advices report the lease of the Pittsburg, McKeesport & Youghiogheny Railroad to the Pittsburg & Lake Erie.

LABOR AND WAGES.

The regular weekly meeting of the Central Union was held in this city November 16th. A communication was received from the Hocking Valley miners, signed by Samuel E. Davis, Secretary, and C. Evans, President of the Ohio Miners' Amalgamated Association. In the miners' letter, it is stated that there are now in the Hocking Valley 5000 destitute miners and their families. The miners say that, under the new scale of wages insisted on by their employers, they would be able to make only $1.50 a day, working full-time. They are able to work, however, only half-time. Out of their wages, they have to furnish their own powder, oil, and tools, and have to pay for all their smithing. The Central Labor Union instructed its secretary to ask all the New York papers to start subscription papers for the miners, and gave from the Union $50. Several papers have complied with their request. The Hocking Valley miners are distributing circulars requesting miners and others not to accept engagements to work in their places.

A cable dispatch from Paris, France, announces that detachments of troops have been sent to Montceau-les-Mines, to restore order, as notices have been posted there by anarchists menacing the authorities and threatening further acts of vengeance.

Secretary Martin states that, for the first time in the history of the Amalgamated Association of Iron and Steel Workers, there has not been a single strike reported in an entire month, and there is none in prospect. Twelve lodges have been chartered and four dissolved since the annual meeting in August.

A convention of river and railroad coal miners will be held in Pittsburg, Pa., on the 27th instant. The objects of the convention will be to consider the subject of arbitration for the railroad mines, to settle grievances of the river miners, and to elect officers.

The forty coal miners, including their president, Costello, charged with conspiracy for interfering with non-union workmen during the late fourth pool strike,

November 19th, entered a plea of *non volunt contendere*, and were fined one cent and costs.

Notices by all the companies were posted throughout the Cumberland coal region, Md., November 17th, that on and after December 1st next the price of mining coal would be reduced from fifty to forty cents a ton.

The wire-drawers in Oliver & Roberts's wire mill, at Pittsburg, Pa., who struck several weeks ago against a cut in wages of fifteen per cent, returned to work November 17th, having compromised on a ten per cent reduction.

The striking coal miners resumed work at O'Neil, Walton & Wood's mines November 17th, and it is expected that all the mines along the river will soon be in operation at the reduction.

It is said that the President has finally determined to appoint John Fehrenbatch to the position of Commissioner of the Bureau of Labor Statistics. Mr. Fehrenbatch has been prominently identified with labor organization for some years, is a practical mechanic and thorough business man, and his appointment is understood to be acceptable to all interested in the success of the new bureau.

The following New England companies have posted notices of a reduction of ten per cent in wages, to take effect December 1st: The Bridgewater Iron Company, Weymouth Iron Company, Robinson Iron Company, Wareham Nail Company, East Bridgewater Iron Company, Tremont Nail Company, and Fall River Iron-Works Company.

The Old Colony and Mount Hope iron companies, of Somerset, Mass., have posted notices of a reduction of 10 per cent in the present wages of all their employés, the reduction to go into effect on December 1st. This is said by the employés to be the third reduction made by the works in two years. Nailers will get about $2.25 a day, helpers about $1.35, and puddlers about $1.70. No trouble will ensue from the reduction, as the men are anxious to work, preferring reduced pay to idleness.

About 200 miners employed in the Walsenburg mines by the Colorado Coal and Iron Company, Colorado, quit work November 17th. These miners took part in the recent general strike, and only returned to work November 13th. As they are members of the Miners' Union, serious complications and trouble throughout the State are among the probabilities.

Trackmen on the Delaware, Lackawanna & Western Railroad, on the Buffalo division, received warning that wages would be reduced from $1.10 to $1, to take effect immediately. It is said on good authority that the Lehigh Valley Company contemplates the same reduction, to take effect in a few days.

The trouble in the Branford Lock-Works, at New Haven, Conn., has been amicably settled, and the men returned to work November 19th.

J. C. Todd, engine-builder at Paterson, New Jersey, has reduced wages 16 per cent.

A meeting of iron manufacturers was held in Philadelphia, Pa., November 17th. A year or two ago, a sliding-scale was mutually agreed on between the operators and workmen, by which the lowest basis was placed at two cents a pound. At the meeting on the 17th, however, a more serious cut was determined on. The leading representatives of the iron interest have concluded to start a wage scale on a basis of 1·8 cents, a reduction of two tenths from the present figures. This cut is to take effect next month.

COAL TRADE NOTES.

MARYLAND.

The Borden Mining Company has stopped shipping by canal for the season.

The American Company has stopped shipping to Alexandria by canal. It will continue shipping to local points.

OHIO.

The indications are, that Rainey's coal-works, near Martin's Ferry, which have been idle for several months past, will be started up again in a short time.

At Weathersfield, the Pine Hill mine has been working full-time. The Mineral Ridge mines are averaging about three-quarter time. Leadville shaft, full-time.

NATURAL GAS.

Natural gas has been struck in the vicinity of Cleveland, at a depth of 640 feet. Seventeen different gas veins have been struck by the bore. This is the first time that gas has been obtained in any considerable quantity in the vicinity of Cleveland, although a dozen wells have been sunk. Operations to bore deeper will continue.

At the depth of 1100 feet, a vein of gas was tapped at Findlay, November 17th, which promises to yield a sufficient quantity to light and heat the entire city.

PENNSYLVANIA.

ANTHRACITE.

The fire in the Bear Valley shaft was tapped November 15th, by a bore-hole sunk from the surface. As soon as the hole was completed, a large volume of smoke, heat, and gas rushed out. Coal-dirt and water will be run into the breast through this and several other holes which are sinking. The fire at Buck Ridge slope is thought to be entirely under control. The fire at both collieries will no doubt be extinguished very soon.

The Buck Mountain Coal Company expected to begin the shipment of coal over its new breaker near the west end of Mahanoy tunnel November 17th. The Buck Mountain vein, on which the slope has been sunk, is in good condition, and the prospect is, that this will be one of the most productive collieries in the district.

The Pond Creek breaker, at Wilkes-Barre, is to be abandoned in a short time.

The Langdon Coal Company is sinking a new shaft at West Shamokin, the rock being struck at thirty feet.

BITUMINOUS.

Messrs. John and George Stone, of McKeesport, have leased the old Dravo coal estate at Dravo station, Pittsburg, McKeesport & Youghiogheny Railroad. The coal land at that place embraces about 200 acres that has never been operated. The work of erecting the necessary works for mining it will begin at once.

The coal operators of the Monongahela River are circulating for signatures a petition to Congress asking for free lockage. The Pittsburg Chamber of Commerce is also making a move in the same direction.

The Atlantic Mines Company's works at Douglass station are ready for operations. They will have a capacity of between 30 and 40 cars a day.

The Bituminous Mine Inspectors of Western Pennsylvania had a meeting in Pittsburg, November 18th. The inspectors from the first, second, third, fourth, fifth, and sixth districts were present. The object was a consultation about the adoption of means for the better ventilation and regulation of mines, in order that explosions may not be so numerous. These explosions, they assert, are due in a certain degree to incompetent fire and mine-bosses employed by the operators, simply because their services can be secured at low wages. The inspectors will ask that the present mining laws of Pennsylvania be so amended that a mining or fire-boss shall be required to have a certificate of proficiency before he shall be allowed to fill the position. Other changes and amendments will be recommended, looking to the safety of the miners.

COKE.

The coke trade, says the Connellsville *Courier*, is devoid of any new features. The crushed coke trade has grown quite brisk with the approach of cold weather, both crushers at Valley and Standard having all the orders they can fill. There is a slight increase in the number of active ovens, there being 5438 in blast this week as against 5296 a fortnight ago. Fairchance and Anchor have started up again; Redstone has fired 100 additional ovens; Alice, which has been idle because of no water, has succeeded in making a start again, and has 50 ovens fired. On the other hand, Stewart has put out 50 ovens. The idle ovens are distributed as follows: Owned by furnaces, 492; independent operators, 61; ovens not burning before or since the pool was formed, 369; pool ovens closed from various causes, 362; pool percentage shut down, 3096; total, 4382.

NATURAL GAS.

A New York firm proposes to lease or buy two gas-wells at Homewood, and erect beside them a large factory for the manufacture of lamp-black. Natural gas has been found to produce the extra good quality of the soot when burned against sheet-iron. There are at present three such factories in the natural gas-fields of Butler and McKean counties, all owned by Eastern firms.

SOUTH AMERICA.

BRAZIL.

Almost simultaneously with the announcement that Alabama has begun to export coal to Central America comes the important news from Rio Janeiro that the Brazilian government has removed the duties on coal. This action may result in increasing the consumption of mineral fuel in that extensive empire. At present, the quantity of coal imported is not very large, amounting to but 64,332 tons in the first eight months of the present year. As compared with the corresponding period of the previous year, however, there was an increase over 18,000 tons.

GENERAL MINING NEWS.

ARIZONA.

PIMA COUNTY—QUIJOTOA DISTRICT.

PEERLESS.—All work is going on as usual, says the report dated November 1st. Peerless tunnel No. 1 is in 346 feet. The vein has been reached, and we are drifting south along the west side of it. The general appearance is very flattering, showing a well-defined vein and some very good ore. This drift will be continued south until we reach a point directly under the winze, when an uprise will be started to connect with it. Crocker north drift is in 77 feet. We have cut into ore that assays from $50 to $1000. When this ore was first reached, we turned our drift and ran along the east side of it for quite a distance. We have now come back and started the drift straight ahead, to ascertain the extent of ore. Peerless winze, on top of the hill, is down 150 feet, and is in a soft, favorable looking material. Good progress is made. The greater portion of the machinery for the air-compressor has arrived, and grading is nearly completed to erect it. A brick kiln is going up, which will furnish all the brick we shall require for the compressor and the mill. We have also a contract for 1000 cords of wood to be delivered at the works.

YAVAPAI COUNTY.

MORNING GLORY.—At a depth of seventy feet, ore containing gold was struck.

CALIFORNIA.

ELDORADO COUNTY.

CRYSTAL.—This company has been organized with a capital stock of $1,000,000, in shares of $10.

MONO COUNTY—BODIE DISTRICT.

Reports for the week ended November 10th:

BODIE CONSOLIDATED.—There were worked at the mill 157 tons of ore. The average assay value of the pulp is $222 a ton. About twelve per cent is lost in the tailings. These tailings are carefully saved. In cleaning up the battery, a large amount of bullion is found that does not show in the pulp-assays.

MONO.—A drift has been run south on the 600 level, which is in 20 feet. Very rich bunches of ore are found in this drift. Native silver is to be seen in it. The ledge is broken up some, but is now getting solid. The south drift, 550 (Lent shaft) level, was extended during the week 20 feet. The face of the drift shows a mixture of quartz and porphyry, the quartz giving low assays. Eight men are employed.

NOONDAY.—Experimental works for working the Noonday tailings by leaching have been erected. The first clean-up is said to have been satisfactory. It showed that the process will work the tailings up to 98 per cent of the assay value, which is from $7 to $8 a ton, about half gold and half silver. The Noonday Company is paid 50 cents a ton for the tailings, and the cost of working them is $3.50 a ton, which leaves a fair profit. The present works have a capacity of five tons a day. Having proved the process to be a successful one, the proprietors of the enterprise will at once begin the erection of works with a capacity of forty tons a day.

STANDARD CONSOLIDATED.—Extracted and shipped to the mill 480 tons of ore and 600 tons of tailings. Received from the ore 485 ounces of crude bullion, and from the tailings 240 ounces, which will be melted and shipped with the week's run.

SAN BERNARDINO COUNTY.

BONANZA KING.—The weekly report of the superintendent shows that a drift has been started on vein No. 3 on the seventh level. The formation is loose, with a good grade of ore. The east cross-cut on the sixth level has cut into a fair showing of ore. The east winze from the fifth level has this same vein of ore in the bottom. The south winze on the same level is again showing a handsome body of ore in the bottom. We have cut into ore in the north drift next the west wall on the fifth level. We have started a cut to the west in the ore-vein in the north drift on the fourth level, and shall start to sink a winze on the ore as soon as we have sufficient room. The winze on the tunnel level continues in the same body of ore. The stopes throughout the mine are producing well. The shaft is well under headway, and will be pushed with three shifts.

SIERRA COUNTY.

MARGUERITE.—The new hoisting-works are almost completed. The pumps will be placed in the new shaft, and the new machinery will probably be put in operation soon.

COLORADO.

CLEAR CREEK COUNTY.

A mass-meeting was held in Georgetown, November 15th, of all persons engaged in the production of silver ores in this county. The purpose of the meeting as stated in the call is to take into consideration the silver question, and to take such action as will tend to the full and complete recognition of silver as a standard co-equal with gold, and as will best subserve the direct interests of the silver-producing regions of the United States and territories.

ASTOR.—This mine, on Democrat Mountain, owned by an English capitalist, will soon be started up with a force of 100 men. The mine has lain idle for two years pending sale. Large bodies of ore are opened up in all its workings.

FAIVRE.—This placer has been leased for five years, and a flume has been constructed preparatory to starting up extensively in the spring.

FREELAND.—The mine is producing its usual large quantities of ore. The smelter is turning out great quantities of copper matte, which is shipped to Argo.

EAGLE COUNTY.

GOLD PARK.—The company has settled its financial difficulties, and will soon resume work.

GARFIELD COUNTY.

The Denver Carbonate Mining Company has consolidated with the New York

Mining Company. Jointly the two companies will develop their properties this winter.

GILPIN COUNTY.

ROLLINS.—Since beginning to sink a winze in the westerly portion of the cross-cut tunnel level of its Perigo mine, the company has succeeded in gaining a depth of 30 feet, with no north wall yet reached, indicating that the ore-chute sinking through is fully as wide, so far as has been determined, as above. The company is running 31 stamps.

GUNNISON COUNTY.

ADAMS PROSPECTING COMPANY.—Considerable development is done Another contract has been let on the Mountain Chief.

CARBONATE QUEEN.—A strike is reported. The ore is galena, running well in silver.

MENOMINEE.—The mine is producing galena and copper ore.

MOFFET SMELTER.—The necessary repairs have been completed, and the works are in operation again. Their enlargement is contemplated. Ore is received in large quantities.

HINSDALE COUNTY.

VERMONT.—The mine has been leased. Extensive improvements are to be made.

LAKE COUNTY.

The Leadville *Herald* reports the following: Owing to the decline in the price of silver and lead, some of the mines have reduced shipments and discharged the superfluous men that this entailed. A meeting of mine managers will be held early next week to discuss the problem, and determine the best plan to pursue. If the present prices are maintained, a reduction of wages will undoubtedly follow.

ENGLISH PLACER MINING COMPANY.—The operations closed on October 24th. The manager reports that the Clear Creek water-way, built last winter and spring, and which delivers water at the head of the company's property in Cash Creek through a tunnel 2100 feet long, has been in successful operation since about July 15th. The company has also built this year an entirely new working flume in Cash Creek. The net results up to date, over and above all working expenses, are between $17,000 and $18,000. Work was only prosecuted at one place on the property this year; but as the company has now secured an abundant water supply, and has plenty of good ground, it is likely that during 1885 at least four pits will be in operation.

EVENING STAR.—The new strike in the Edwards drift has been opened to over two feet in thickness, and promises to develop into a large body.

HENRIETT.—An immense ore-body is developing in this mine. As yet, no top or bottom has been found, drifts are driving through and across the ore-body, and the ore extracted in doing this work. It is stated that it will more than pay the current expenses for the month. The average value is about 10 ounces in silver and from 30 to 40 per cent in lead. The course of the chute indicates that it will cross the Maid of Erin. This new discovery will add largely to the shipments of these properties, unless it is decided to suspend shipments until a revival of the lead market.

OURAY COUNTY.

ANCHOR.—It is said that an Eastern company offered $30,000 for this property; but some of the owners would not accede to this, and the sale fell through.

PARK COUNTY.

LONDON.—The local debts of this company have been paid up, with one or two exceptions.

PITKIN COUNTY.

It is stated that the Pennsylvania Iron Company of Pittsburg has for several weeks had an agent at Aspen, looking at the opportunities this county presents, and to particularly inquire into a valuable iron property near Ashcroft, and also valuable coal-banks down the valley. An engineer will estimate the cost of a railroad between these two properties; if the cost is not too high, the scheme carries.

SAN JUAN COUNTY.

SAMPSON.—The mill is working satisfactorily.

DAKOTA.

One of the tin mines near what is known as Bismarck's Ranch, on the road from Harney to the Summit mine, has been sold to an English company for $5000.

CALEDONIA.—The report for the week ended November 9th shows that the shaft has advanced 8 feet, making a total depth of 103 feet. The slow progress made in sinking the past week was caused by delays in putting in shaft and station sets on the 300-foot level. The work has begun of putting in new mortars, and generally repairing the mill.

GOLDEN SUMMIT.—The shaft is down 130 feet, and a drift is running in the country-rock to tap the ledge. If the lower drift shows up as well as those on the sixty-foot level, the mine will probably warrant the erection of extensive reduction-works.

GRAND JUNCTION.—Under the present management, the property is successfully worked. The tunnel driven for the purpose of working from the east side has penetrated to the best paying ore, and now a comparatively small force of men in the mine is able to keep the entire forty stamps of the mill supplied.

IDAHO.

BUFFO.—The new concentrator of this silver mining company, which has a daily capacity of 30 tons, is working smoothly. The claims of the company comprise some 150 acres on Warm Spring Creek, and during the past summer paid a small profit over expenses. The works will be kept going all winter, and about 20 men will be employed.

VIENNA.—The mill is running to full shifts, and doing a good business. It will undoubtedly be run all winter.

WOOD RIVER.—This gold and silver mining company has determined to drive a deep tunnel to tap the ledge in the Bullion mine. It will tap the ledge at a depth of over 700 feet, and greatly reduce the cost of extracting ore and opening up the property.

MICHIGAN.

COPPER MINES.

ALLOUEZ.—The third head is working satisfactorily, and an improvement is noticeable in the south end of the mine. About 150 tons of mineral will probably be the monthly production.

RIDGE.—Orders have been received to stop all tribute work at the mine and to reduce the company's force.

GOLD MINES.

NEGAUNEE.—This gold and silver mining company will resume work on the range some five miles north of Negaunee, where the company has already done considerable exploratory work.

ROPES.—The mill is now in full operation.

IRON MINES.

LAKE SUPERIOR.—Operations have ceased for the season.

NONESUCH.—The work of exploring this mine for silver is now well under headway Four miners have been at work for two weeks, and two more will be employed at once, in cross-cutting the veins at all the levels. This work has not been undertaken without satisfactory evidence that it will prove successful.

WEBSTER.—The owners of this mine have made a sale of 1000 tons of ore to the Emma furnace at Youngstown, Ohio, for delivery this season, to permit of a test being made.

MONTANA.

J. Schuyler Crosby, governor of this territory, in his annual report to the Secretary of the Interior, estimates the population at about 84,000, an increase of 4000 since 1883. The value of the taxable property, which does not represent one quarter of the wealth of the territory, is estimated at between $50,000,000 and $60,000,000. The announcement of the discovery of gold in the Little Rockies, near the heart of the Great Northern Indian Reservation, 100 miles southeast of Fort Assiniboine, has drawn hundreds of miners to that locality.

DEER LODGE COUNTY.

GRANITE MOUNTAIN.—The secretary, under date of November 13th, writes: We hope to have the mill finished and stamps dropping next week. Having one of the biggest and richest mines in the world and as good a mill as any on the coast, the silver bullion product of Montana will no doubt be considerably increased during the next twelve months.

HOPE.—The mill is running and doing well, and the mine is improving. The total production since January 1st amounts to $70,472.

LEWIS & CLARKE COUNTY.

BOSTON & MONTANA.—The Gloster mine, the company's property, is now developed by levels to the depth of 400 feet, showing a solid body of rich ore ranging from ten to fourteen feet thick. The present ore output is about 150 tons a day. The bullion production this year up to September 30th amounts to $324,502. Previous to that time and since operations were begun in 1880, the production amounted to $518,202—making a total of $842,704.

SILVER BOW COUNTY.

ANACONDA.—The report of Mr. William McCaskel's resignation as superintendent of the company's smelter has been denied.

HARRIS & LLOYD.—This claim has been sold to a California company for $125,000. Development-work will begin soon.

NEVADA.

ESMERALDA COUNTY.

MOUNT DIABLO.—The company has entered into an agreement with the Holmes Company, which owns the two mills at Belleville, recently belonging to the Northern Belle, whereby Mount Diablo ore will be milled at a cost of $12.75 a ton. As soon as one of the mills can be put in repair, crushing will begin. There is already a large accumulation of ore. The company will have about $22,000 in the treasury after paying last month's expenses.

STATE LINE GOLD MINING PROPERTIES NOS. 1, 2, 3, 4.—The entire property has been conveyed to Mr. W. G. Robinson, of this city, by the owner, Col. A. C. Ellis. On account of the claim of Mr. Verdinal, the secretary of the old company, as to the validity of the title to the property, Mr. Robinson has decided to cease further operations until he can demonstrate to the satisfaction of the stockholders that his title to the property is absolute. Information as to the reorganization of the company was given in the ENGINERING AND MINING JOURNAL of October 25th. Mr. Robinson reports that the mine is in good condition, and the mill is ready to start immediately. There are in sight upward of 20,000 tons of good ore, which will mill 10 dollars a ton. The debts of the old company amount to $175,000.

STOREY COUNTY.

Considerable work is going on in the mines of Flowery District and in Six-mile Cañon. The mills operated are all water-power, and have a total of 31 stamps, running steadily and crushing daily about 80 tons of ore, producing about $30,000 worth of bullion a month.

COMSTOCK LODE.

ALPHA CONSOLIDATED.—Operations have been renewed on the 600 level, which will be thoroughly prospected, exhausting all the chances, and at the same time the necessary initial work will be performed preparatory to opening up adjacent levels.

COMBINATION SHAFT.—The new hydraulic machinery to be placed on the 3000 level of this shaft has been tested at the Risdon Iron-Works in San Francisco, and is now shipping to Virginia City. The work of cutting out a pump station on the 3000 level is progressing. The working station on the 3000 has been completed.

CONSOLIDATED VIRGINIA.—About 500 tons of milling ore have been extracted from the 1200 level of this mine. This ore is taken out of that portion of the mine leased by Senator Jones. The ore will be taken to the Eureka mill on the Carson River for crushing.

HALE & NORCROSS.—Five hundred and forty-six tons of ore shipped to the Eureka mill gave bullion to the amount of $7826.

OPHIR.—The water found in the old workings is rapidly draining off.

NEW MEXICO.

OLD MAN.—This mine, since June last, has produced $61,000, and it is claimed that the dumps contain 15,000 tons of ore of an average value of from fifteen to twenty ounces of silver to the ton. The property is worked by a large open cut, and will not require machinery for years.

SILVER MOUNTAIN.—The owners are erecting a plant of machinery made in Colorado. The product of this mine all comes to the Argo works, as it carries from 15 to 30 per cent in copper besides its silver riches. Two car-loads of this ore netted over $4600 in Denver.

UTAH.

SALT LAKE COUNTY.

LEAD MINE COMPANY.—At the company's mines, which have been worked for the past four years, considerable improvements have been made. The company owns two smelting-stacks, sampling-mill, and accompanying buildings and conveniences, complete on the Big Cottonwood, having a daily capacity of 80 tons of ore, run by water-power and connected with the mine and mill, and with all the world by railroads. The mines furnish a perfect flux for dry ores, which are purchased as needed in the Salt Lake market.

WASHINGTON COUNTY.

MOUNTAIN CHIEF.—The smelter of this company began operations November 8th. The smelter works well.

VERMONT.

ROOKS.—The company intends to increase its works to several times their present capacity during the winter.

WISCONSIN.

APPLETON.—This iron mining company has been organized to operate in section 27, Gogebic region. The capital stock is $25,000. Operations will begin at once. The following are the officers: President, L. H. Kuderling; Vice-President, J. W. Flack; Secretary, A. M. Spencer; Treasurer, Arthur Leberman; General Superintendent and Manager, Mr. Hebbing.

NANAIMO.—The mine has ceased operations for the winter.

NORTHERN BELLE.—Work is pushed on this gold and silver mining company property in Ashland County. A shaft has been sunk at the junction of two distinct veins of mineralized rock, to a depth of 28 feet.

FINANCIAL.

NEW YORK, Friday Evening, Nov. 21.

From the course of the mining market for the past week or two, it would seem as if the interest in mining stocks is gradually increasing. Business in the past week has been active, and the prices have been steady, with few exceptions. The extraordinary volume of transactions in Sutro Tunnel presents a feature the market has not shown for a long time. The sales have amounted to 75,700 shares. The price has been firm, the highest showing 15, and the lowest 10 cents. The other Nevada shares show little business.

The drop in Iron Silver from 95 to 50 cents has attracted considerable attention. The dealings have, however, amounted only to 3000 shares. Since the reports from the mine continue to be satisfactory, it is thought that this has been merely a speculative movement in the interest of parties who are short of the stock. Breece and Amie show considerable business. The former's sales amounted to 9700 shares and the latter's to 1200 shares. Robinson Consolidated, Colorado Central, and others show occasional transactions.

Consolidated Pacific continues to be the feature of the Bodie group—with sales amounting to 3000 shares, and prices at from 90@95c. Standard Consolidated has also been moderately dealt in. Bodie Consolidated has received but little attention, though at present it would seem as if this company is the most prosperous of the group. The financial statement for October shows that the company has cash on hand amounting to $75,112.95. A dividend of fifty cents a share has just been declared. Plymouth Consolidated stock, it appears, is gradually growing in favor; it was called for the first time on Monday at the Exchange. The sales since then have amounted to 700 shares, and the price has been steady at from $15@$15.13. The company's property is situated in Amador County, and up to October 31st of this year produced bullion to the amount of $858,911. Regular monthly dividends of $50,000 per month have been paid. Horn-Silver has been quiet, and shares amounting to $3715 have changed hands. The price has ranged at from $4.50@$4.75. Sales of Ontario were made at $19.

The Bullion Gold and Silver Mining Company's stock will shortly be listed at the Mining Exchange. The company has just announced a dividend of $5000.

The stock of the Moulton Mining Company of Montana has just been listed; the sales this week have amounted to 1300 shares, and the price has been strong at from $1.05@$1.25.

A block of the Old Dominion Copper Company's stock was sold at public auction, November 19th, to satisfy a judgment against S. M. Hamilton. The first lot of 28,000 shares was bid up to $2.12½, and the second lot of 16,000 shares to $2.37½.

A circular has been issued to the stockholders of the Sonora Consolidated Mill and Mining Company, and an opportunity is offered them to exchange their stock for certificates of the Sonora Mining Company, on the payment of ten cents per share. This privilege will be available until December 20th.

The sales this week amounted to 121,750 shares, as against 47,152 shares for the preceding week, showing an increase of sales of 74,598 shares. The tables printed elsewhere give a complete summary of the market.

MEETINGS.

Consolidated Batopilas Siver Mining Company, No. 2 Wall street, Room 33, New York City. The date of the annual meeting of the stockholders of this company has been changed from the last Monday in November to the last Monday in February of each year. The next annual meeting will be held on the last Monday of February, 1885, and will be duly advertised.

New Central Coal Company, of Maryland, Nos. 6 and 6½ Trinity Building, New York City, annual meeting of stockholders and election of trustees, December 9th, from twelve M. to two o'clock P.M.

San Miguel Gold and Silver Mining Company, No. 3 Broad street, Room 62, New York City, annual meeting of stockholders and election of trustees, December 10th, at twelve o'clock M.

Wells Farm Land and Mining Company, office of Simpson, Thacher & Barnum, No. 11 Pine street, New York City, meeting of stockholders for the purpose of electing a Board of Trustees, November 22d, at ten o'clock A.M.

DIVIDENDS.

Bodie Consolidated Mining Company, of California, has declared dividend No. 18, of fifty cents a share, payable December 5th.

Bullion Gold and Silver Mining Company, of New Mexico, has declared dividend No. 2, of $5000, payable December 1st.

Father de Smet Mining Company, of Dakota, has declared dividend No. 39, of twenty cents a share, payable 29th inst.

Moulton Mining Company, of Montana, has declared dividend No. 3, of $30,000, or 7½ cents a share, payable December 10th.

Ontario Silver Mining Company, of Utah, announces its 101st dividend—$75,000 for October—payable November 24th. Total dividends to date, $5,975,000.

Pueblo Smelting and Refining Company, of Colorado, has declared an extra dividend of 5 per cent, payable December 15th. This makes 15 per cent this year.

Silver King Mining Company, of Arizona, has declared dividend No. 44, of twenty-five cents a share, payable November 15th.

PIPE LINE CERTIFICATES.

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

Last Saturday, the market opened weak at 67½c., from the effects of the break the day before to 66c., but rallied to 70⅛c. at the close, and on Monday and Tuesday 73½c. and 73⅝c. were respectively the highest prices, closing off at 70⅝c. on Tuesday. This decline appeared to be purely speculative, as there was no bearish well news. Wednesday, there was a recovery to 72⅛c., closing at 71⅛c.; and on Thursday, the market recovered to 72⅜c. To-day, the market was still in the rut at 71¼@72⅜c., the market closing last night at 71¼. The production of Thorn Creek is now about 10,000 barrels a day, against 17,000 this time last week. There have been several phenomenally large wells in this district, but their initial production is not maintained. The field, while very rich at first, soon weakens in every spot so far opened, and shows drainage. The outside fields are slowly declining, and it is probable that Thorn Creek will sink into the same insignificance as Cherry Grove, Wardwell's Ferry, Cooper Tract, and Balltown, all of which disturbed prices for a short time. When this district is out of the way, we look for an important upward movement in the market, as oil is closely held, and as production then will barely keep pace with consumption, it will be worth more money than now; besides, with Wall street educated to sell it short on every rally, the big bulls will probably try to squeeze them when they least expect. Meanwhile, all interest centers in some frontier wells to the far east of Thorn Creek, and upon their character will probably depend the immediate course of the market.

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

	Opening.	Highest.	Lowest.	Closing.	Sales.
Nov. 15....	$0.67⅛	$0.70⅛	$0.67⅛	$0.70	4,678,000
17....	.70¼	.73⅛	.70¼	.72¾	5,767,000
18....	.73	.73⅝	.70⅛	.70⅝	5,237,000
19....	.71	.72⅛	.70⅞	.71⅛	3,815,000
20....	.71	.72⅜	.71	.71¾	3,267,000
21....	.71⅛	.72⅜	.71¼	.72⅛	2,463,000
Total sales.....					25,227,000

Boston Copper and Silver Stocks.

[From our Special Correspondent.]

BOSTON, Nov. 20.

In copper stocks, we have to note a decline in Calumet & Hecla the past week of $11 a share, with a recovery of a portion of the decline in the later dealings. The closing sale last week was at $157. The present week opened at $155, and steadily declined to $146, with sales to-day at $150, closing offered at $151, and no bi . The recent advance was due in part to a rumor that a $5 dividend would be declared for the next quarter, for which there is no foundation in fact, as, in order to do that, the company would have to borrow on copper, which it is not probable that it would do in its present financial condition. With ingot copper dull and declining, there is but little prospect of a dividend in the very near future. The short interest, if any existed, is doubtless fully covered, and investment orders at present prices are not very numerous. Quincy has been quite active the past week, considerable stock having been put on the market, which, however, has found ready purchasers at $32½ @$31¾, principally at the former price, at which several round lots were taken. The stock was a little weak to-day, $30 being the best bid, but none offered under $32. If ingot copper should decline to 12c., it will have a depressing effect on this as well as on other producing mines of the lake region. There was a little activity in some of the speculative coppers this week, with sales of Huron at 75c.; Pewabic, at $1; Franklin, at $6⅛@$7; and a few shares of Osceola at $9.

In silver stocks, dullness is the prevailing feature. A few sales of Harshaw at 50c., and 100 shares of Bonanza at $1, comprise the recorded transactions for the week at the regular Stock Exchange.

At the Mining Exchange, Bowman Silver continues to be the leading stock, with sales during the week as low as 8c.; later, there is a firmer tone to the market, and 10c. is freely bid, with but little offered. Dunkin Silver, dull at 19@22c., with a few sales at 20c. Consolidated Pacific holds steady, with an upward tendency. Sales at 93@97⅛c. The reports from the mine continue to be of an encouraging character. The water meter stocks are firm and in good demand at improving prices.

3 P.M.—There was no special change in the market at the afternoon Boards. Calumet & Hecla sold at $150, closing $149 bid, $151 asked.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Nov. 14.	Nov. 15.	Nov. 17.	Nov. 18.	Nov. 19.	Nov. 20.
Albion						
Alpha						
Alta	.70	.75	.55	.55	.55	.55
Argenta						
Bechtel						
Belcher		.60	.60	.50	.65	.65
Belle Isle						
Best & Belcher	1.25	1.25	1.12½	1.00	1.00	1.12½
Bodie	2.75	2.87½	3.12½	2.87½	3.00	3.12½
Bullion						
Bulwer						
California						
Chollar	1.75		1.75	1.75	1.75	1.75
Con. Pacific	.95	.95	.90	.95		.95
Con. Virginia	.15	.10	.15	.10	.10	.10
Crown Point	.75	.80	.75	.65	.75	.75
Day						
Elko Cons						
Eureka Cons	2.75					
Exchequer						
Gould & Curry	.60	.70	.60	.60	.65	.65
Grand Prize						
Hale & Norcross	2.62½	2.87½	2.37½	2.50	2.50	2.50
Independence						
Martin White						
Mexican	.60	.70	.60	.55	.50	.55
Mono						
Mount Diablo	2.50		3.50		3.50	3.75
Navajo	3.37½	3.37½	3.50		3.12½	3.25
Northern Belle						
North Belle Isle						
Ophir	.50	.60	.50	.55	.55	.55
Overman						
Potosi	.90	.95	.90	.75	.75	.80
Savage	.80	.80	.80	.75	.75	.75
Scorpion						
Sierra Nevada	.60		.55	.45	.50	.55
Silver King						
Tip-Top						
Union Cons	.60	.65	.50	.50	.50	.50
Utah		.50		.30	.30	.30
Wales Cons						
Yellow Jacket	1.37½	1.25	1.12½	1.12½	1.25	1.25

METALS.

NEW YORK, Friday Evening, Nov. 21.

Copper.—Thus far, the report that the Lake companies have made a large sale of copper for export lacks confirmation. There is no doubt, however, that sales have been made during the past few weeks, and that arrangements have been completed for steady shipments to France. The price realized probably ranges between 12@12¼c. here. Of other brands, the export sales are also heavy, important contracts having been closed this week. There is no doubt, therefore, that our market is kept in fair shape, and some sellers are beginning to show a disposition to hold firmer. Still, 11⅞@12¼c. remains the quotation for outside brands, and 12¾@13c. for Lake.

In England, Chili Bars have this week sold down to £51 15s., the latest cable being £52. Best Selected is quoted last £57 10s.

Tin.—The market has been quiet at 16¾@17c. for Spot Straits, while London cables last £75.

Lead.—The market has been dull, a few hundred tons of Refined selling during the week at 3·40c.

and about 300 tons of Common at 3⅝@3·40c. While there are no signs of a further collapse, it must be noted that within the next few weeks the December make must be placed. Should buyers persist in their present attitude of apathy, values will probably suffer again.

Messrs. John Wahl & Co. telegraph to us as follows from St. Louis to-day :

Our market continues very dull, and since the date of our last report, prices have further declined. Buyers, expecting a decline, are holding off and buy only for immediate wants. Our market is nominally 3·15c. and 3·20c., respectively, for Hard and Refined lead.

Spe'ter.—The market is dull and nominal at 4·35@4·40c. for Common Domestic.

Antimony.—There has been no change.

BULLION MARKET.

NEW YORK, Friday Evening, Nov. 21.

An advance in Indian exchange in London has arrested the decline in silver for the time being, and improved our market as by the figures of the accompanying table :

DATE	London. Pence.	N. Y Cents.	DATE.	London. Pence.	N. Y. Cents.
Nov. 15	49 11-16	107⅜	Nov. 19	49⅞	108
17	49¾	107⅝	20	50	*
18	49¾	107¾	21	50	108½

* 108⅛@108⅜.

BULLION PRODUCTION FOR 1884.

MINES.	States.	Month of October.	Year from Jan. 1st, 1884.
		$	$
*Alice, G. S.	Mont.	.....	949,041
*Belmont	Mont.	13,683	46,805
*Black Bear, G	Cal	.....	19,600
Bodie, G.	Cal	5,241	409,784
*Bonanza King, G.	Cal	.....	191,891
*Boston & Montana, G.	Mont.	37,987	362,489
*Caledonia, G.	Dak.	.....	73,511
*Chrysolite, S. L	Colo.	13,904	131,541
*Consolidated Bobtail, G	Colo.	3,819	79,030
*Contention, S. G.	Ariz.	.....	293,607
*Deadwood-Terra, G.	Dak.	37,232	423,918
*Derbec Blue Gravel, G. S.	Colo.	8,135	132,324
*Father de Smet, G.	Dak.	43,767	391,919
*Grand Prize, S.	Nev.	16,868	74,675
*Head Center Cons	Ariz.	.....	1,273
*Head Center & Tranquillity	Ariz.	8,436	20,329
*Hecla Cons., G. S. L. C.	Mont.	.....	972,952
*Helena, G. S. L. C.	Mont.	107,000	941,036
*Homestake, G.	Dak.	107,195	1,059,754
*Hope, S.	Mont.	31,171	70,472
Horn-Silver, S. L.	Utah.	225,000	2,143,087
*Iron Silver, S. L.	Colo.	.....	556,365
*Kentuck, G. S.	Nev.	467	22,411
*Lexington, G. S.	Mont.	94,610	998,109
*Mammoth Bar, G.		284	1,891
*Moulton, G. S.	Mont.	.....	604,188
*Mount Diablo, S.	Nev	———	24,820
*Murchie, G. S.	Cal	.....	19,000
*Navajo, G. S.	Nev.	71,758	382,589
*North Belle Isle, S.	Nev.	———	5,874
*Ontario, S. L.	Utah.	167,436	1,816,143
*Original, S. C.	Mont.	———	29,724
*Oxford, G.	N. S.	2,401	33,092
*Paradise Valley, S. G	Cal.	.....	103,950
*Plymouth Consolidated, G.	Cal.	.....	780,506
*Rooks, G.	Vt.	6,716	48,662
*South Yuba, G.	Cal	.....	21,432
*Stormont, S. L.	Utah.	12,943	133,503
*Syndicate, G. S.	Cal.	.....	90,475
*Tombstone, S. L.	Ariz.	‡80,016	450,772
United Gregory, G.	Colo.	.....	7,174
Total amount of shipments to date			$14,889,718

* Official. † Assay value. ‡ Not including value of lead and copper ; G., gold ; S., silver ; L., lead ; C., copper. ——— No bullion produced. Silver valued by the different companies from $1.05@$1.29·29 per ounce ; gold, $20.67.

Foreign Bank Statements.—The governors of the Bank of England, at their regular weekly meeting, made no change in the bank's minimum rate of discount, and it remains at 5 per cent. During the week, the bank gained £434,000 bullion ; and the proportion of its reserve to its liabilities was raised from 35¾ to 38 3/16, against 42 11/16 per cent at this date last year. The weekly statement of the Bank of France shows a loss of 8,175,000 francs gold and a gain of 1,975,000 francs silver.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Nov. 21.

American Pig.—During the week, the daily newspapers have printed somewhat wild dispatches concerning the inroads of Southern pig into the Philadelphia and the Eastern markets, until now almost exclusively held by anthracite furnace men. As yet this movement does not amount to much, but there is considerable discussion pro and con, whether or not it is only a passing phase, or whether it is really the entering of the wedge. We believe that a contest will certainly be made at an early date, and there are rumors afloat that an open reduction in the price of Lehigh Foundry brands is imminent. We quote $19@$20 for No. 1 Foundry ; $17.50@$18.50 for No. 2 ; and $16@$17.50 for Gray Forge. Bessemer pig is dull, and Spiegeleisen is quiet at $27 asked for 20 per cent, and $22 for 10 to 12 per cent.

Scotch Pig.—There has been no change whatever in the situation.

We quote ex ship and to arrive : Langloan, $21.50; Summerlee, $20.75 ; Dalmellington, $20 ; Gartsherrie, $21 ; Eglinton, $19.25@$19.50 ; and Glengarnock, $20@$20.50.

At the Metal Exchange, the following cable quotations have been received : Coltness, 58s. ; Langloan, 57s. 6d. ; Summerlee, 53s. 6d. ; Gartsherrie, 54s. 9d. ; Glengarnock, at Ardrossan, 50s. ; Dalmellington, 48s. ; and Eglinton, 44s. 6d. Warrants, 43s. 5d.

Steel Rails.—There are still a number of orders in the market, none of which has, however, been closed. The only transaction we hear of is the sale by a Western mill of 10,000 tons of rails to the Gould roads, delivered at St. Louis, for a shade over $30, equivalent to about $27 at mill, with the option of increasing the order to 20,000 tons. We quote $28 at mill.

Old Rails.—Dull at $16.50@$17.

Philadelphia. Nov. 21.

[From our Special Correspondent.]

Pig-Iron.—Rumors of large transactions in Southern pig-iron are rife, but the only actual negotiations in progress are for a lot of between four and five thousand tons, which will probably be placed by Saturday, and which, if placed, will come to Charleston by rail, thence here by water. The last large sale was a five thousand-ton lot, of which one fifth will be delivered as soon as it can be handled. The depression in local pig-iron circles has not been as great for several years, and it is probable some furnaces will blow out. As to prices, not a word can be said.

Muck Bars.—These are quiet at $29@$28.50.

Foreign Iron.—Even at buyers' prices, there is scarcely any demand. Bessemer is nominally $19. Spiegel, $23@$26@$31, according to per cent.

Blooms.—Prices are drooping, and business has been done at $51 for Charcoal (2464 pounds). Anthracite, $42. There is scarcely any inquiry.

Merchant Iron.—The manufacturers have reduced the card rate to 1·80c., to go into effect next month. The workmen will accept, as there is no other alternative. Prices run from 1·8c. to 1·6c., according to make. More cheap stuff has been selling lately than best. Stores buy only as they run out. Manufacturers have very little on hand. Some mills will probably close down in two weeks and wait until after the holidays.

Nails.—Steel nails are going in small lots at $2.15, and can be had a trifle less on large lots, while iron nails are selling at $2.05, and rumor says they are offered in large lots under $2. This much is true, that sales have been made on terms that are withheld. Some mills have quit cutting, having had a sufficiency of that form of amusement.

Plate and Tank.—To-day's quotations in small lots are 2·1c. for Plate; 2·15c. for Tank ; 2·75c. for Shell; 3·75c. for Flange ; 4·25c. for Fire-Box. Business on a large scale is not visible to the naked eye, and only small lots are taken by people who at almost any other time would buy largely.

Structural Iron.—Manufacturers are negotiating for about 4000 tons, but we can give no facts yet. To get this, some extremely low prices have been named. Prices in small lots are 2·10c. for Angles ; 2·25c. for Bridge Plate ; 2·75c. for Tees ; and 3·50c. for Beams and Channels ; but these figures mean nothing if big business is to be had.

Sheet-Iron.—Only a moderate demand is reported, and no change in card rates.

Wrought Pipe.—The business in hand and in sight justifies the statement that trade is fast improving, though it is secured at prices which leave very little profit. Butt-Welded Black, 45 ; others unchanged.

Steel Blooms.—Some little business was reported in Nail Blooms at $32 for Bessemer and $33 for Foreign at port. The manufacture of blooms is growing, and prices are rather uncertain, though there is not much margin.

Steel Rails.—The makers report inactivity, though there is some little inquiry that will probably lead to business on a basis of $28.50.

Old Rails.—Rails are weaker at $17.50@$18 here and near here.

Scrap.—Several buyers ordered, and sales are more frequent in large and small lots at $19 for Selected to $18 for Ordinary No. 1.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Nov. 21.

Anthracite.

The trade is moving along well so far as Stove coal is concerned, about $4 being generally obtained by the companies. Egg is less strong, and Broken and Pea are in overabundant supply, the latter selling at $2.10@$2.25.

It is imperative that the coal companies come to an understanding at the earliest moment concerning the future policy to govern the coal trade. If they could be got together to discuss the important problems at issue like business men, all concerned would be immeasurably better off. Of course, it would not do for some of them to insist upon absurd claims, which, we fear, some of them will put forward in the hope that the anxiety of others, who are in financial straits, will cause them to compromise rather than see every thing wrecked. It is a curious illustration of the happy-go-lucky feeling that appears to reign supreme that the troubles of the last year, its menaces and its dangers, should be well-nigh obliterated by six weeks of comparatively smooth running of the trade. The past, it might be thought, would have taught the managers of the coal companies how costly is the delaying of action until the best time for it has passed.

Bituminous.

The event of the week has been the posting of notices by the Cumberland operators that after the 1st of December wages are to be reduced in that region from 50 to 40 cents a ton. The movement, which it is not believed will be resisted, is simply one growing out of the necessity of equalizing the wages in the Cumberland District with those for a long time ruling in other competing fields. The announcement has had no effect whatever on the coal market, which remains dull and lifeless.

Philadelphia. Nov. 21.

[From our Special Correspondent.]

Stocks at Port Richmond are 104,000 tons. The essential conditions of the trade have not been modified, and there is very little room for any change, owing to the fundamental difficulty of decreased manufacturing requirements in all markets, East and West, and in the local and line trade. Your correspondent has taken the views of large consumers here who usually have their bins and yard room full, but to-day they have nothing in, and will not buy. There is, however, a good deal of confidence as to the starting up of business in January ; but this is faint, and does not affect the present situation. The domestic sizes are in short supply, and if the local demand was as heavy as ordinarily, delay in delivery would be much more general than it is. The line trade looks somewhat better; but all through the State things are in a bad way. A larger than usual number of vessels are wanted for all points along the coast. There are about enough arriving to get loaded. Sometimes a great deal of delay occurs. Freights to Boston are firm at $1.15. The New England buyers, or some of them, have been making inquiries as to what large lots could be had next month. The season will soon close, and whatever coal is wanted will be ordered soon. The labor organization going on in the region is more of a sick and burial benefit sort than a genuine trades-union sort, although there is enough latent discontent to make trouble there over wages if the opportunity offered.

The same reports are made this week as to bituminous. The Cumberland region has been reduced 20 per cent, making 40 cents a ton. This brings the two regions apparently on a par, but in reality it gives Cumberland operators a little more margin. Our opera-

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

Name and Location of Company.	Highest and Lowest Prices per Share at which Sales were Made.												Sales.
	Nov. 15.		Nov. 17.		Nov. 18.		Nov. 19.		Nov. 20.		Nov. 21.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.					.05	.04	.05		.05	.03	.04		9,700
Amie Con., Co.	.04		.05										
Argenta											3.50		5
Bassick, Co.					.30								100
Belle Isle, Ne.					2.85		2.95		3.00		3.35	3.20	1,500
Bodie Cons., Ca.	3.00				.20				.21				1,200
Breece, Co.													300
Bulwer, Ca.	.58												
California, Ne.													
Cal. & Hecla, Mich.													
Castle Creek													
Chollar													
Carysolite, Co.									.85		.93		500
Cons. Cal. & Va.													
Cons. Va., Ne.	.03								.04				1,100
Dunkin, Co.	.22												500
Eureka Cons., Ne.	3.00		3.15	3.00	3.10	3.00	3.25						1,075
Father de Smet, Dk.			4.00	3.95									500
Findley, Ga.													
Gold Stripe, Ca.									.02				200
Gould & Curry, Ne.													
Grand Prize, Ne.	.25						.22						2,100
Green Mountain, Ca.													
Hale & Norcross, Ne.													
Hall-Anderson, N. S.													
Homestake, Dk.													
Horn-Silver, Ut.	4.75	4.50	4.60	4.50	4.75	4.50	4.75		4.70	4.65			3,715
Independence, Ne.							.17						300
Iron Silver, Co.	.95		.85	.50	.65	.60	.62	.61	.72	.65			3,000
Leadville C., Co.													
Little Chief, Co.													
Little Pittsburg, Co.													
Martin White, Ne.					.25								100
Moulton			1.25				1.15		1.05				1,300
Navajo, Ne.	3.60		3.65				3 30						1,200
Northern Belle													
North Belle Isle, Ne.					.30		.30						400
Ontario, Ut.									19.00				20
Plymouth			15.00		15.13		15 25	15 13			15.13		700
Quicksilver Pref., Ca.													
" Com., Ca.													
Robinson Cons., Co.			.42	.40	.40	.39	.41	.40			.40		3,100
Savage, Ne.													
Sierra Nevada, Ne.							1.20						50
Silver King, Ar.					5.50						5.50		35
Spring Valley, Ca.											1.10		100
Standard, Ca.	.55		.55	.50	.55	.50	.45		.48		.85	.35	2,755
Stormont, Ut.													
Tip Top, Ar.													
Vizina, Ar.													
Yellow Jacket													

NON-DIVIDEND-PAYING MINES.

Name and Location of Company.	Highest and Lowest Prices per Share at which Sales were Made.												Sales
	Nov. 15.		Nov. 17.		Nov. 18.		Nov. 19.		Nov. 20.		Nov. 21.		
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Albion			.10				.05						400
American Flag													
Barcelona, G.													
Bechtel Con., G.													
Belvidere													
Best & Belcher, G. S.							.96		.95				500
Big Pittsburg, S. L.													
Bradshaw, S.													
Bull-Domingo, S. L.													
Cal., B. H., G.													
Central Ariz'na, S.							.20						600
Climax, Co.													
Colorado Central.			.80						.70				1,350
Cons. Imperial													
Con. Pacific	.92		.93		.94	.90	.91		.95	.93	.95		3,000
Decatur													
Durango, G.													
Eastern Oregon													
Goodshaw, G.													
Harlem M. & M. Co.													
Hortense, S.													
Lacrosse, G.													
Mariposa Pref., G.													
" Com., G.													
Mexican, G. S.	.50				.50				.50				1,700
Mono													
North Standard, G.													
N. Horn-Silv'r, S. L.													
Ori'nt'l & Miller, S.					.09		.12	.09					700
Rappahannock, G.	.07												500
Red Elephant, S.													
Ruby, of Arizona.													
Silver Cliff, S.													
Sonora Con.					.03								1,000
South Bodie, G.													
South Bulwer, G.													
South Hite.													
South Pacific.													
State Line, 1 & 4, S.													
" Nos. 2 & 3, S.			.03		.02								700
Sutro Tunnel	.12		.12		.11	.10	.11	.10	.13	.11	.15	.12	75,700
Taylor Plumas													
Unadilla, S.													
Union Cons., G. S.													

Tables giving dividends and assessments will be printed the first week of each month. Dividend shares sold, 35,600. Non-dividend shares sold, 86,150.

tors are not disposed to make any further reductions. The figures for Clearfield production for the week are 65,624 tons, against 66,042 tons for the same week last year, a decrease of 418 tons; and for the season 2,762,682 tons, against 2,503,901 tons, an increase of 258,783 tons. The Cumberland figures are 44,524 tons, against 32,355 tons for the same week last year, an increase of 12,169 tons; and for the year 1,660,716 tons, against 1,477,556 tons, an increase of 183,162. The increase for both regions is 441,945 tons As frequently noted, a great deal of railroad capital is attracted into the bituminous regions of the State to develop coal territory. Several railroad companies have just been chartered. One road will run from Crawford Junction, McKean County, to Johnsonburg, Elk County, thirty miles. The capital stock is $300,000. Among the Philadelphians interested in this enterprise are Lewis Victor Bright, James Buckley, and John J. Wilkerson. Among the New Yorkers are C. L. Atterbury, John King, and Edmund S. Bowen. Another road will be built from Brockwayville, Jefferson County, to Daguscahonda, Elk County, thirteen miles. Capital, $130,000. It will be built by the company that holds the first-named road. The board of consulting physicians of the Miners' Hospital, at Pottsville, has resigned because of an inability to agree.

Buffalo. Nov. 20.

[From our Special Correspondent.]

Your valuable space will not be encroached upon to any great extent this week by an account of the coal and coke trade of this city. There is really nothing new to report; business remains in the same condition, excepting that in some branches of manufactures a slight improvement has been manifested.

The prospects for 1885 are canvassed freely, but nothing but conjectures and their contingencies have come to the surface; in fact, one man's opinion is just as good as another's. When the results of the year's business are known, the shortcomings reviewed, and the conclusions arrived at, then we may expect some definite announcement of a plan of action. As I said a few days since, "Time will develop ideas; further time will be apt to produce conclusions; and still later, action." Remember the poor next Thursday; be liberal; the Lord loveth a cheerful giver!

The season of lake and canal navigation is nearing its close. The tonnage wanted to complete Western orders has apparently all been engaged, and vessels are rapidly going into winter quarters.

Have you heard that Mr. Charles Neilson, the able and efficient superintendent of the Buffalo and Rochester division of the New York, Lake Erie & Western Railroad, has tendered his resignation, to take effect about December 1st? His successor has not been named yet.

It is said that Mr. Andrew Langdon, of this city, will have his Enterprise colliery, at Port Bowkley, near Wilkes-Barre, Pa., reopened about January 1st, 1885, and give employment to 400 laborers, if the work progresses favorably. The wrecked workings have been cleared, and the roof well propped all over the mine. If the colliery is restored to full working order, it will show a triumph of skill and perseverance. Its capacity is estimated at 1000 tons a day.

The engagements by lake from Buffalo, on coal cargoes, for the past week were at the following rates: 75c. to Chicago and Milwaukee; 25c to Detroit; 30c. to Toledo; and to Duluth and Saginaw on contract.

Receipts of coal by lake, none.

Receipts of coal by canal for the second week of November, 6938 tons; shipments, for same period, 611 tons.

Receipts of coal by Lake Shore & Michigan Southern Railroad for the past week, 732 tons; namely, 420 tons for Buffalo, and 312 tons for other points.

The shipments of coal by lake, from November 13th to 19th, both days inclusive, were 25,130 tons; namely, 17,080 to Chicago, 4800 to Milwaukee, 1000 to Duluth, 500 to Detroit, 650 to Toledo, and 1100 to Saginaw.

No canal charters are reported; the coal shipped being on owners' account.

The New York State canals will be closed on Monday, December 1st, unless sooner closed by ice.

A review of the statistics for 1884 shows that the coal shipments by lake thus far this season amount to 1,333,560 tons, against a total for last season of 1,253,940 tons, and for 1882 of 1,027,500 tons. Enough more will be sent forward this fall to make the total about 1,400,000 tons, which would show an increase over last season of nearly 150,000 tons. A year ago, coal freights to Chicago were $1.50; now they are just half that sum.

The receipts at Duluth of coal for the week ended November 15th were 5600 tons; for the season to date, 283,247 tons. No further arrivals, excepting about 5000 tons in transit, are expected this year.

Boston. Nov. 20.

[From our Special Correspondent.]

The present appears to be a good time to buy anthracite coal, and we note a better feeling in this market. So far as tide-water stocks are concerned, this branch of the business has been brought into very good shape by the curtailments that have taken place and that are ordered for the rest of the year. Prices are steady, and are likely to remain so, while the buyer of to-day can get as low a freight and as prompt dispatch as are likely to be had. There is some difficulty experienced now where quick dispatch is wanted, but we do not see how there is to be any improvement in this particular later on. This is especially so in the case of stove coal. There is really a shortage of this size, and while it is not of such a nature as to advance prices, it causes delay in filling orders. Egg coal is in about the same condition as stove. There continues, however, to be a large supply of broken, nut, and pea coal, and this, notwithstanding nut and pea have been used to a greater extent for steam coal this year than in the season of 1883.

We hear of very low figures on broken coal, and the present would appear to be a good time to buy. It is a drag on the market. It is probable that some operators will re-break a part of their broken into stove. It is considered that 40 cents a ton covers the expense of re-breaking, and at the present time there is a difference of from 35 to 50 cents a ton in the prices of broken and stove.

The unusual period of warm weather early in the month has had a quieting effect on business; but unless the weather should continue unfavorable, jobbers expect a good trade for the rest of the month, more particularly from Boston trade.

We quote f. o. b prices without change, as follows:

At New York, Stove, $4@$4.15; Broken and Egg, $3.50@$3.65; Pea, $2.40; individual coals, $3.75@$3.90 for Stove, $3.25@$3.50 for Broken and Egg At Philadelphia, $3.90@$4 for Stove, $2.20 for Pea, $3.30@$3.50 for Broken and Egg. Special coals, $4.85@$5 for Broken, $5.35@$5.50 for Stove.

There is nothing to cause a movement in bituminous coal. Manufacturing business is too dull to cause any earlier stir in that direction than usual. Outside of transient weekly sales, we learn of no business.

Delivered cargoes range from $3.55@$3.70. The movement in provincial culm coal is practically over for the year, although it usually continues until a later date. No skipper would go down to Cape Breton for a cargo now, particularly with freights so low.

There is a strong tone to freights, and the recent advance is maintained. It is complained that rates are not yet on a living basis.

We quote: New York, $1@$1.05; Philadelphia, $1.10@$1.15; Baltimore, $1.15@$1.20; Newport News, $1.10@$1.15; Richmond, $1.20; Cape Breton, $1.55@$1.60; Bay of Fundy, $1.30@$1.40.

There is only a fair retail movement, owing to the backwardness of cold weather. We quote:

White ash, furnace and egg	$5.50
" " stove and nut	5.75
Red ash, egg	6.00
" " stove	6.25
Lorberry, egg and stove	$6.75@ 7.00
Franklin, egg and stove	7 50
Lehigh, furnace, egg, and stove	5.75
" nut	5.75

Wharf prices, $4.50 for Broken, $4 85 for Stove.

The domestic receipts of coal at this port for the month of October were 207,706 tons, showing an increase over the receipts of October, 1883, of 70,791 tons. The receipts from January 1st to November 1st have been 1,852,474 tons, showing a decrease, compared with the same period of 1883, of 131,177 tons. In the ten months, shipments to this port from New York have fallen off 142,309 tons; from Baltimore they have increased 193,684 tons.

STATISTICS OF COAL PRODUCTION.

Comparative statement of the production of anthracite coal for the week ended November 15th, and year from January 1st:

Tons of 2240 lbs.	1884. Week.	1884. Year.	1883. Week.	1883. Year.
Wyoming Region.				
D. & H. Canal Co.	113,516	3,364,150	101,704	3,631,763
D. L. & W. RR. Co.	†	4,282,536	110,947	4,453,677
Penna. Coal Co.	38,509	1,138,548	34,054	1,328,346
L. V. RR. Co.	34,060	1,194,248	24,266	1,227,016
P. & N. Y. RR. Co.	6,568	194,898	5,751	191,930
C. RR. of N. J.	*	*	*	1,202,078
Penn. Canal Co.	12,897	403,961	16,708	464,052
North & West Br. RR.	17,669	716,792	16,307	447,046
	223,219	11,295,133	309,737	12,945,908
Lehigh Region.				
L. V. RR. Co.	138,022	3,994,910	114,954	4,450,601
C. RR. of N. J.	*	*	*	1,126,889
S. H. & W. B. RR.	1,883	136,184	1,689	35,095
	139,905	4,131,094	116,643	5,611,985
Schuylkill Region.				
P. & R. RR. Co.	340,951	9,695,126	268,723	8,491,796
Shamokin & Lykens Val.	*	*	*	950,363
	340.951	9,695,126	268,723	9,442,159
Sullivan Region.				
St Line&Sul.RR.Co.	2,636	65,122	1,740	60,756
Total	676,711	25,186,475	696,843	28,060,808
Increase				
Decrease		2,874,333		

* Included in tonnage of the Philadelphia & Reading Railroad.

† Reports not received.

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

Total same time in 1879 ..... 23,314,582 tons
" " " " 1880 ..... 20,847,775 "
" " " " 1881 ..... 24,827,454 "
" " " " 1882 ..... 25,770,651 "

Belvidere-Delaware Railroad Report for the week ended November 15th:

	Week.	Year 1884.	Year 1883.
Coal for shipment at Coal Port (Trenton)	7,240	101,396	113,136
Coal for shipment at South Amboy	18,391	561,887	522,281
Coal for distribution	26,402	708,868	730,122
Coal for company's use	5,563	161,434	142,579
Total	57,596	1,533,585	1,508,118
Increase		25,467	
Decrease			

OFFICE OF THE MOULTON MINING CO.,

BUTTE CITY, MONT., Nov. 13, 1884.

DIVIDEND NO. 3.

Dividend No 3 of THIRTY THOUSAND ($30,000) dollars (being 7½ cents per share) will be payable at the office of John M. Moore & Co., Transfer-Agents, No. 78 Broadway, New York, on and after December 10th. Transfer-books close December 5th.

W. A. CLARK, President.