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[WITH SUPPLEMENT.]

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NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. Articles written by Mr. Raymond will be signed thus *

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TABLE FOR THE CONVERSION OF ENGLISH AND METRIC UNITS.

This table will be published every week in the ENGINEERING AND MINING JOURNAL. It is based on the authority of RANKINE, and is correct to the fourth decimal place.

1 Meter = 3'2807 feet.	1 Atmosphere = 14'7 lb. per sq. in. = 10'333 Kilog. per sq. meter = 29'922 in. or 760 mm. of mercury = 33'9 ft. or 10½ meters water.
1 Foot = 0'3048 m.	1 Kilogramme = 2'2046 lb. av.
1 Liter (vol. of 1 kilog. water) = 0'2202 gal.	1 Pound av. = 0'4536 kilog.
1 Gallon (vol. of 10 lb. water) = 4'541 liters.	1 Deg. centigrade = 5-9 (deg. F. - 32°).
1 Kilog. per sq. meter = 0'2048 lb. per sq. ft.	1 Deg. Fahrenheit = 9-5 deg. C. + 32°
1 Kilog. per sq. mm. = 1'422'28 lb. per sq. in.	1 Calorie (kilog. water raised 1° C.) = 244 kilogrammeters = 3'9683 heat-units.
1 lb. per sq. in. = 703'0958 kilog. per sq. m.	1 Heat-unit (lb. water raised 1° F.) = 772 ft.-lb. = 0'252 cal.
1 Gramme = 15'4323 gr.	
1 Grain = 0'0648 gram.	
1 Kilogrammeter = 7'2331 ft.-lb.	
1 Foot-pound = 0'1383 klgm.	

WESTERN OFFICE OF THE ENGINEERING AND MINING JOURNAL—DENVER, COLO.

The Western office of the ENGINEERING AND MINING JOURNAL, at Denver, Colorado, is under the charge of T. F. VAN WAGENEN, Esq., as Staff Correspondent, and W. W. ROSE, JR., Esq., as Manager. These gentlemen are the fully accredited agents of this JOURNAL for the Western Department, extending from the Mississippi to the Pacific, and are authorized to make contracts for advertising, take subscriptions, and collect and receipt for the same.

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AMERICAN INSTITUTE OF MINING ENGINEERS.

OFFICIAL BULLETIN.

The members and associates of the Institute are hereby informed, in accordance with a recent decision of the Council, that the ENGINEERING AND MINING JOURNAL will not be sent to those in arrears for the current year after July 1.

THOMAS M. DROWN, Secretary.

EASTON, PA., June 1, 1877.

Let the Trustees of the Johns Hopkins University note the decline in the value of the Baltimore & Ohio stock (over 30 per cent. since 1st Jan.) and save the endowment, on which the usefulness of the University depends, by seeking a safer investment than that offered by the Baltimore & Ohio Railroad under its present fossil management.

STORM SIGNALS FOR MINE USE.

It has been decided in France to send notice to the various coal mines of any sudden fall of atmospheric pressure recorded at the several meteorological observatories. It is well known that the outflow of fire damp is greatly increased by a sudden fall in the atmospheric pressure, and nearly all fiery mines now use the barometer as an indicator of the amount of ventilation required. In addition to the barometer readings at the mines the Government weather report, which would indicate the approach of a dangerous atmospheric disturbance before its arrival, would no doubt in some cases be the means of preventing dangerous fires and explosions in mines producing fire damp in large quantities.

The matter is worthy the attention of those in charge of such collieries, and, no doubt, upon suitable application the Government would send such reports to the principal mining districts interested.

THE CONSUMPTION OF POWDER IN MINING ANTHRACITE COAL IN THE LEHIGH REGION, PA.

The powder used in mining anthracite coal is a much more important item of "cost" than is generally supposed, even among the managers of mines. The universal custom of the mining regions is that the miners buy the powder they use. This they do from the mine owner, who generally, though not always, gets a small advance on the price he pays the manufacturer. The manufacturer's price for blasting powder is, at present, exceedingly low, owing to a very active competition in the business and the low cost of the materials. Including delivery at the mines, it is, in the Wyoming Region but \$1.60 to \$2.00 per keg of 25 lb., and in the Lehigh Region about \$1.00 per keg. A few years ago these prices were \$3.00 and \$3.50 per keg.

The powder used is now manufactured exclusively with nitrate of soda, or is what is called "soda powder," while formerly the miners would use nothing but "saltpetre powder." In strength there is practically no difference between these, but the "soda powder" is rather more hygrometric than the article made from saltpetre, and, therefore, often makes more smoke.

The powder is, for the most part, put up and sold in wooden or sheet-iron kegs, holding 25 lb. of powder; but within a few years some of the manufacturers put it up in paper cartridges (Boies' patent), which can be cut off to the desired length by the miner.

Since the mine owner (operator) generally makes a profit on the powder sold to the men, he too often forgets that he has finally to pay it out in the form of wages, and that it is to be estimated as one of the items in the cost of coal. At present, when every cent added to this cost is of great importance, a consideration of the following table will be of interest. We are indebted to Mr. T. D. JONES, Inspector of Mines for the Lehigh District, Pa., for this valuable and interesting information:

TABLE GIVING THE OUTPUT OF COAL FROM THE DIFFERENT BEDS IN THE LEHIGH REGION, AND THE CONSUMPTION OF POWDER IN MINING IN THE SAME.

	Coal sent to Market	Coal produced.	Powder consumed	Tons Coal Mined.	Percent- age of Different Coals marketed.
	Tons of 2,240 lb.	Tons of 2,240 lb.	Kegs of 25 lb.	Per Keg powder used.	Per lb. powder used.
Mammoth Seam.....	2,198,573	2,374,458	36,535	64'99	2'5996
Buck Mountain Seam.....	738,022	797,065	14,132	56'40	2'2560
Wharton Seam.....	307,933	331,595	8,360	39'66	1'586
Aggregates.....	3,243,628	3,503,118	59,027	59'34	2'37

Tons of coal produced per ton of powder used..... 5,317'58

It will be seen that nearly 68 per cent. of all the Lehigh coal sent to market is from the Mammoth Seam (white ash), while less than 23 per cent. is from the Buck Mountain (red ash) bed. The coal from the Wharton Seam is very hard and "rough" in appearance, and, therefore, not so salable as the others. It is best adapted to blast-furnace work, for which it is largely used. The Wharton bed varies in thickness from 7 to 14 feet, and its extreme hardness is evident from the fact that less than 40 tons of coal are got on an average with one keg of powder, while in the Mammoth bed the same amount is sufficient for the mining of 65 tons. The great thickness of the Mammoth Seam (from 25 to 80 feet) also contributes to this result, though there is no doubt the Wharton coal does not blast so well as that of either the Mammoth bed above it or the Buck Mountain bed which underlies it. The thickness of the Buck Mountain Seam varies from 8 to 14 feet in thickness, but is rarely more than 12 feet regular. It is easier mined than either of the other beds, account being taken of its less thickness, and, consequently, a keg of powder will mine over 56 tons of coal from it.

From these figures we perceive that the average amount of coal mined by one pound of powder in the Lehigh region is 5,317'58 pounds of coal—or with powder at \$4 a keg, as it was some years ago, this item would enter for 6½ cents on the ton of coal, or with powder at \$2 a keg, the average would be 3½ cents per ton of coal, while in the Wharton Seam it would amount to 10 cents and 5 cents respectively per ton, and in the Mammoth Seam 6 cents and 3 cents per ton. In the Wyoming and Lackawanna regions, the coal, though soft, is in much smaller and less highly inclined beds (the pitch of the bed exerts a great influence on the consumption of powder), and the consumption of powder is much greater than in the Lehigh field. A few years ago we obtained figures which showed it to be about 30 tons of coal to the keg of powder.

In all cases the whole of the powder used about the mine, whether in blasting the coal or in driving rock tunnels or sinking rock shafts, is charged to the coal mined, so that these figures are not quite correct for blasting in coal alone. The variation would probably be unimportant, a few per cent. added to the yield per keg of powder would probably cover the change to be made, were it possible to ascertain the proper proportion of powder to deduct for rock work.

FALLACIES IN MINING AND ORE DRESSING.

Staff Correspondence of the Engineering and Mining Journal.

The number of mistaken ideas afloat among miners in regard to veins, ore, and the various particulars of ore reduction is rather surprising, when the large average experience of these men as a class is considered. It is also curious that they are so often at fault concerning the simpler details of their work, and especially is this evident in the history of "process manias," an example of which is shown in the furor now existing in Boulder County. We propose to refer to a few of these fallacies, with the hope of giving some information that may be of use.

1.—SHOULD ORES BE ROASTED BEFORE CONCENTRATION?

This question will apply on several processes now in course of testing. It may be answered clearly and easily. Concentration is the separation of gangue from ore by mechanical means—either in the medium of water or air. Its action depends wholly upon the fact that the several substances of which ores are composed, such as quartz, feldspar, pyrites, galena, etc., etc., have different weights, so that when they are put together into water the heavier will fall to the bottom soonest. If the water is moving, the lighter particles will be carried away. All this is quite simple. Now the weight of a body or substance apparently varies at times. This may appear rather a strange statement, but if one drops two pieces of lead weighing an ounce each into water, one of the pieces being in the form of a plate and the other in the form of a lump, he will see that the latter will reach the bottom much the quickest. Hence arises the necessity in concentration of sizing. If now we pulverize ore very finely, and then attempt concentration, it will be found that a large part of the mineral will be carried away by water. If the ore contains native or pure metals, such as gold and silver, these will not crush up, but will flatten out as scales or plates, and will be carried away as easily almost as clay or quartz. From this it will be seen that ores should not be finely pulverized before concentration. But to roast ores completely fine pulverization is necessary—unless the roasting is done in heaps; and, under any circumstances, well roasted ore on being put into water will immediately pass into the condition of the finest slimes, so that a perfect separation of the ores from the gangue is wholly impossible. There is still another reason why roasting before concentration is a mistake. In the furnace the action of heat and air causes the formation of soluble sulphates of some of the metals desirable perhaps to be saved (copper, iron, and silver), and when these are put in water they are dissolved and wholly lost.

2.—SHOULD ORES BE PERFECTLY ROASTED AS A PREPARATORY STEP FOR CHLORINATION?

The answer to this involves the whole question of roasting, about which there are many erroneous ideas afloat. The term is also confused frequently with calcination. It seems to be thought by many sulphur is the great enemy of the miner, and that before anything else can be properly done this element must be wholly driven away. No mistake, however, could be greater. When salt is used to chloridize, a percentage of sulphur is absolutely necessary to decompose the salt, and if the ore does not contain enough, more must be added. The sulphur acts as a sulphurous acid.

3.—THE COST OF ROASTING ORES.

Many of the patent furnaces now being tested claim to roast ores perfectly at a cost of from \$1 to \$3 per ton. Even if the claim could be substantiated (which is open to doubt), this is not remarkable. At the Boston & Colorado works ore is roasted at a cost not over 75 cents per ton. The ordinary reverberating furnace and the Bruckner cylinder will roast for \$2 to \$3, and if calcination is done in heaps or ovens it will cost scarcely 35 cents per ton.

4.—DO VEINS INCREASE REGULARLY IN RICHNESS FROM THE SURFACE DOWNWARD?

An excellent example of this curious idea is shown in the following paragraph extracted from the letter of a miner at Cedar Mountain, Colorado. The writer says: "A beginning has been made towards the development of a lode of great extent on Cedar Mountain; in length and width rivaling those of San Juan, but with the characteristic of most lodes in other sections—Nevada, Utah, California, etc.—of showing a nominal value at the surface and increasing in value regularly with increased depth. . . . A truer and better characterized fissure vein would not be sought for, showing a regular increase in value of \$1 per vertical foot." Now the fact is that most veins show their richest ores right at the surface, because when air and water have had a chance to act on mineral, many metals of no particular value, such as iron, copper, lead, and zinc, are oxidized and washed away, leaving the unalterable gold and silver free and concentrated. On the outcroppings of the Comstock hundreds of tons of ore worth \$2,000 to \$10,000 per ton were mined, which have never been duplicated below, and the history of all metal mines is practically the same in every part of the West and of the world. As to a regular increase of richness from the surface down, the absurdity of the idea may be shown very clearly by an examination of any vein in Colorado or anywhere else. If every vein discovered had to be sunk 100 feet in depth before \$100 was found, there would be few mines worked, and conversely, if every mine sunk to the depth of 1,000 feet yielded \$1,000 ore, not a mine in the country would be idle.

5.—DO VEINS NECESSARILY INCREASE IN WIDTH REGULARLY AS DEPTH IS GAINED?

This, again, is a common idea. Let the miner figure out the result of such an hypothesis. His mine, we will suppose, is 4 feet in width at the top, and increases regularly 1 inch with every foot in depth. At 500 feet depth the vein will be 45 feet wide, at 1,000 feet it would be nearly 100 feet in thickness, and for every 1,000 feet sunk an additional 100 feet in round numbers would be gained. Take the case of a hillside on which are 5 parallel veins 100 feet apart on the surface. At the depth of 1,000 feet all these veins would come together, forming one immense lode 500 feet broad. The every-day experience of any miner in the country will disprove such a state of affairs, for he knows it does not exist.

The fact is, the position of the present surface line with regard to the rich portions of the vein is an accident of the elements which have wasted away the rocks for hundreds or perhaps thousands of feet, and have left the surface where it now is, while the rich portions of the veins—such as the bonanzas of the Comstock—are quite limited both in height, length, and width, and are found at irregular intervals in the vein, and are of variable richness.

HELENA, MONTANA, AND VICINITY.

Staff Correspondence of the Engineering and Mining Journal.

Helena, Montana, is one of the classic towns of the West. Like the two Virginias, White Pine, Central, Silver City, and other towns, its mines have been in the early days famous producers of the precious metals. Last Chance Gulch, at whose mouth the town is located, was discovered in 1864. The cañon above the town is narrow and steep, and in places was very spotted. As the stream emerges from the mountains and spreads itself out into the broad valley of the Prickly Pear, it became for a length of three to four miles one broad, deep bar, in which the gold was collected through centuries of erosion, and when the pioneers found its golden sands it was ripe for the harvest.

After yielding about \$10,000,000 in gold, Helena, like all other towns built upon the basis of placer mining, declined rapidly in size and wealth as the restless miners moved away to newer and supposed richer gulches. With the exception of Alder Gulch, in the same Territory, and a few noted cañons of California, no richer placer ground has yet been found in the United States than Last Chance, and even now the half-deserted and pit-marked gorge carries millions of the yellow metal in its bed.

It is upon the quartz mining interests, however, that the future of this section of Montana rests, and as attention has been drawn to these resources, the discoveries have not been without encouragement. A strong belt of gold veins crosses the head of Grizzly and Oro Fino Gulches, about four miles above town; at the head of Ten Mile Creek, on the northwest, a number of very rich silver veins are found; on the hills surrounding Scratch Gravel a good vein of argentiferous copper ore exists, and to the southwest about 20 miles away, are the argentiferous lead mines. To these Helena is a natural center, and the enterprise of its citizens has pushed its influence even farther.

The belt of gold mines referred to has yielded, since its discovery, \$4,000,000 in gold. There is one large vein known at different points of its outcrop (which may be followed plainly for over one mile) as the Park, Peerless, and Union lodes, besides which there are numerous ledges. The Union vein has been one of the most productive of mines for the amount of ground opened, though it has been abused greatly; enough, however, of the vein is now in pay to encourage continued workings in other parts, and as the smaller proprietors become consolidated in larger ones, and development pushed in systematic ways, those parts of the great lode now out of ore will gradually be brought into pay once more. A depth of nearly one thousand feet has been attained on the vein in the Columbia Mine, and there are at least a half dozen inclines on other parts which are down two or three hundred feet.

The recent opening of a 40 ton concentration works at Jefferson City has given a great impetus to the mines of Boulder and Colorado districts. These veins are very rich carriers of galena (argentiferous), are large, and are rapidly becoming of great value. The prominent mines are the Rumley, Comet, Argentum, and Gregory.

Ten Mile district is still a prospect camp. The mines are located at a high altitude, and will require some time and capital for their development. The ore is of high grade, milling from \$300 to \$1,000 per ton. The Scratch Gravel veins are of a somewhat similar nature. The Lexington is the only one that has received any amount of development.

The old placer ground below Helena is good for many millions more of gold, if worked on a large scale, and with improved machinery. Just below the town, and crossing the gulch nearly at a right angle, the lower rim of an ancient water channel has been discovered, from which it is thought the bulk of the gold found below originated. In due time this old water course will be explored, and its exploration will probably result in discoveries of resources not as yet dreamed of. The primary alluvial gold deposits of Montana (from which those which have given the Territory its reputation were no doubt derived) are in all probability very extensive and many times richer than the bars or gulches recently worked.

WOOD'S "ANALYTICAL MECHANICS."

TO THE EDITOR: SIR—If contradictions and assertions were arguments, I would surrender. The leading question under discussion possesses some historical interest. In my *Mechanics* I stated in the preface, "Lagrange at the outset deduced a general equation from which all others were derived;" also, in the body of the work, "This is the most general principle of mechanics, and M. Lagrange made it the fundamental principle of his celebrated *Mécanique Analytique*, which consisted chiefly of a discussion of equation (118)." The general principle here referred to is that of *virtual velocities*. For these remarks I have been ferociously attacked by our critic, "R.," in the following words: "Nor was any such equation discussed in the *Mécanique Analytique*, nor did the author of that masterpiece of analysis propose or attempt to base the science on any single formula. . . . Prof. Bartlett, of West Point, about the year 1850, was the first to show that the 'general formulas' of Lagrange could be deduced from the single equation which Prof. Wood has coolly accredited to the author of the *Mécanique Analytique*."

In his reply to my article he has abandoned this line of attack and rushed to the defense of the claim which he has set up for Prof. Bartlett. He says, in his second article, "I have no desire to claim the invention of this equation for Prof. Bartlett;" also, "Lagrange's general equation of dynamics is really the same equation under another form;" also, "Rankine also uses the equation in the very form in which it is employed by Prof. Bartlett." (Why this reference? Did Rankine use it prior to 1850?) Also, in reply to my statement that Prof. Bartlett developed his equations in the same order as Lagrange, and, I should have added, in precisely the same way, he admits that "the process by which the general equation was deduced in the old editions of his work might possibly give some faint color to such an assertion; but in the new edition, which has now been several years in print, the general equation is deduced with the utmost generality." We suppose that the *ninth* edition, printed in 1874, is here referred to,

hence it appears that the process was tinged with some faint color for twenty years. The critic proceeds thus: "And, having been deduced, is described as 'the one fundamental equation which embraces in its discussion the whole of physical and mechanical science.'" One of the great faults of Lagrange was that, having the general equation, he, like a true artist, failed to write upon it "This is a horse," that is, he failed to name it, but left the intelligent reader to judge of its true character.

Having surrendered so much, he proceeds to support his claim for Prof. Bartlett. He says that my reply "raises the question of the origin of the general equation of energy." Suppose it does raise it; it is not the question at issue, and I do not propose to discuss it at this time. He quotes from the preface of the ninth edition of Bartlett as follows: "All the phenomena are presented as mere consequences of that single law." The law here referred to is the law of the conservation of energy. This is not the issue. "Nor have I used any language which conveys the idea" that I have set up such a claim for Lagrange. He further says: "There is no evidence that he (Lagrange) ever conceived of such a thing as a general equation of energy." Who says he did? Still, the following language, taken from page 118 of the ninth edition of Bartlett, indicates that he possibly might have done so: "Or, following Lagrange, we may denote the total energy of the system by the constant H , and the kinetic energy, or half the vis viva, by V , which substitution gives

$$H + V = H \dots \dots \dots (D)$$

An equation which may be enunciated thus: The total energy, both potential and kinetic, is constant. This principle is now called the law of the conservation of energy; but in the precise form here given, Equation (D), it is used by Lagrange, though by him called the principle of living force." Note here that the principles are admitted to be the same, though the names are different. Further down the page he adds: "From the above it will be seen that Equation (D) is substantially identical with our fundamental Equation (A), they being only equivalent algebraic transformations for the same general law." Observe, it is for the same general law. Not merely are the equations identical, but it or they express the same law. Now can Captain Raymond "see any difference between Lagrange's formulas and Bartlett's equation"? Equation (A) here referred to is the general one of mechanics. It should be observed that Equation (D) was not Lagrange's general formula, but was a special case under it, being deduced from it on the hypothesis that the forces are functions of their distances from the center of the force. It is given in the second part of his Dynamics, page 4. He does not claim the discovery of this principle, but attributes it to Huyghens. See page 241 of the edition of 1811. But I will not be drawn aside to discuss the claims of or for Prof. Bartlett.

The main issue, divided into three parts, is: Did Lagrange discover a general principle of mechanics, and did he write, make, invent, or discover a general equation expressive of that principle; having the equation, did he recognize it as a general equation in fact; did he discuss it? That he was in possession of such an equation is now fully admitted by "R." We then proceed to consider the second part. Before presenting the proof under this head, I will observe that I do not wish to split a hair on this subject. Either Lagrange has a substantial claim or he has not, and I have no desire to credit him with what does not belong to him. I will also observe that, if we admit that Lagrange did not recognize his equation as a general one, and any subsequent writer did so recognize it, or if any subsequent writer recognized the general principle prior to 1850, then Prof. Bartlett was not the first to recognize a general equation and a general principle. If it is claimed that Prof. Bartlett recognized some other general principle, observe that we are not discussing that. It is also fair to observe that Lagrange should not be robbed of his honor simply because he proposed to establish general formulas. The critic has not shown that in this expression he did not mean that he would deduce a general formula for the equilibrium of a free body; another for the equilibrium of a constrained body; another for the motion of a free particle; another for the motion of a free mass, etc.—all of which might be drawn from one differential equation. The fact that he did not erect a monument and inscribe upon it, "This is the one fundamental equation," etc., should not be proof against him, if we find in his language evidence that he recognized a general principle.

We will first take the testimony of Lagrange. An examination of his old edition "might possibly give some faint color to" the suspicion that he did not recognize the general principle; "but in the new edition (nouvelle edition, 1811) now several years in print," there is left no question on this point. In this edition, printed over sixty-five years ago, we find the following language in reference to the general equation under discussion, page 251, "It is evident that that formula does not differ from the general formula of statics, given in the second section of the first part, except in the terms due to the forces which produce the acceleration of the body," etc. Also, "The same rules which we gave in the second section of the first part for the development of the general formula of statics will apply equally well to the general formula of dynamics." Our next witness is M. Poisson, who says, in his *Mecanique Analytique*, tome ii., 1833, p. 393, "As the forces lost by all the points of the system during each instant ought to equilibrate themselves continually, if one applies to these forces the principle of virtual velocities, we will obtain a general formula from which we will be able to deduce, in each case, all the equations of the movement, in the same manner that we deduce all those of equilibrium from the general equation of virtual velocities. Lagrange has thereby reduced to a uniform process the solution of all the problems of mechanics, or at least the differential equations upon which they depend." It should be particularly noticed that this author recognized the general principle of virtual velocities, and refers to the general equation of virtual velocities, and to the differential equations upon which the problems depend. Our next witness is that of Whewell, who says in his *History of the Inductive Sciences*, vol. i. p. 381, "The same formula expresses the general condition of statics and that of dynamics." This follows his remarks in regard to the labors of Lagrange.

Our next witness is that of M. Poinso, as given in the *Notes* to the third edition of Lagrange's *Mecanique Analytique*: "We know that Lagrange in his celebrated work called the *Mecanique Analytique* has had as an object the reducing of mechanics to general formulae, all drawn from the single principle of virtual velocities, or rather from the differential formula which is the expression of that principle." This was written before some faint color was detected in Bartlett's process, or even before his first edition was printed. Here, too, we find that the general formula is that which expresses the principle of virtual velocities. Had I been accused of copying from this writer, it would have been no more preposterous than the accusation which has been made. By the side of the statement of this eminent French mathematician, how do the expressions of "R." sound, "Nor was any such equation discussed," etc., "Nor did the author of that masterpiece of analysis propose or attempt to base the science on any single formula," "Prof. Bartlett was the first," etc.? The last witness is Prof.

Bartlett, prior to 1874. In the edition bearing date 1860, page 55, we find that the process is almost identical with that of Lagrange, even to the substitution in "Equation (29)" of the forces which produce the accelerations. If the color is faint, it is just as bright as in Lagrange's method. If Lagrange used D'Alembert's principle, then Bartlett did, but neither mentions it in his analysis of this equation. The equation thus deduced by Bartlett is declared to be "identical with formula (A)."

The third point is, Did he discuss his general equation? Our critic says, "No such equation was there given or discussed as a general equation of mechanics." Put the emphasis on *a* and we probably have the intended meaning. This, in the light of the preceding remarks, is a mere quibble, and unworthy of serious consideration. That he had the general equation is not denied; that he considered the principle of virtual velocities as general, underlying the whole subject, is evident; that his successors recognized the differential equation as the expression of that principle is shown from their own writings; and to say that he did not discuss it is ridiculous. As I have remarked in another place, the trouble is, he did not label it. This subject is not exhausted, but I trust I have given enough to satisfy fair-minded men.

Our critic states that I have misrepresented him deliberately, and adds, "Nor have I used any language which conveys the ideas expressed by the words which he quotes." Let us see. He said, "A statical couple does not produce motion of any kind." I said, "One case in which a single couple acting upon a body will not produce rotation." He said, "The distinguishing characteristic of a central force—that its intensity is a function of the distance—is ignored." I said, "Or one author who asserts that 'the law of action of a force must be a function of the distance' in order that the force shall be central." He said, "The moment of a force measures the capacity of a body to store up work during such motion." I said, "One author who defines the 'moment of inertia of a body as the measure of the capacity of a body to store up work during such motion.'" In the language of the editor, in the use of italics Captain Raymond "certainly goes too far." But I did not intend to use his exact language, but I did intend to summarize briefly the several points of attack which I had not previously noticed, and set them off by quotation marks as topics to be discussed. I intended to state the points at issue correctly, and I believed, and still believe, that I did so. If my manner of doing it was improper, then I regret to say that I find myself in the same unfortunate condition as the critic and the editor.

To cite a single instance of "R.'s" "inaccuracy and want of clearness," take his statement in regard to the moment of inertia of a body. He says, "The other (that is, the moment of inertia of a body) measures the capacity of a body to store up work during such motion." Is this intended as a definition? Then it is incorrect. Is it intended to define the function? Then it is not clear. In the language of "R.," "Its errors are too apparent to escape the notice of any one who has a sound elementary knowledge of the subject." The measure of the work stored in a rotating body is $\frac{1}{2} I \omega^2$, in which I is the moment of inertia of the body, and ω is the angular velocity of the body. Now, to take one factor of this expression as a measure of the whole "is absurd." As well may we say that the function of a mass is the measure of a body to store up momentum during motion; or, the measure of a body to store up living force during motion. Had he said that the capacity of a body to store up work is proportional to the moment of inertia of the body, we would have agreed with him. Did Captain Raymond intend it as a definition? Then motion is a necessary part of it. Turn to the examples in Bartlett and find that the moment of inertia of a straight line is $\frac{1}{2} M a^2$, and tell us what motion is involved in that, or what is the capacity of a straight line for storing work. Or turn to page 305 of the ninth edition and find that the center of pressure on a surface equals the moment of inertia of the surface," etc., and tell us where "the capacity of the body for storing work" is applicable. Or, substitute the definition in the expression for the moment of flexure of beams, or in the expression for the moment of rupture of beams, and see if it does not make nonsense. In such expressions does it measure the capacity (of what?) to store up work, etc.? He objects to my definition of a central force, for, says he, "According to the above (that is, my) definition, all forces are central." He says, "The distinguishing characteristic of a central force—that its intensity is a function of the distance—is ignored." But according to this definition all forces whose law of action is known are central! It is, however, easy to give examples in which the intensity of the force is not a known function of the distance, and yet the force be central.

But Captain Raymond does not care to discuss these points with me. It may be the privilege of a critic to hold an author up to ridicule and shirk the responsibility of defending his positions. Those who know little of the subject will doubtless be surprised that Prof. Wood would write such a worthless book, and those who have studied the work will consider the critic as stupid for making such poor use of his privilege. No scientific work is published which has not its vulnerable points, and an author may be surprised that so many of these are overlooked and that points should be attacked which are easily defended. I will assert that I have been misrepresented, either directly or by insinuation, on every principle of my book on which I have been attacked, and that every definition to which "R." has referred will stand the test of a critical examination. I do not say that the misrepresentation has been intentional, but, throwing over it the mantle of charity, I will assume that he supposed that he was doing the public (and himself) great service, and the editor, by indorsing him, was doing me a great personal favor. But the mischief done cannot be arrested. It is an old adage that "A lie will run around the world before truth can put on its boots."

DEVOLSON WOOD.

HOBOKEN, May 30, 1877.

[The editor says, "Even in his reply, the translation of Lagrange's phrase, *chaque probleme* as 'the problem' instead of 'each problem,' is, we are satisfied, a mere oversight," etc. Not having Lagrange by me when I wrote the sentence, I copied it literally as I found it in Whewell's *History of the Inductive Sciences*. The original would not have even suggested to me the word "the" for "chaque."—W.]

SEPARATING NICKEL FROM ORES CONTAINING IRON.—Considerable difficulty having been met with in separating nickel from ores containing a large quantity of iron, the following method was adopted:—The ore was dissolved in aqua regia, the silica separated; to the filtrate ammonia was added in excess, the precipitate of oxide of iron well stirred, filtered, and washed with ammoniacal water; the iron redissolved with hydrochloric acid, reprecipitated with excess of ammonia, and treated as before. The two solutions were added together, and boiled to expel excess of ammonia; solution of potassa hydrate was then added, and the solution heated till ammonia was no longer given off, the solution filtered, the precipitate well washed with hot water, redissolved in acid and reprecipitated by potash, washed, dried, ignited, and weighed in the usual manner. Care must be taken that no copper is present during the operation. By this method better results were obtained than by the usual way.—*Chemical News*.

AMERICAN INSTITUTE OF MINING ENGINEERS.

Sixth Annual Meeting, held at Wilkes-Barre, Pa., May 22, 1877.

[OFFICIAL REPORT.]

(Concluded from page 373.)

THE EXCURSION OF THURSDAY.

The Prospect Shaft of the Lehigh Valley Company was first visited, under the guidance of Mr. Frederick Mercur, the engineer of the company. Superintendent Mitchell, of the Lehigh Valley Railroad, supplied a special train for the party. After inspecting the fine direct-acting hoisting-engines, a portion of the company, in successive installments (including several ladies), descended the shaft in cages, and penetrated some distance into the workings, observing the unusually complete precautions which are taken in this mine against fire-damp and fire. The Prospect Shaft has the reputation of being, with respect to the generation of fire-damp, the worst in the world. It is connected with another shaft at Oakwood, and each of these has a Guibal fan—the former being 20 feet and the latter 30 feet in diameter; probably the largest in the United States. Inspector Williams, on a recent test, found the Prospect fan, at sixty revolutions, to be exhausting 57,000 cubic feet of air per minute, while the Oakwood fan, at thirty-five revolutions, was exhausting 73,000 feet. This aggregate of 130,000 cubic feet of air per minute was required to prevent the accumulation of fire-damp in dangerous quantities. But sudden outbursts of the gas frequently take place nevertheless, and might give rise to serious fires. To suppress these, pipes are carried through the mine, supplied with water from the surface, there being little water in the mine; and Babcock fire-extinguishers are also used. One of the excursion parties on this occasion had opportunity to see how quickly, by these means, a sudden fire was extinguished. The Prospect Shaft is 600 feet deep, and the Oakwood Shaft 750 feet. The workings extend under the Susquehanna, and although there is little water in the mines (as is indeed often the case with very fiery mines) there is a considerable escape of gas at one point through the river itself.

The Empire mine, of the Lehigh and Wilkes-Barre Company, was next visited, but not entered. Here Mr. Charles Parrish exhibited to the members many interesting drawings illustrating the mechanical arrangements for hoisting, handling, and shipping coal. To Mr. Parrish the Institute is also indebted for a fine collation, served on the train.

The fine exposure of coal on the surface in the open cut and tunnel of the Wanamie colliery was next visited, after which the excursion was continued to Nanticoke and to the great "No. 7" breaker of the Lehigh and Wilkes-Barre Company, which was thoroughly inspected. The return to Wilkes-Barre was so far delayed by these manifold attractions that the business session appointed for the afternoon could not be held, and the final session in the evening was consequently crowded with work, so that, at last, many papers were read by title only.

THURSDAY EVENING SESSION.

The proposed amendments to the Rules, of which notice was given at the February meeting, were next discussed. (See report in *ENGINEERING AND MINING JOURNAL* of March 10, 1877.)

The amendment to Rule II., proposed by Mr. Frank Firmstone, with reference to the method of election of members, was laid over till the next annual meeting. The amendment proposed by the same to Rule V., to insert three scrutineers instead of two scrutineers, was adopted. Of the amendments proposed by Prof. Prime, the first, relating to honorary members in Rule II., was laid on the table; the second, taking out reference in Rule II. to members permanently residing in foreign countries, was laid on the table; the third, referring to foreign membership in Rule III., was laid on the table; the fourth, striking out the passage in Rule IV. with reference to the classification of the members of the Council, was adopted; the fifth, referring to vacancies in the Council in Rule IV., was indefinitely postponed.

Mr. E. B. Cox's proposed amendment to Rule IV., referring to the number of vice-presidents and managers, was withdrawn.

Mr. Drown's proposed amendment to Rule V., to substitute four for two weeks, was not adopted.

The amendment proposed by Prof. Frazer to Rule V., referring to the order of the names on the ballots, was not brought up, owing to an oversight on the part of the Secretary.

Mr. J. D. Weeks, of Pittsburg, introduced a question of privilege. He said that it had been publicly charged in the *ENGINEERING AND MINING JOURNAL* that the Council of the Institute had refused him, in his capacity of editor of the *Iron Age*, access to papers read before the Institute, owing to dishonorable conduct on his part in publishing a paper in full in the *Iron Age*, in violation of an understanding between him and the Secretary. He demanded that the subject be investigated.

The Secretary, T. M. Drown, said that the ground of the action of the Council was the representation made by him to the Council that Mr. Weeks had violated an understanding between them in publishing a paper in full in the *Iron Age*.

After discussion, the subject was referred to the Council to investigate and report at the next meeting.

The Chairman, Mr. E. C. Pechin, announced on behalf of the Council that the contract existing between the Institute and the *ENGINEERING AND MINING JOURNAL* had expired by limitation.

Mr. R. W. Raymond, on the part of the *ENGINEERING AND MINING JOURNAL*, said that, as it had been publicly charged that the Institute was run in the interest of the *JOURNAL*, the proprietors would decline to renew the arrangement for publishing the papers of the Institute, unless it was voted desirable in open meeting of the Institute. After prolonged discussion, the following resolution was adopted: That the arrangement at present existing between the Institute and the *JOURNAL* be continued, revocable by either party at three months' notice.

The chairman announced that negotiations were in progress to arrange a meeting of the Institute on Lake Superior some time in the near future. In view of these negotiations it was voted that the Council be authorized to antedate the October meeting if desirable.

General J. T. Wilder presented an invitation from the Iron, Coal, and Manufacturers' Association, in Chattanooga, Tennessee, to the Institute, to hold one of its future meetings there.

The following resolution was unanimously adopted:

Resolved, That the hearty thanks of the Institute are hereby tendered to Mr. L. C. Braistow, General Paul A. Oliver, Mr. Charles Parrish, Judge Rhone, the officers of the Lehigh & Susquehanna and the Lehigh Valley Railroads, and the local committee, Messrs. Stearns, Mercur, and Wright, for the thoughtful and generous reception of the Institute in Wilkes-Barre, and for the many courtesies which have contributed so largely to the pleasure and profit of the members during the meeting.

Prof. Persifer Frazer, Jr., showed some small cards on which he had had printed in tabular form the conversion of inches into centimeters, feet into

meters, yards into meters, and miles into kilometers, as a contribution to the effort being made to familiarize the public with the metric system, and to facilitate calculations. The cards were distributed to those members desiring them.

Prof. Frazer then read a paper on the Classification of Coals.

Mr. R. W. Raymond exhibited a specimen of the silver-bearing sandstone of Utah.

The following papers were then read by title:

The Cost of a Blast Furnace Plant in the Cleveland District of England, by P. Barnes, of New York.

The Cost of Iron Rails at one of the leading Mills in England, by P. Barnes, of New York.

The Boulder Drift—its Southern Limit, with its Relations to Mining Operations, by Prof. G. H. Cook, State Geologist of New Jersey.

Fire Clays of New Jersey, by Prof. J. C. Smock, Assistant State Geologist of New Jersey.

Hydraulic Mining in California, by A. J. Bowie, Jr., of San Francisco.

Iron Works and the Manufacture of Iron in Mexico, by J. P. Carson, of New York.

The Action of Small Spheres of Solids in Ascending Currents of Fluids and in Fluids at Rest, by J. C. Bartlett, of Cambridge, Mass.

The Mechanical Work performed in Heating the Blast, by Prof. B. W. Frazier, of Bethlehem, Pa.

The meeting was then declared adjourned.

THE PROPERTIES OF IRON ALLOYED WITH OTHER METALS.*

By G. H. Billings, Norway Iron Works, Boston, Mass.

There exists an unconfirmed opinion among many iron masters that the combination of a small quantity of manganese, chromium, titanium, tungsten, aluminium, nickel, and some of the metalloids with iron has a beneficial effect upon the quality. And the impression prevails in some localities that the excellence of steel greatly depends upon the influence of some of these elements. But as the recorded experiments are so meagerly described, and made under such various conditions, the student in search of information upon the subject is somewhat bewildered by the contradiction of the opinions expressed. Observing some interesting phenomena while experimenting with an alloy of iron, copper, and nickel, I was led to determine the effect of some of the metals upon iron as free from contamination by other elements as it is possible to procure in practice, in order that the result of an alloy of an individual metal with iron might be more closely studied, for it is almost an impossibility to determine the influence of a small amount of one element upon a metal combined with a large amount of another, and the mere presence of another sometimes makes this difficult. And as most of the experiments recorded upon this subject have been made with iron containing sufficient carbon and other elements to interfere with the effect of that metal the influence of which it was desired to observe, I have endeavored to avoid these sources of error as far as practicable. In determining the specific gravity of the alloys in these experiments, I considered it essential to saw out pieces from the ingots, so that the specific gravity of the samples might be obtained in the condition the molecules assumed while cooling down from fusion. This was done because no just comparisons can be deduced when the normal relations of the molecules have been disturbed. After many trials with iron alloyed with a single metal and containing a minimum of carbon, I increased the amount of the latter element to the highest degree consistent with the alloy undergoing the same treatment as when the carbon was at minimum.

IRON AND NICKEL.

Liebig states that some of the alloys of nickel and iron which he examined had the appearance of genuine Damascus steel, receiving readily a beautiful damask, and according to M. Bergman nickel readily unites with iron in all proportions, producing a soft and tenacious alloy. I have been unable to produce an alloy of these two metals exhibiting evidence of damask by any of the treatments employed to produce it, even in iron containing as much as eight per centum of nickel, but found, as M. Bergman had, that a perfect combination resulted in every instance. In these experiments I employed a homogeneous iron, containing but a trace of sulphur and phosphorus, no manganese, nor other metal that could be determined by treatment with hydro-sulphuric acid and sulphide of ammonium. It contained only .08 of 1 per cent. of carbon, and had a specific gravity of 7.766. I used in all the following experiments some 15 pounds of this iron, melting it in an uncovered crucible, placed upon the bank in the pure flame in a Siemens-Martin regenerative furnace. When the iron was fully melted, .08 of 1 per cent. of nickel was introduced, which caused a slight rising of the fluid metal, seeming to produce greater fluidity. After allowing the alloy to remain in the furnace some thirty minutes after the introduction of the nickel, it was poured into an iron mold, flowing freely and unaccompanied by the emission of sparks, as is characteristic of iron. When cold, the ingot was placed upon two supports across the anvil of the steam hammer, and subjected to several blows before it was broken. The appearance of the fracture was not distinguishable from that of the iron previous to melting. One piece of the ingot was turned, polished, and etched, but did not differ from the same iron unalloyed when subjected to the same treatment. Another piece was heated to a bright heat and placed under the hammer, when, after a few blows, it crumbled into fragments. Another was heated to a welding heat and hammered, forging well until the temperature fell to that of redness, when it broke into pieces at every blow of the hammer. To sum up this experiment, then, the nickel exercised no appreciable influence upon the iron at a white heat, but at a red heat it rendered it highly red-short and worthless. Analysis gave nickel .732 per cent.; carbon, .07 per cent.; specific gravity, 7.787. Several other potfuls were melted, and the same per cent. of nickel added, under the same conditions, with like results. To determine the influence an amount of carbon approximating to the amount of nickel would have upon the alloy, the fragments left from the previous experiments were melted and the amount of carbon increased by the addition of a steel high in carbon and of excellent quality, together with a small amount of nickel to equalize its percentage with the carbon. As soon as this was thoroughly melted it was poured. The ingot was then forged, at a bright-red heat, into a bar 1½ inch square, from which a piece some 4 inches long was taken, ground upon each side until good edges were obtained, when it was hardened by cooling at a red heat in a saturated solution of soda chloride. It was again ground and applied to cutting a hard chill roll. Considerable pressure was applied and a heavy chip taken, but at the fourth revolution of the roll the edge of the tool failed. The combination of carbon was here manifested by its main characteris-

* A paper read before the American Institute of Mining Engineers, at the New York meeting, February, 1877.

tic—hardness evincing a tendency to moderate the effect of the nickel by allowing the alloy to be forged at a lower temperature than when containing a minimum of carbon. Another piece of this alloy was rolled, at a bright-red heat, into a shape $\frac{1}{2}$ of an inch by $\frac{3}{8}$, cut into pieces and chamfered for welding. The heated ends were dipped into fine sand to form a fusible silicate to obtain clean surfaces. They were then raised to a high welding heat and united. A firm weld was effected, but, upon hammering the piece until a low red heat was reached, the rod fractured upon both sides of the weld. The welded portion was then bent home, over the horn of an anvil, and cracked upon all edges, showing conclusively that the bar was red-short. We see in this experiment that the increase of carbon increased the hardness and counteracted, to a certain extent, the red-shortness which the nickel caused before, since the alloy in the second case forged at a lower temperature than in the first case, in which the alloy contained less carbon. And we also see that the nature of this alloy is red-short. Analysis showed:

Carbon.....	.72	Specific gravity.....	7.758
Nickel.....	.66		

An ingot containing 6 per cent. of nickel and low in carbon was cast. When cold and fractured, it was not noticeably different from the fracture of the same iron unalloyed; and its tenacity and ductility were but slightly impaired. But at a red heat it crumbled into fragments under the hammer. The specific gravity of this alloy was 7.851.

IRON AND COPPER.

Melting a quantity of the same iron used in the foregoing experiments, 2 per cent. of copper was added, when vapor of the copper arose from the open pot to a considerable extent. After stirring, the contents were poured as in the previous experiment. When cold, the ingot was fractured, exhibiting a dull gray fracture, of close, granular appearance. All attempts to forge it were fruitless, it being so red-short that it crumbled into grains. When turned, polished, and etched, it showed homogeneity, without distinct crystalline structure, but when heated and cooled in water, a film of copper appeared upon the surface of the piece. Broken when cold, it was decidedly weak, and when heated fractured readily. Although neither the alloy of nickel and iron nor copper and iron showed a fracture greatly different from the iron unalloyed, yet when the two alloys were melted together, forming an alloy of copper, nickel, and iron, the ingot fractured much more easily, and showed large, coarse crystals, radiating from the center of the ingot, and a structure like that of spiegeleisen. It was decidedly cold-short, and although less red-short than either of the separate alloys, still it was not forgeable at any heat. When this was etched, a beautiful crystalline structure was distinctly visible.

IRON AND TIN.

M. Karsten relates some experiments he made upon this subject in Siberia. He found that 1 per cent. of tin added to iron rendered it extremely brittle when cold, but not when hot, finding that the alloy could then be readily forged, giving out during the operation white vapors, which condensed upon the anvil and hammer. "M. Hervé found that an alloy formed of 100 parts of iron and 1 part of tin presented an even fracture, slightly granular, gray in color, dull, brittle, and hard." In alloying these two metals, I used the same homogeneous iron, containing .08 of 1 per cent. of carbon, particularly free from sulphur and phosphorus, and thoroughly melting it before adding the tin; pouring the alloy, after stirring, into molds. When cold, the ingot was broken with comparative ease, showing a rather fine, bright crystalline fracture, somewhat honey-combed towards the center, the holes showing the lustre of tin. Under the glass, the crystals were indistinct, and the mass of spongy structure. When turned, polished, and etched, it showed homogeneity. Under the shears it was dry, hard, and inclined to fracture rather than cut. It was decidedly cold-short. When heated to redness and passed through rolls, it broke into fragments. At a white heat, under the hammer, it flew into particles, some of which were sufficiently fine to ignite in their passage through the air. Although this alloy contained less than 1 per cent. of tin, it was rendered by it cold-short, red-short and hot-short. Steel and tin alloyed showed the same characteristics. By analysis this alloy had tin, .73; carbon, .06; specific gravity, 7.805. Of all the metals I have alloyed with iron my experiments point to the fact that tin has the most hurtful effect. An almost insignificant quantity of tin in the absence of other metals renders iron cold-short. Having received for examination a piece of cold-short spring steel, of ordinary carbonization, which broke in punching, I discovered traces of copper and tin; and upon inquiry found that, at the manufactory, a quantity of brass and copper had been broken under a steam hammer at about the time of the manufacture of this lot of steel; and as the puddlers used the cinder from the hammer, it is probable fragments of the brass and copper found their way to the puddling furnace, and there entered into the product.

TO BE CONTINUED.

MINING IN CANADA.—ANNUAL REVIEW FOR 1876.

By Prof. Robert Bell, of the Geological Survey of Canada.

(Continued from page 376.)

PHOSPHATES.

The deposits of mineral phosphates of lime or apatite in the townships of Hull, Templeton, and Buckingham, in Ottawa County, Q., are now attracting more attention than those which have been longer known in the counties of Frontenac and Lanark. Those on the north side of the Ottawa appear to be of a more regular or persistent character, and operations have been commenced upon them in several places. Still the older localities have not been entirely neglected. The Pixley lot, number two in the 12th concession of Bedford, was purchased in June by Messrs. A. A. Humphrey and W. A. Allen, and 312 tons of apatite were afterwards mined and shipped from it, which, with 102 tons sent away by the previous owner, made 514 for the season. Messrs. Watts, Good, Humphrey, and Frazer mined and shipped from various lots in the township of Loughboro' an aggregate of 906 tons during the season 1875-76. It is believed that between 800 and 1,000 tons have been mined in this township by different parties during the winter of 1876-77; about one-third of this has been produced by Messrs. John Frazer & Co. on a lot near the Frontenac Lead Mine.

In Ottawa County the principal operations have been carried on by the Buckingham Mining Company, which is now fully organized with a capital of \$400,000. The company has opened offices in Montreal and at Buckingham village. It has under construction a steamer for towing barges on the Lievre River, and a mill for the manufacture of plumbago. During the year the company mined about 1,400 tons of phosphate, principally from the lots in concessions 7 to 12 around the east side of McGregor Lake in Templeton, and made a

first shipment of 100 tons to England. This averaged between 80 and 85 per cent. of pure phosphate. The company employed between twenty-five and thirty men at mining during 1876, and will have 100 at work during the present season. More or less mining for apatite has been done during the year by Mr. Edward Haycock, in Hull, by Mr. John G. Miller near Perkins's Mill in Templeton, and by Messrs. Clarke and Leitch near the town line between Wakefield and Hull. The researches of Mr. Vennor, of the Geological Survey, show that a great trough of crystalline limestone exists between the Lievre and Gatineau Rivers, towards the centre of which the apatite will not probably be found as abundant as along each of its sides.

The following figures, by the port-wardens of Montreal and Quebec, for which I am indebted to Mr. F. W. Henshaw, of Montreal, show the amounts of phosphates which have been shipped from these ports: From Montreal, in 1874, 916 tons; in 1875, 1,041 tons; in 1876, 2,405 tons. From Quebec: In 1873, 195 tons; in 1874, 224 tons; in 1875, nil; in 1876, 73 tons.

Apatite yielding 80 per cent. pure phosphate sells in England at present for \$28.38 per ton, and the total cost up to the moment of delivery to purchasers there is about \$15.90, leaving a profit of \$12.48 per ton.

The manufacture of soluble superphosphate from Canadian apatite has been steadily continued by Mr. Alexander Cowan at the Brockville Chemical and Superphosphate Works, but the enterprise has not yet begun to receive the encouragement which it deserves from the farmers of the Dominion. One of the principal markets has hitherto been found in Nova Scotia. Now that bread-stuffs are likely to command a high price, it is to be hoped that this valuable manure for wheat lands will be better appreciated in the Province of Ontario.

PYRITES.

Work has been continued by Mr. Cowan at the iron pyrites quarry in Elizabethtown, two or three miles from Brockville. About twenty-five men, on an average, have been employed during the year. The quarry consists of a slope, running down a distance of about 200 feet, with a height of about 30 feet, and attaining a vertical depth of about 80 feet from the surface at its extremity. The material excavated consists of a mixture of about one-third pyrites to two-thirds rock. Mr. Cowan's acid works are so situated at the quarry that the pyrites is hoisted directly from it to the burners. In addition to two sets of spacious sulphuric acid chambers, the same gentleman, in 1875, erected apparatus for the manufacture of nitric and hydrochloric acids, of both of which he has also stocks on hand.

During the year a pyrites mine was opened on the last lot in the parish of St. Jerome, in the Province of Quebec, chiefly through the enterprise of the Rev. Father Labelle. In addition to the sulphide of iron, the ore contains traces of cobalt, nickel, and silver.

A workable deposit of iron pyrites, if found in the Lake Superior region, would be of more value than one in the eastern part of the Dominion, since it would be available for the manufacture of sulphuric acid in the Western States, where both coal and salt are cheap. These three substances are at the basis of various chemical manufactures, the products of which command high prices in the West.

SLATE.

Operations have been prosecuted with vigor at the Rankin Hill Quarry, four miles east of Acton Vale in Quebec. An average of 50 or 60 men have been employed during the year, principally in opening and developing the quarry, but a quantity of slate has also been prepared for market. The quarry contains both red and green slates, which are used principally for ornamental purposes. The colors, which are bright, do not appear to be liable to fade like those of the imported varieties, and the quality of the slates is otherwise good. They obtained a medal at the Centennial Exhibition. The quarry is under the efficient management of Mr. John Stewart.

The production of the New Rockland Quarry, in the township of Melbourne, in 1876, was only about 4,000 squares, against 7,200 in 1875. The number of men employed varied between 12 and 61, and averaged about 40 for the year. The internal dimensions of the quarry are now about 350 feet in length by 130 in breadth, and from 90 to 120 (in different parts) in depth. In an article on Canadian roofing slates, written in 1863, I pointed out the prospect of obtaining a market in Europe for the excellent slates of the Melbourne band, and now the New Rockland Company have entered into a contract to furnish in England at a good price all they can make during the present year. They propose to employ about 100 men, and expect to produce between 10,000 and 15,000 squares within a year. Owing to the exertions of Mr. C. S. Drummond, the enterprising Secretary of this company, the Government were induced last year to place a duty on imported slates, which has proved a great benefit to the slate producers of this Province.

I have not been able to obtain any figures in regard to the Melbourne Quarry, but it is supposed that its production last year was about equal to that of the New Rockland Quarry.

PLUMBAGO.

This mineral has been mined during the year only in the county of Ottawa, although it occurs also in considerable quantities in Frontenac, Lanark, and Argenteuil. Mr. John G. Miller has taken out about 300 tons of disseminated plumbago on the east half of lot 13, in the 10th concession of Buckingham. The steam mill which is being erected by the Buckingham Mining Company is situated six miles west of the village of the same name. The 16-stamp mill of the old Canada Plumbago Company was burnt in 1875, during which year and 1874 it had been employed in working up the ore on hand, principally into stove-polish.

The Dominion of Canada Plumbago Company have had a 20-stamp mill at work preparing various forms of plumbago for market. On the property belonging to this company, the mineral occurs in the form of veins on the north half of lot 21, in the 7th range of Buckingham, where several shafts have been sunk, and in the form of a bed, of a less pure variety, on lot 20, in the 8th concession. The company were said to be shipping a car load a week in the month of January of the present year. The splendid display of crude and manufactured plumbago, crucibles, etc., made by this company at the Centennial Exhibition, was universally admired. I am indebted to Mr. H. G. Vennor for the above facts in regard to plumbago mining in Ottawa County.

MICA.

This mineral, which is valuable for making stove-windows, mica powders, etc., occurs almost invariably along with the phosphate of lime in North Burgess and elsewhere. A large mass of it having been discovered in Chesterfield Inlet, on the west side of Hudson's Bay, in the central part of the Dominion, it is said that an American vessel visited the spot during last summer, and brought away some fifteen tons of a very fine variety, which is reported to have been sold in New York for about \$20,000.

TO BE CONTINUED.

ROB ROY COAL MINE, COLORADO.

[WITH SUPPLEMENT.]

Staff Correspondence of the Engineering and Mining Journal.

The Rob Roy Coal Mine, an illustration of which we give in the supplement accompanying this issue, is located at Canfield, twenty miles north from Denver, and on the line of the Boulder Valley Railroad, which branches from the Denver Pacific line at Hughes.

The property embraces 160 acres of land, underlain certainly by four veins of lignite, and probably by seven, but as yet the last three have not been searched for. The formations lie nearly flat, with a slight dip towards the southwest. On the eastern edge of the property the fourth vein (which is the one worked) has been thrown up about six feet, but otherwise the deposit, so far as at present shown, is not faulted or dislocated.

The coal is generally regarded as of tertiary origin, though there is much doubt on this point, some of the best authorities considering it cretaceous. This question, however, is quite immaterial in a study of the economic value of the bed, and may be delegated wholly to the geologists who have time and opportunity to study the banks with the care they really deserve. Twelve miles east of Erie in the foot-hills of the mountains the coal measures are tilted on edge, and there show seven distinct veins of lignite, the thinnest of which is two feet in width and the thickest eleven feet. There can hardly be any doubt that the whole series occurs on the Rob Roy property, but, as stated above, the company owning the lands has sunk only to the fourth, which is reached at a depth of 130 feet from the surface.

The section given in our supplement shows the relative position and size of the four veins. The upper three are disregarded, being unworkable; the fourth has a width of seven and one-third feet, with a clay parting twenty-two inches from the top, which leaves a little over five feet of solid coal below without a break. This is known as the Rob Roy vein.

The mine is operated by a shaft, which pierces the ground about 200 feet from the northern edge of the company's line, and is 130 feet deep. It has two compartments, and in the narrow space between these is placed the steam and water columns. At the bottom is located a Knowles pump, from which pipes lead to the sump. From the bottom of the shaft a main entry leads off to the south, and from this side entries have been driven. The general plan upon which the seam is worked is shown in the accompanying supplement, and also the extent of vein worked out and in course of development. All the entries are well tracked through their entire length with iron rail. Excellent ventilation is secured by a furnace built in the vein a few feet west of the shaft. The pure air is drawn down the main working shaft and carried to every part of the mine by a very complete system of air gates (not shown in the plate), and finally passes through the furnace into the upcast.

Underground transportation is effected wholly by mules, of which the company keeps six to eight in constant use. Each animal hauls two car loads, and will bring to the shaft from 25 to 35 tons daily with ease. There is a slight but constant grade in the main entry from the shaft downward, so that all coal has to be dragged uphill as soon as the cars emerge from the side galleries. In the latter, however, the grade is reversed.

The property contains, in the one seam being worked now, about 14 million tons of workable coal of the finest quality. Of this amount about 45,000 tons have been extracted and sold, about 200,000 tons are placed in sight by the present developments, while the balance remains wholly intact. The three veins below, all of which will be found within 600 feet of the surface, will yield, it is thought, about 20 feet in thickness of workable coal, so that the total resources of the property may be reckoned at less than 5,000,000 tons, which is sufficient to supply the demand of Colorado for many years. It is probable that the veins below will be found to carry a quality of coal even superior to that of the vein now being worked, owing to their greater depth and consequent greater subjection to pressure, which circumstance has been found in the Western lignites to be an element of considerable importance in the value of this mineral.

An analysis of the Rob Roy Coal, made by Joseph Luce, chemist, in Denver, last year, gives the following results:

Water.....	12.05	Specific gravity.....	1.348
Volatile matter.....	35.13	Sulphur in pyrites.....	0.56
Fixed carbon.....	40.20	Sulphur in combination.....	0.71
Ash (light gray).....	6.62		

This analysis shows the coal to be of better quality than any produced in Colorado north of the Canon City semi-bituminous coal. The percentage of sulphur is quite small, and never large enough to cause the slightest inconvenience for stove or grate burning. Coming from the mine the coal has a bright, hard lustre, breaks into firm and solid blocks, and slakes only after long exposure to the air. Alone it will not coke, but, mixed in the proportion of 10 to 1 with Canon City or Trinidad coal, it is thought by experiments made some time since that a good coke can be produced. The actual calorific power of the coal has not yet been determined by test. It has been used, however, in comparison with Wyoming (Evanston) and Kansas (Carbondale) coal, and is preferred greatly to either for steam purposes. It has been tested also in reverberating, roasting, and smelting furnaces at the Collom Works, Golden, and has given great satisfaction.

The cost of mining the coal has been, until lately, \$1 per ton, delivered on cars at the mouth of the rooms. It is now worked at 75 cents. The cost of transportation to the shaft, hoisting, screening, and delivery on board the cars amounts to about 30 cents per ton on a monthly output of 6,000 tons; 40 cents per ton on a yield of 3,000 tons. These rates are, however, being gradually reduced by changes in the underground workings, and improved arrangements for pumping and screening. By careful management a monthly yield of 2,000 tons can be handled at 40 to 45 cents.

The mine is provided with a good hoisting engine of 24 horse-power, which will easily raise 250 tons in 12 hours. Protection against fire is secured by a large tank placed alongside the engine house, and from which, with the assistance of the pump, a stream of water can be thrown over all the surface buildings.

The coal as it comes from the mine is passed over screens of tramway iron, placed one and one-fourth arch apart, which lead directly to the cars. All passing through the screens is led over a second set, the dust eliminated, and the product, denominated mill coal, is sold for furnace purposes. At one time last year, when the West dust-burner was being operated in the smelting works at Golden and Denver, there was a considerable demand for the dust, but at present that product is used only to a moderate extent.

The product of the mine for the last eight months has amounted to nearly 20,000 tons. The use of coal for domestic and steam purposes is now universal in all towns of Colorado accessible by rail, and the demand is steadily growing. Attempts will be made this year to use it in furnace work at several of our smelt-

ing works, and, by the use of proper grates, it will probably be found to be much more economical than wood, which is rapidly becoming scarce in all the older mining towns. Compared with other northern Colorado lignites, the mineral from the Rob Roy bank shows so much superiority that it has gained a very favorable standing with consumers. This is partly due to the actual superiority of the coal, chemically considered, and partly to the great care taken by the company to exclude slate from their produce. The coal, therefore, has the reputation of being unusually free from clinker and unusually clean. In its management and operation, the mine is a credit to so young a State as Colorado.

The extension of our mountain railroad system is doing much to increase the coal trade. The Rob Roy Mine is directly connected with the Colorado Central Railroad, and by the rich mining sections of Gilpin and Clear Creek counties. The former camp is now using alone about 800 tons per month, and as the south fork of the road is pushed up towards Idaho and Georgetown, now being done, a new and equally large field will be opened. There is also a growing trade in Central and Western Kansas, which will ultimately be controlled by Colorado mines, for the quality of the fuel is much superior. A glance at a map of Eastern Colorado will show how central is the position of Erie as regards the northern half of the State, and how large the market will become as the fertile valleys on the edge of the plains fill up, and railroads push their way up the broader of the mountain gorges to the mining camps along the range.

THE NEW IRON DISTRICT IN SOUTHERN OHIO.

By William Kent, M. E.

(Concluded from page 377.)

BLAST FURNACES.

There are four furnaces now in blast in this region; the XX and the Fanny furnaces at Shawnee, the Baird Furnace, about 3 miles from Shawnee, and the Thomas Furnace, at Gore, on the Straitsville branch of the Hocking Valley Railroad, 9 miles from Logan. The following table relating to these four furnaces has been published by Isaac B. Riley, C. E., of Newark, O.:

	Baird.	Fanny.	Thomas I. Co.	XX.
Height of stack.....	44 feet.	48 feet.	47 feet.	50 feet.
Size of top.....	5 feet 6 in.	6 feet.	6 feet 9 in.	7 feet 6 in.
Size of hearth.....	5 feet.	5 feet.	5 feet 6 in.	5 feet.
Size of bosh.....	17 feet 8 in.	12 feet.	12 feet 6 in.	13 feet 6 in.
Batter of bosh.....	3½ in. to 1 ft.	3½ in. to 1 ft.	3½ in. to 1 ft.	3½ in. to 1 ft.
Number of tuyeres.....	4	6	4	8
Size of tuyere nozzles.....	4 inches.	3½ inches.	3½ inches.	3 inches.
Daily product (February, 1877).....	13	14	19	21
Date of blowing in.....	October, 1875.	Sept. 15, 1876.	Dec. 8, 1876.	Jan. 17, 1877.

Some additional particulars relating to the Fanny and XX furnaces, obtained by the writer, are here given.

XX Furnace.—Closed top. Diameter of bell, 4 feet. Six boilers, plain cylindrical, each 54 feet long, 42 inches diameter. Four of these are in use, and two kept in reserve. Two ovens, similar to Player's, 27 U pipes each. Temperature of blast, 600° to 800°. Engine, by Columbus Machine Company, vertical, non-condensing. Steam cylinder, 37 inches; air do., 74 inches, 4 feet stroke. Revolutions per minute, 24 to 30. Steam pressure, 60 pounds. Air do., 4½ to 5 pounds. Cast house, 50 x 100 feet, supported on iron pillars, corrugated iron roof. Stock house, 40 x 100 feet, of wood, with stock cellar, walled with stone, 11 feet deep. Steam hoist, by Crane Bros. Present product, 130 to 140 tons per week. Grade varies from No. 1 Foundry to No. 1 Mill. The cost of this furnace, according to a published letter of the President of the Company, Mr. T. J. Davis, was \$53,792.25, exclusive of railroad tracks and excavations.

Fanny Furnace (No. 1).—Five boilers, plain cylindrical, each 40 feet long, 40 inches diameter; of which two are kept in reserve. Engine similar to that at XX Furnace, 4 feet stroke. Air cylinder, 72 inches; steam do., 24 inches. Steam pressure, 60 pounds; air do., varies from 2 to 5 pounds. Revolutions per minute, 25 to 30. Ovens and hoist like those at XX Furnace. Temperature of blast, about 700°. Product, 90 tons per week, chiefly No. 1 Foundry.

This furnace was formerly located at Newark, O., where for a time it used the coal and ore from the Shawnee district, and on their being found suitable for iron making, it was removed and erected in its present place.

Fanny Furnace, No. 2, is now being built alongside of No. 1. Size 13 by 48 feet. Engine by Weimer Machine Co., of Lebanon, Pa., a high speed engine, similar to the one exhibited by that firm at the Centennial; 3 feet stroke, said to be guaranteed to furnish 10,000 cubic feet of air per minute. This furnace is also to have one of Weimer's new ovens, with suspended cast iron pipes. The furnace will probably go in blast in August.

These furnaces use the ore of the Shawnee vein, above described. About two tons of calcined ore are required to produce a ton of iron. The coal is obtained from the hills above the furnaces, and is used in the raw state. From 3 to 3½ tons are required per ton of iron. The XX Furnace just commenced, on the last day of the writer's visit, to use one-fourth coke, made from the coal of the bottom of the Great Seam. The limestone is also obtained from the hills above the furnaces, from ¾ to 1 ton being used per ton of iron.

The furnace at Gore is at present using one-sixth Lake Superior ores, mixed with the native ores, with good results. The native ore used at this furnace is chiefly limonite, obtained by stripping, as it lies under only five feet of cover. It is now being used in the raw state.

The following estimate of the cost of making a ton of pig iron was obtained at one of these works:

Ore, 2½ tons raw at.....	\$1 75	\$4 38
Coal, 3 " ".....	75	2 25
Limestone, ½ ton ".....	70	0 61
Labor.....		2 47

Total, exclusive of superintendence, interest, repairs, etc.....	9 71
These are estimated by the writer at.....	2 10

Making a total of..... \$11 81

The writer, however, considers this as the minimum cost, that is, the cost when everything is working smoothly and the best quality of ore is used. The following revised estimate is believed to be more reliable, as a rather high average:

Ore, 3 tons raw at.....	\$2 00	\$6 00
Coal, 3½ " ".....	75	2 44
Limestone, ½ ton ".....	1 00	87
Labor.....		2 47
Superintendence, interest, repairs, etc.....		2 10

Total..... \$13 88

analysis No. 23 is of the magnetic ore. A very fine looking specimen of specular ore from Marble Mountain, in Warren County, was exhibited. These ores are found in the crystalline limestone overlying the Potsdam sandstone.

In the same country considerable quantities of limonite ore have been worked, which deposits are similar to those in the adjoining portions of Eastern Pennsylvania. Specimens of this ore from Thatcher's Mine were shown. Arenaceous limonites from the adjoining county of Hunterton were shown. The bog iron ores, which at one time, from their position with reference to charcoal districts, were largely used in Southern New Jersey, are now not worked to any extent. But one specimen of this kind of ore was shown, it being from Jacksonville, in Middlesex County.

CORRESPONDENCE.

KATAHDIN, MAINE, IRON ORES.

TO THE EDITOR: SIR—An account of our ore deposit in your issue of May 5 makes ours a "bog ore which is found at the bottom of a pond." Some of your readers have thought our deposit peculiar enough to warrant a brief description, and the error in the above account seems to afford an opportunity for it.

The rocks in the vicinity of the Katahdin Iron Works are mainly mica schists and clay slates. A body of syenitic rocks seems to be thrown up, with a trend northwest to southeast, among the schists. This syenite is filled with a magnetic pyrites, not in crystals, but intermixed in scales like mica.

Our ore is of two kinds. One is a precipitate of iron that has been in solution in water of mineral springs coming up through this formation, and deposited on the surface of the mountain side to a depth of from two to ten feet. This ore is intermixed with leaves and twigs changed to ore, and incloses often pieces of charcoal, acorns, beechnuts, and oak leaves, though no oaks are found in the neighborhood at present. Frequent analyses of this ore have been made, varying slightly from this one by I. B. Britton:

Protoxide of iron.....	75.95	Sulphuric acid.....	.69
Alumina.....	.07	Water and organic matter.....	22.34
Lime.....	.16	Metallic iron.....	53.24
Silica.....	.17	Phosphorus.....	0.66
Phosphoric acid.....	.14		

The sulphur, being mainly present as SO₂, readily passes off in roasting. The other, or New Bed ore, is formed from the above described pyritiferous ledge, and is made *in situ* by the action of air, frost, and water. This change takes place in an incredibly short space of time. Pieces of the ledge, when blasted out hard and with a metallic ring, on exposure to air oxidize so rapidly as frequently to generate smoke and form a crust of sulphite of iron a quarter of an inch in thickness in a few months. A fair sample analysis of this ore is the following:

Peroxide of iron.....	71.05	Phosphoric acid.....	.046
Alumina.....	1.82	Sulphuric acid.....	1.02
Lime.....	1.63	Water.....	16.12
Silica.....	8.65	Iron.....	49.74

All the ore is very light and porous, and breaks up when roasted. The surface ore contains but a small amount of sulphur, the little there is passing off in the furnace, so that the iron made from it shows only a "trace." Owing, probably, to the vegetable matter inclosed, this ore contains from 0.06 to 0.14 phosphoric acid, and yields iron with .06 to 0.13 phosphorus. The ledge ore contains no woody matter, and shows a very small amount, 0.02 to 0.03, of phosphorus in the ore, and 0.04 to 0.06 in the iron. The ledge ore, however, contains more sulphur. To remove this a kiln has been built for roasting the ore with gas, and injecting a jet of steam into the kiln during the process. A sample of No. 14, very open and soft, gave

Silicon.....	3.68
Sulphur.....	0.33
Phosphorus.....	0.67

Owing, perhaps, to the peculiar physical property of the ore and the intimate admixture of the silica with it, the resulting iron shows an unusually large percentage of silicon, the removal of which seems to defy the ordinary methods of fluxing. Some experiments made for reducing silicon in the pig may be of interest enough to warrant a brief description at another time.

O. W. DAVIS, JR.

OFFICE OF KATAHDIN IRON COMPANY, BANGOR, ME., May, 1877.

NOTE ON THE MANUFACTURE OF FERRO-MANGANESE IN THE BLAST FURNACE.*

By F. Valton, Paris, France.

In the April 7th number of the ENGINEERING AND MINING JOURNAL, Mr. W. P. Ward, of Cartersville, Georgia, explains in a very interesting manner the results he obtained in the manufacture of ferro-manganese in the blast furnace. These results may be summed up as follows:

Production in the blast furnace of an alloy containing 67.2 per cent. of manganese and 3 per cent. of carbon at most.

Utilization of the manganese amounting to 58 per cent.

With the exception of the indicated proportion of carbon, which should be almost doubled to express the true state of facts, we would have had no observations to make on Mr. Ward's paper had he taken into account the results obtained in the same line in other centers of production.

Before 1870 spiegel with 8 or 10 per cent. Mn only was known among blast furnace products. In a journey to Sweden, in 1871, I ascertained that the Schysshytta Works manufactured regularly a spiegel with 18 per cent. manganese. Later, at the Vienna Exhibition, in 1873, the Lava and Jauerburg Works in Carniola, presented to the jury a ferro-manganese obtained in the blast furnace having 33 per cent. of Mn. I say ferro-manganese purposely, because above 25 per cent. this alloy should change its name; the properties of iron are then so much concealed that the magnet has no longer any power. These works have improved their manufacture and reached 45 per cent.

About 1875, several French works tried the manufacture of ferro-manganese in the blast furnace, and fully succeeded. It must not be forgotten that at the Philadelphia Exhibition there was some 60 per cent. blast furnace ferro-manganese made by the St. Louis Works of Marseilles. The Terrenoire Company had even sent an alloy with 75 per cent. of Mn made in the same way. We will add that in this last case the utilization of the Mn employed amounted to 70 per cent. in a product made regularly and truly commercially.

* Read before the American Institute of Mining Engineers, at the Wilkes-Barre meeting, May, 1877.

PRESSURE AND VELOCITY OF WIND.

TO THE EDITOR: SIR—Mr. Francis E. Galloupe, S. B., in a portion of his excellent paper on the development and practice of modern American locomotive engineering, published in the Journal of the Franklin Institute for June, 1877, page 391, says: "The formula employed by the United States Signal Service, by which to calculate the pressure of the wind from its velocity, is one used by Colonel Henry James, R. E., F. R. S., and derived from a meteorological paper of the British Board of Trade, in which the pressure per square foot $P = v^2 \times .005$." He adds: "See also a table calculated by same formula in Alexander Buchan's *Handy Book of Meteorology and Loomis's Meteorology*."

It is evident that the pressure depends upon both the velocity and the density of the air; and that this density depends upon the temperature, the barometric pressure, and the pressure due to the motion of the air. The latter considerations affecting the density are, however, not taken into account in the above formula. It was conclusively shown by the writer, in a paper entitled "A Dissertation on the Theory and Practice of Windmills," which appeared in the ENGINEERING AND MINING JOURNAL of September 23, 1876, that a variation in temperature alone from 0° F. to 100° F. produces a difference in the amount of pressure for a given velocity of wind of over one-fifth the total amount. In the same paper a formula was established, embracing the above-mentioned considerations, which was verified by experiment. A comprehensive table was also constructed based on this formula.

Now, although at the present time, for several plausible reasons, it is deemed expedient by the United States Signal Service to employ the above formula, it will be readily understood that it is inadmissible for engineers, in making accurate calculations of the motive power of air and the resistance of air, to ignore the fact that the pressure depends in so important a degree upon temperature and barometric pressure, as well as upon the velocity of the wind.

Very respectfully,

ALFRED R. WOLFF.

No. 7 WARREN STREET, NEW YORK, June 2, 1877.

GOLD IN SCHEELITE.

TO THE EDITOR: SIR—In your issue of April 28, I notice a letter from Mr. B. Silliman, speaking of the occurrence of scheelite as a gangue for gold, and which he appears to believe is the first notice of the occurrence of that association. I would, however, say that the same mineral occurs with gold in the Italian Alps, at the Val Toppa Mine, in the Val d'Ossola, near Piedimulera, and is there known by the miners under the name of marmor rossa (red marble), from its reddish color and marble-like appearance. In either 1869 or 1870, I believe, Dr. Le Neve Foster read a paper before the Miners' Association of Cornwall and Devon on the occurrence of scheelite at the Val Toppa Mine.

Yours truly,

GEORGETOWNS, COLO., May 5, 1877.

ERNEST LE NEVE FOSTER.

MINING NEWS.

Staff Correspondence of the Engineering and Mining Journal.

COLORADO.

THE KEYSTONE MINE.—In a notice of the Keystone Mine, which appeared in our issue of the 19th ult., it was stated that the lode was yielding ore worth \$100 per ton. The figure should have been \$1,000, and the mistake was one of the printer. It is well known that this never yields ore of very high grade, and within the last 60 days has been doing especially well.

The continuous snows of April and May have greatly impeded mining outside of the larger concerns, but the general outlook is favorable for a largely increased product for the year. This is especially the case in the numerous silver districts owing to the establishment of new reduction works and ore markets.

The express office reports for four months ending May 1, 1876, show Gilpin County's production of gold and silver to have been \$924,000, currency value. Of this sum \$411,000 came from the stamp-mills, and the remainder from the Boston and Colorado smelting works. The latter produced \$294,000 in silver (mainly from ore of other counties), and \$179,000 in gold. Some \$30,000 worth of ore went to the Golden Smelting Company. The actual amount that should be credited to the mines of Gilpin County is about \$630,000, an increase over the corresponding months of 1876.

The Bobtail, Gregory, Gunnell, and Kansas continue to be the leading producers of the county. Their yield is about the same as last year. Their greatest depths are respectively 700, 860, 700, and 775 feet.

Important movements are being made in the way of reopening and working a large number of idle but once rich and productive mines. The cost of putting these in working condition, freeing them from water, and, in some cases, sinking until "pay" is reached, will be considerable. But there is a prospect of more of this class of deep mines being taken hold of this year than in any previous season. Work began on the two most important properties on the Gardner not long ago, and will undoubtedly be resumed on the California and Roderick Dhu, which are on the same vein. The Illinois will be worked in conjunction with the latter. The Alps will soon be worked again. These lodes have each produced, with one exception, over half a million and are from 450 feet to 740 feet deep. The Missouri is paying well, and the Sudeberg will probably be worked soon. The Kent County, also on Quartz Hill above the Kansas and California, keeps 37 stamps at work with a yield of 800 tons and \$20,000 monthly. A splendid body of ore has been opened west. The mine is 550 feet deep.

A great deal of work is going on in lodes and localities that have been idle for years. Some of these lodes are "relocations" under the Congressional law, and with the others spoken of were never worked to any great extent. Some of these are proving to be valuable veins and may yet take rank with the first. The Maryland is the most productive of these. It had been idle for 15 years. At some outlay of capital the Buell, Flack, Forks, and Bates that have produced so many hundred thousand dollars could be developed into "pay" and rendered as profitable as ever. In fact, they have never run fairly out of paying veins.

An advantage now appreciated here is the greatly reduced expenses of mining and milling, and the superior character of the work done and returns received. The following will show what is being done in a quiet way by New York men and capital—the result of one individual firm's exertions. Outside of the value of the mines reopened, their uniform success is due to good management and capable miners in charge.

The Monmouth-Kansas shaft is 775 feet deep, and, like the Ophir-Burroughs, will eventually reach a depth of 1,000 feet. The ore deposits are of great extent. The vein has an average width of 3½ feet, but has exceeded 7. The mill ore returns from \$15 to \$20 per ton, and there are several localities showing from 12 to 18 inches of rich smelting ore. The 52-stamp mill over the mine has not been fully occupied for some months, but will be now that sufficient ore has been uncovered to insure a supply. The next level will be commenced at a depth of 825 feet. This part of the Kansas has produced over \$300,000 in three years, a large part of which was profit.

A half mile further east on the same vein is what is known as the English-Kansas, now owned by Medcalf & Fagan of New York. The water is being removed, and a body of ore already uncovered pays current expenses. When the mine is in complete shape for work the 24-stamp mill near by, lately purchased for the purpose, will be set in motion. The ore is very valuable. In nineteen months of 1871-2 over \$91,000 was obtained from this property, \$28,000 of which were the net receipts of smelting ore.

The ore vein of the Gannell and Grand Army is still strong and good. The yield has been large notwithstanding the delays and trouble caused by an excess of water and the putting in of pumps and machinery. The Grand Army is about to pass into the hands of German capitalists. In twenty-five months to February, 1877, the above-named properties gave a return of \$318,608, or an actual yield of \$350,000.

The Rialto is the same lode for which the large and extremely expensive Cook & Kimball mill was built years ago. As usual at that time, it was thought necessary to expend all funds that were procurable in building a process mill before opening the vein to test its value. The company soon broke up, and Cook & Kimball left the country. The latter afterwards became famous as the right-hand man of Governor Bullock in Georgia. The recent discoveries made on this lode show another instance of valuable property neglected and thrown away by badly managed companies. It has been operated for some time by James C. Fagan, and shows fine bodies of ore wherever opened, with a width of from four to eight feet and a mill yield of from \$10 to \$20 per ton. The selected ore sells for high figures at the smelting works. The best body of ore is found in a tunnel run along the vein. The size and value of this vein and the handsome profits realized show it to be among the best properties of the county.

Several sales of property have recently been made here. Among them was that of the Comstock, a late discovery, which, after having been opened from the surface to a depth of 100 feet, had yielded \$30,500 with a profit of over 50 per cent.

The number of mill stamps in operation during the past winter has usually been about 500, sometimes more. There are now 575 stamps at work located in 18 mills, crushing 450 tons of ore daily. Probably 670 stamps will be in motion in June and more thereafter. The season has been a very backward one. These, with the smelting works with 50 tons daily capacity and the concentrating works of from 33 to 70 tons capacity for dressing, constitute the facilities for handling ore in Gilpin County that are now in operation. A Tooele concentrator from Nevada has just been introduced into the Winnebago mill.

CALIFORNIA.

We glean the following from our exchanges published near the respective mines:

The Zacatera Gold Mine is situated at West Point, Calaveras County, Cal. A ten-stamp mill is being constructed, and will be completed in a few days. This mine has not been prospected sufficiently to determine its value. Plenty of good rock has been extracted, and there is plenty more in sight. The custom work around West Point is ample to justify the putting up of the mill. The quartz of this locality is much softer than any met with on the Amador vein. With ten stamps it is calculated to crush about 40 tons per day.

The Allison Ranch Gold Mine is about 475 feet on the incline, which is a vertical depth on the lode of about 340 feet. Out of this small opening somewhere between \$2,300,000 and \$2,400,000 in gold was taken. The mine has scarcely been scratched in the way of prospecting. No movements are being made looking to the resumption of work on this mine.

The Pittsburg Gold Mine is located between Grass Valley and Nevada City, Cal. The mine is looking very well, the quartz averaging \$40 per ton. The Company is putting in a drill on the 700-foot level, and will soon have everything ready for extensive work.

The Virginia Gold Mine is located at Arastraville, Tuolumne County, California. The vein in this mine is 14 inches wide, and enlarging; pays for milling from \$23 to \$50 per ton, containing largely galena sulphurets, which assay from \$300 to \$500 per ton. In sinking south, struck a chute which assays \$23 per ton; now going north toward the old shaft and value of ore increasing.

The Yuba River Gold Mining Company operating at Park's Bar, in the Pioneer River, California, is getting along nicely now. Some delays were encountered by a belt of hard rock which came in near the bottom of the incline and continued for some distance into the drift; the latter is now in a distance of 65 feet, and the ground permits an advance of about 4 feet a day. The water is decreasing, none coming in where they are, which must be well out under the river, and it now seems most certain that the plan of drifting into the rich gravel of those river-beds which have been covered deeply by the tailings of quartz and hydraulic mines for the past 20 years is entirely feasible. The property of this company consists of 155 acres of the Yuba River, at the point known in early days as Ousley's Bar, and which is well known to have been extremely productive of gold from the banks of the stream, but the bed-rock of the river was reached in only one or two places.

MONTANA.

The *Miner* says that the Sloss and Barker Mines have been working continuously all winter, but that the spring freshets have temporarily stopped work. This is in Silver Lake district. The ore found is said to be of very good grade. It is treated in an arastra. There is a great abundance of water for placer purposes around Silver Bow and Rucker. The ditches are full to the rim, and on the range the snow is lying deep and melting slowly. This district will probably produce considerable gold this year.

The company owning the smelter at Clark's Fork, in Montana, have determined to complete their mill this season, and to commence the reduction of ores. A number of owners of mines in that locality will immediately begin opening their property, and if the smelter reduces successfully, the district will rapidly spring into life. The Clark's Fork Mines are mainly of argentiferous galena. The deposits are of great size, and no doubt will become very valuable.

The Montana Company, who have succeeded well with their Krom Concentration Works at Jefferson, are contemplating the erection of another mill of a similar pattern. The location will probably be in Butte.

The new superintendent of the Hope Mine, at Phillipsburg, has arrived, and active work on the property will be resumed immediately. This is good news from Phillipsburg.

From the Diamond city paper, *Confederate Gulch*, we glean the following items: King & Co. are ground sluicing below the mouth of Boulder. Two parties are prospecting for the deep channel on Spruce Bar. Water was turned into the Boulder Ditch on May 21st. A little Grant has been set up at Diamond Bar, and is now washing the deep bank. The Pine Tree lode is reported to be looking well. The Duck Creek mill is running about 7 tons of ore daily, from which it is saving \$20 to \$25 per ton.

The same paper speaks as follows of the rich veins at the head of Montana

gulch: The time has at length come when our people begin to feel the necessity of developing the rich belt of quartz leads known to exist at the head of Montana gulch. Once the fame of this district filled the whole land. Rich leads were found, men made wages from the rock with a hand mortar, rich deposits, or rather pockets, were found. Eight or ten thousand dollars was taken from one of these. Every foot of the mountain was claimed, and the lucky owner considered himself a millionaire, but the leads gradually fell into the hands of capitalists, who have only done enough work on any to acquire a title, and are making no effort to develop their wealth.

NEVADA.

RICH DISCOVERY IN THE RICHMOND (NEV.) SILVER MINE.—We congratulate our citizens on the outlook. Both of our great mining companies are to resume active operations within the next two weeks. This is to take place no matter what may be the delays attending the hearing of the pending suit. Both of the companies now have an ample supply of ore outside of the disputed territory. The Richmond has lately developed one of the finest and most extensive ore bodies ever brought to light in the grand old mountain. After the granting of the injunction in February, Superintendent Rickard and Foreman Potts turned their attention to the unexplored ground in the northwestern portion of the mine. The prospects were promising, and they prosecuted the work vigorously. Finally their efforts were rewarded with success, and to-day the Richmond is more valuable than ever before in its history. The new discovery is immensely rich in both silver and lead—richer by far than anything the mine has hitherto produced. The body is also known to be of great extent. It has been pierced and cross-cut for a distance of 80 feet in solid high grade ore, and the end is not yet. Undoubtedly it is one of the most important discoveries that has ever been made in Eastern Nevada, and important to the town of Eureka almost beyond measure. The Richmond furnaces are thus enabled to resume operations at once with a certainty of continuing to run up to their full capacity for an indefinite period, regardless of the issue of the law suit. And now it only remains to be said, in this connection, that the furnaces will start immediately after the first of the coming month. As regards the Eureka Consolidated, every preparation is being made for an early start, certainly within ten days or two weeks. The development on the 5th level, recently noted in these columns, is turning out so magnificently that Superintendent Donnelly entertains no fears about an abundance of ore in the future, so it is an assured fact that the Consolidated is to be fired up for a long and profitable run. In addition to this Superintendent Shaw, of the Jackson, designs making a heavy run of the rich carbonates from the lower levels of his mine. He will supply one of the Consolidated furnaces just as soon as the works get under headway once more. It is thus shown that the prospects are most flattering for all the furnaces in the district to be in full blast within a very short time, with plenty of ore in sight to keep them moving uninterruptedly for the remainder of the season.—*Eureka Sentinel*.

The San Francisco *Bulletin* of the 28th ult. says:—"The case of the Eureka Consolidated Mining Company against the Richmond Silver Mining Company is set for trial in the United States Circuit Court for Monday, June 4. This is an action in ejectment arising from disputed boundary lines. It was brought in the federal courts of the State of Nevada, and transferred for trial to this circuit for the convenience of Justice Field of the Supreme Court, who will sit in the case with Judge Hillyer of Nevada. A trial was had in Eureka on a similar complaint last February, and the defendant was granted a nonsuit on the ground that the wrong parties had been named as defendants in the action. The value of the property involved in the suit is roughly estimated at \$2,500,000. For the purpose of elucidating the question, a model of the two claims constructed of glass has been set up in the court-room. This model is some six feet in length by four in width and three feet in height. It is composed of horizontal plates, upon which are marked in dark colors the levels, drifts, etc., and vertical plates showing the tunnels, shafts, etc. The ore body followed down by the main incline is designated by red coloring, running down to the eighth level of the Richmond shaft, a depth of nine hundred feet. The apex of the hill is fashioned by rounded plates set on edge. The model is very ingeniously arranged for delineating the works of the respective companies."

MICHIGAN.

LAKE SUPERIOR IRON ORE SHIPMENTS.—The following table exhibits the shipments from the port of Marquette for the season, up to and including Wednesday, May 30:

IRON ORE.			
Name of Mine.	Gross Tons.	Name of Mine.	Gross Tons.
Republic.....	21,245	Humboldt.....	2,992
Cleveland.....	15,293	New York.....	741
Lake Superior.....	10,669	Champion.....	7,172
Edwards.....	2,102	McComber.....	883
Rolling Mill.....	3,546		
Carp River Quartz.....	390	Total.....	65,033

PIG IRON.	
Name of Furnace.	Gross Tons.
Pioneer.....	102
Carp River.....	37
Rolling Mill.....	1,880
Total.....	2,019

The following table exhibits the shipments from the port of L'Anse for the season, up to and including Wednesday, May 30:

IRON ORE.	
Name of Mine.	Gross Tons.
Michiganme.....	972
Keystone.....	399
Total.....	1,371

The following table shows the ore shipments from Escanaba up to and including Thursday, May 31:

Jackson.....	11,830	Lake Superior.....	1,947
South Jackson.....	1,025	Rolling Mill.....	1,576
New York.....	5,964	Winthrop.....	1,189
Angeline (hard).....	3,283	Cambria.....	1,235
Angeline (hematite).....	268	Goodrich.....	503
Barnum.....	4,889	Cleveland.....	215
Saginaw.....	9,621		
Salisbury.....	4,672	Total.....	49,207
Michiganme.....	990		

—Marquette Mining Journal.

Freight.—Charters have recently been made as follows:

L'Anse to Cleveland and Ashtabula, O.....	\$1 30 to \$1 35
Marquette to Cleveland and Ashtabula.....	1 30 to 1 35
Escanaba to Cleveland and Ashtabula.....	0 80 to 0 85

LABOR NOTES.

BURNING OF THE PITTSBURG STEEL CASTING Co.'s WORKS.—These works were destroyed on the 2d inst. by a fire originating from a gas furnace. Loss, \$75,000.

The Northern Central and the Baltimore & Potomac Railroad companies have reduced the wages of their employes 10 per cent.

At Armstrong's Station, on the Connellsville Railroad, the miners are on strike against a reduction from 3c. to 2½c. per bushel for mining coal.

The coal miners at Mercer, Pa., are on a strike against a reduction of wages to 70c. per ton for mining coal. Day men are offered \$1.60 and \$1.70 per day.

CHINESE AS COAL MINERS.—The Chinamen employed at the Ione, Nevada, coal mines are paid \$10 per month for mining coal, from which they pay their own living expenses.

REDUCTION OF WAGES IN THE CAMDEN, N. J., WATER WORKS.—The Water Commissioners of Camden have established the rate of wages for laborers employed in that department at \$1.50 per day.

The Coal Miners at Snoddy's Mills, Fountain County, Indiana, are out on strike against a reduction of twenty cents per ton for mining coal. A number of colored men have been appointed to fill the places of the striking miners.

PENNSYLVANIA CONVICT LABOR.—A committee has been appointed by the Pennsylvania State Legislature to investigate the contract convict labor system in the State penitentiaries, and make penal institutions self-sustaining and productive of revenue.

PHOSPHATE OF LIME IN CANADA.—New deposits of phosphate of lime continue to be discovered in the townships of Hull and Templeton on the Ottawa. Several sales of mining rights have been effected upon a royalty, as a rule, of \$1.50 to \$2 per ton.

The 10 per cent. reduction ordered by the Pennsylvania Railroad Company has caused considerable complaint among the laborers employed at the company's piers in this city. A number refused to work at the reduction, but their places were readily filled. The wages formerly paid was \$1.80 and \$1.50 per day respectively, the rates now given are 17 cents and 14 cents per hour.

STRIKE OF COAL MINERS AT STONEBORO', PA.—It is believed that the strike will become general in this district. The colliers employed at the mines of Cunningham & Co. were compelled to leave the collieries and join in the strike. The strikers have intimidated all the miners in the region from the works. Much Molly Maguirism has been indulged in, and the coal companies are instituting measures to protect their property from threatened outrages. Between 2,000 and 3,000 men are out on the strike, they demanding an advance of 15 cents per ton.

PUDDLERS' WAGES.—The agreement regulating the compensation of puddlers and others engaged in the iron manufactories expired on the 5th inst. It is understood that the manufacturers as an associated body will not pay the rates for "puddling" that have ruled for the past year, but will make a reduction. What percentage will be deducted from the puddlers' wages is not known, but that a reduction will be made is certain. If the employes accept the new schedule of wages, the iron establishments will continue running until July 1, when it is customary for the mill-owners to cease operations and take account of stock. In the event of a refusal on the part of the men to accept the reduction, a complete lock-out will be decided upon by the manufacturers. It is stated that the Pittsburgh puddlers are getting \$1 per ton more than is being paid in any part of the East, and the Pittsburgh proprietors claim a reduction is necessary to meet Eastern competitors. The workmen, it is understood, are willing to renew the expiring compact, but will enter into no agreement that has a reduction clause.

THE BRITISH COLUMBIA COAL MINERS' WAGES QUESTION.—The *Victoria Standard* says: "Taking advantage of the depression in the coal trade in the Eastern States, where miners are working for \$1 per day, it is stated these capitalists are about introducing 250 Pennsylvania miners to work the Puyallup Coal Mines at the low price of \$1.50 per day per man. As the Nanaimo Mine holders have to pay 75 cents per ton duty, which the Puget Sound companies are exempt from, it is manifest that the price of \$1 per ton, equivalent to \$3.50 to \$4 per day, will have to be materially reduced shortly. It would be well for the miners to recognize the situation by voluntarily reducing their rate per ton from \$1 to 75 cents. Unless they do this they will wake up some morning and find all the mines shut down, and themselves without employment. Such a state of things should be avoided, as it would not only be a calamity to the men, but a serious injury to the whole of British Columbia. It is to be hoped the miners of Nanaimo will admit the force of circumstances and act in a rational and sensible way. An important development of the Puget Sound Mines is now going on at Puyallup, from whence to Tacoma, a distance of about thirty miles, a railway is now under construction. The contract calls for its completion by the first of July next, when the company expect to ship twenty thousand tons per month."

COAL MINERS' WAGES IN PENNSYLVANIA.—From the *Pottsville Miner's Journal* of the 1st inst. we take the following interesting statement showing the earnings of coal miners, in collieries, selected as representative ones of all parts of the Schuylkill region, and including the best and worst paying operations. The earnings per day are for contract work, all day's wages being fixed by this basis. For convenience of reference, as well as greater particularity, the principal divisions of mining work—gangways, breasts, and chutes—are shown separately, in three divisions each, giving, first, the lowest amount earned by any one man; second, the highest earned by any one man, and third, the average wages of that kind of work for the whole colliery. In one or two instances, where the figures could not be obtained in full, the average only is given. All the amounts are net cash, after the usual deductions for powder, oil, etc., have been made. The statements cover the month of April, 1877. The first line of figures under each main head comes from a colliery west of Tremont, the second from one near Pottsville, the third from the Mahanoy Valley, and the fourth and fifth from collieries near Shenandoah:

GANGWAYS.					
Lowest.	Highest.	Average.	Lowest.	Highest.	Average.
\$1 47	\$2 52	\$1 89	\$ 21	\$ 25	\$1 72
1 47	2 09	1 88	3 21	3 25	3 43
1 37	2 31	1 87			

BREASTS.					
Lowest.	Highest.	Average.	Lowest.	Highest.	Average.
\$0 64	\$2 83	\$1 36	\$1 13	\$3 30	\$2 02
0 57	1 99	1 15	0 53	2 55	1 36
0 49	3 14	1 20			

CHUTES.					
Lowest.	Highest.	Average.	Lowest.	Highest.	Average.
\$ 84	2 58	\$1 90			
0 79	3 79	2 32			2 03
		1 76			

The summing up of these statements shows that the gangway men received last month an average of \$2.12 a day; men working breasts, \$1.45, and men driving chutes, \$1.60—an average of all of \$1.76. A great difference will be noticed in the earnings of different men. Thus, while one man will earn \$2.83 a day, another, employed in the same colliery, at the same kind of work, will earn only 64 cents. In another the contrast is still more strongly marked, one man earning \$3.14 while another makes only 49 cents. The difference is accounted for by the

character of the work and the skill of the miner. It appears, then, that some miners can, if so disposed, make fair wages, even in these days of low-priced labor. The collieries are running nearly or quite full time now, and if no suspension occurs a reasonable amount of prosperity may be looked for in this region during the balance of the year.

In contrast with the above we place the weekly wages received by cotton operatives in France, England, and America; the figures being taken from the *Industrial Record*, and are said to be "based on recent reliable data":

	France.	England.	America.
In cotton room	\$3 12	\$5 76	\$6 00
Card grinders	2 40	5 76	7 50
" strippers	2 40	5 76	6 00
Drawing fenders	3 12	5 84	4 00
Male spinners	5 70	5 16	9 00
Frame	3 12	3 84	4 00
Average per week	3 31	5 52	6 08

A BLOW AT TRADES UNIONS.—The Longshoremen's Union Protective Association No. 2 has nearly 1,000 members. It was formed under the act for the incorporation of charitable, benevolent, and missionary corporations. It has in its by-laws a provision for the expulsion of any member who takes less than 40 cents an hour, but it is understood that only 200 out of the 1,000 get that price. Roger Burke and others were expelled for taking 30 cents an hour. They applied to Judge Barrett for orders of mandamus to reinstate them. Judge Barrett grants the orders, saying in his opinion: "The corporation was organized, as its certificate indicates, for benevolent purposes, and this by-law prohibits any of its members, under penalty of fine, suspension, or expulsion, from working for less than 40 cents an hour. Such a by-law of such a corporation is unreasonable and oppressive. It is contrary to public policy. It limits a man's right to earn his livelihood in his own proper way. For conduct which is neither inherently wrong nor subversive of any benevolent or charitable purpose, it subjects the member to disfranchisement and deprives him of his right to the benevolent offices of the corporation. It is therefore void."

THE ALBANY, N. Y., MOLDERS' UNION, formerly one of the most powerful labor organizations in the country, has virtually disbanded by voting that the members may work for whatever wages they can get. They have been on a strike all the winter and spring, and their places in the foundries have been filled. The same result has nearly been reached in Troy, a great stove manufacturing place, where a long strike has been attended with much bloodshed.

ASSAY DEPARTMENT OF THE ENGINEERING AND MINING JOURNAL.

This department is opened for the purpose of affording to miners and prospectors the means of ascertaining the general character and approximate value of minerals found, and, when so desired, the actual value of the ore will be determined by careful assay or analysis.

Replies will be made in the columns of the *ENGINEERING AND MINING JOURNAL* to questions asked regarding the nature and the commercial value of minerals and of samples sent. The results of assays will also be published in these columns, except when otherwise requested.

No charge will be made for these examinations or replies. Where assays are desired, the following rates will be charged. The amount should invariably accompany the order.

Assay for Gold	\$2 00
" Silver	1 00
" Gold and silver	2 50
" Copper	1 00
" Lead	1 50
" Zinc	2 00
Control Assays	3 00
Zinc Analyses	5 00

Postage or expressage on samples must always be prepaid. Communications, samples, etc., to be addressed to

Western Office,
ENGINEERING AND MINING JOURNAL,
Denver, Colorado.
OR
ENGINEERING AND MINING JOURNAL,
(P. O. Box 4404.)
27 Park Place, New York.

ANSWERS.

ASSAY.
1. E. D. B., Cleveland, O.—Silver 134 oz., gold none.

Denver Office:
SAMPLES.

52. R. MARBURG, Yuma, Arizona.—The stones sent were wood opals, quite handsome, and would probably show considerable fire when ground. They will pay to save, and if you have any deposit or vein, take it up.

53. E. T. H., Alma.—The mineral sent is compact, uncrystallized zinc-blende (zinc and sulphur). Under the blowpipe it yields a small globule of silver, which is probably contained in the blende as sulphide of silver in mechanical mixture.

54. MARTIN ALBRO, Breckinridge.—Sample is a fine specimen of garnets; no tin. Tin ore is darker in shade, has more of a cast-iron lustre. There are some formations in the Blue Valley which have come under the notice of the writer that are favorable for tin. The discovery of stream tin is, however, more likely than of veins.

55. A. M. R., Georgetown.—Sample is a slate rock. We pounded a small piece and panned out a few colors. It is a favorable formation for gold. Bears a strong resemblance to the bed rock in Georgia gulch, across the Range.

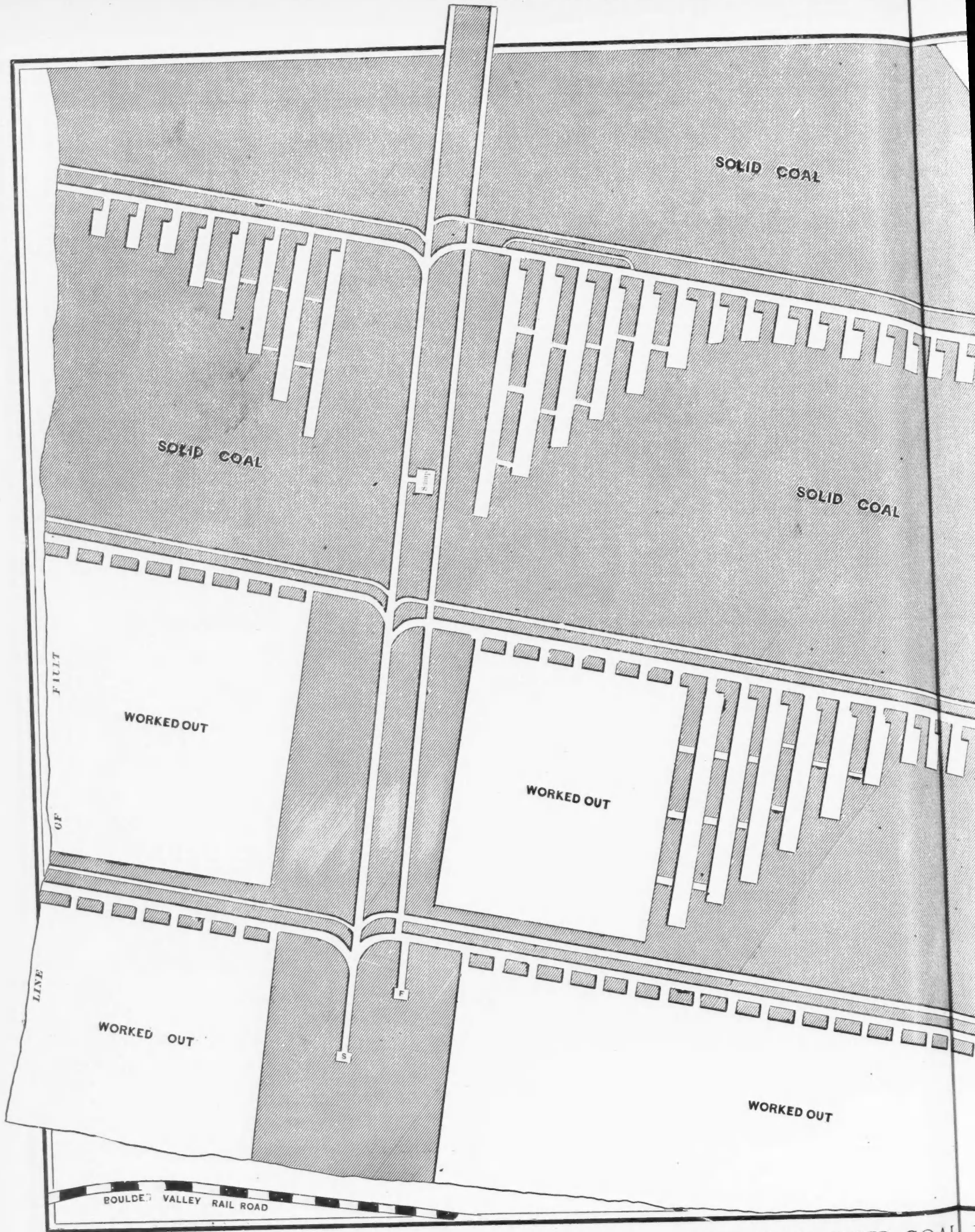
56. B. S. G., Central.—The piece of rock you sent me was covered with crystals of tetrahedral blende. The mineral is the same as the ordinary blende—in composition—but the crystallization is rather unusual.

57. E. E. R., Greeley.—The specimen yielded iron, copper, arsenic, sulphur, cobalt, and nickel, and is, undoubtedly, carrollite. If the mineral is pure, it is a fine ore of cobalt and nickel, containing about 37 per cent. of the former, and from 1 to 2 per cent. of the latter.

58. W. B., Denver.—The samples from Ewing District, Utah, contained bernite (sulphide of iron and copper). The percentage of the latter metal is about 55, but it runs as high as 68 and 70. Iron varies from 6 to 20 per cent. It is an excellent copper ore. Have not examined the sample said to be fire clay.

ASSAYS.

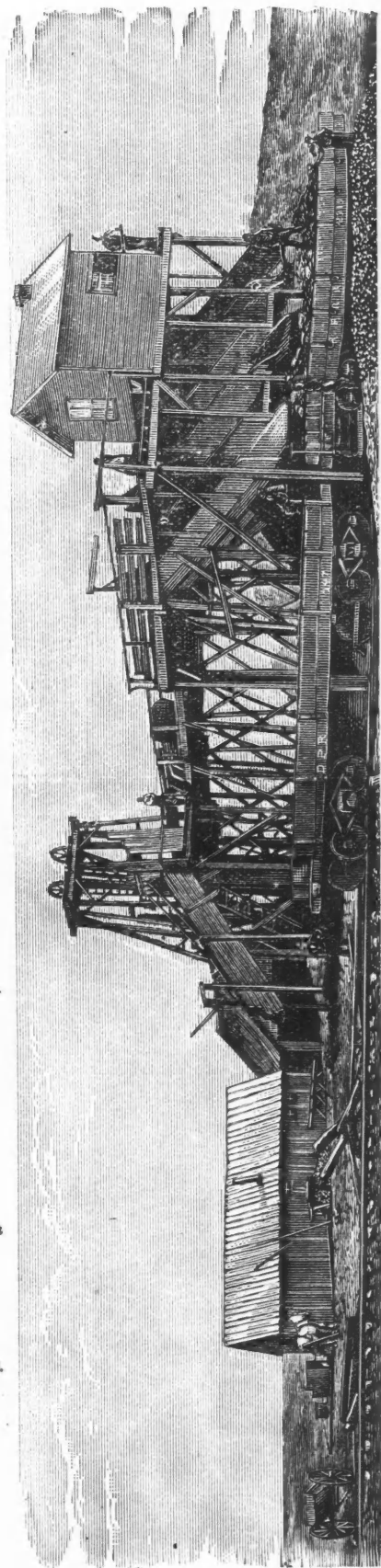
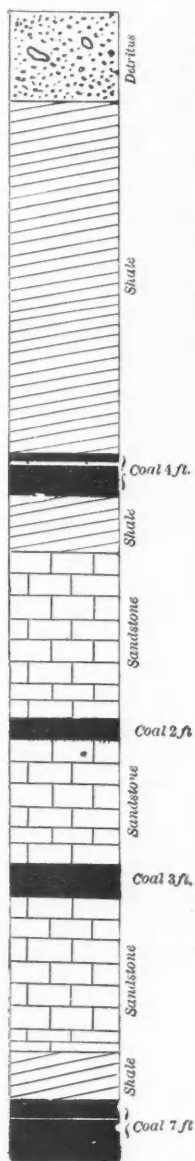
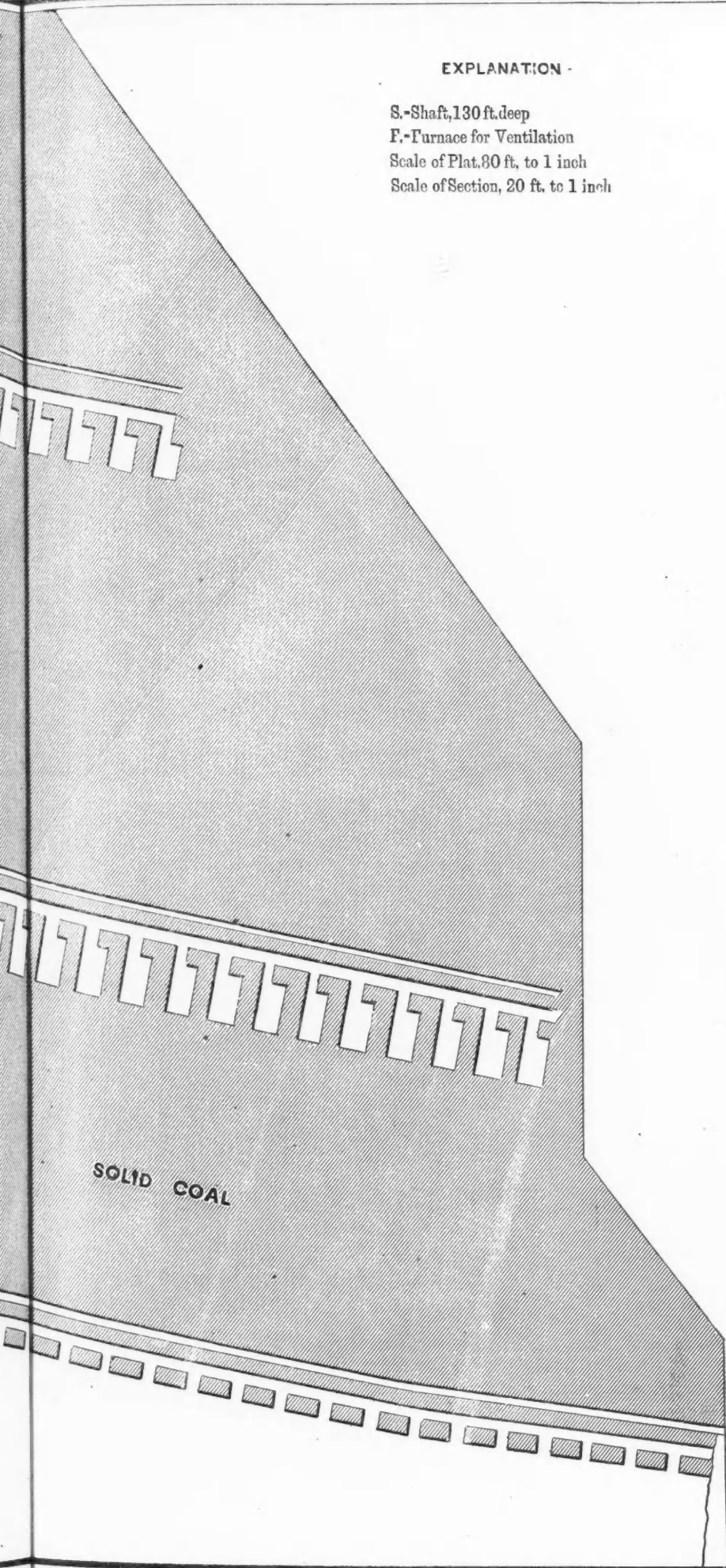
- 59. A. M. P., Georgetown.—Silver, 968½ oz.
- 60. A. L., Georgetown.—Silver, 251 oz.
- 61. R. D. D., Georgetown.—Silver, 301 oz.
- 62. F. W. P., Alma.—Silver 180 oz., lead 6 per cent., zinc 4½.
- 63. E. E. A., Rosita.—Copper 12 per cent., silver 76 oz.
- 64. J. A. R., Lake City.—Silver 421 oz., lead 31 per cent.
- 65. N. A., Hot Sulphur Springs.—Mineral spring deposit: Soda, carbonic acid, potash, lime, magnesia, sulphur, silica, trace of boracic acid.

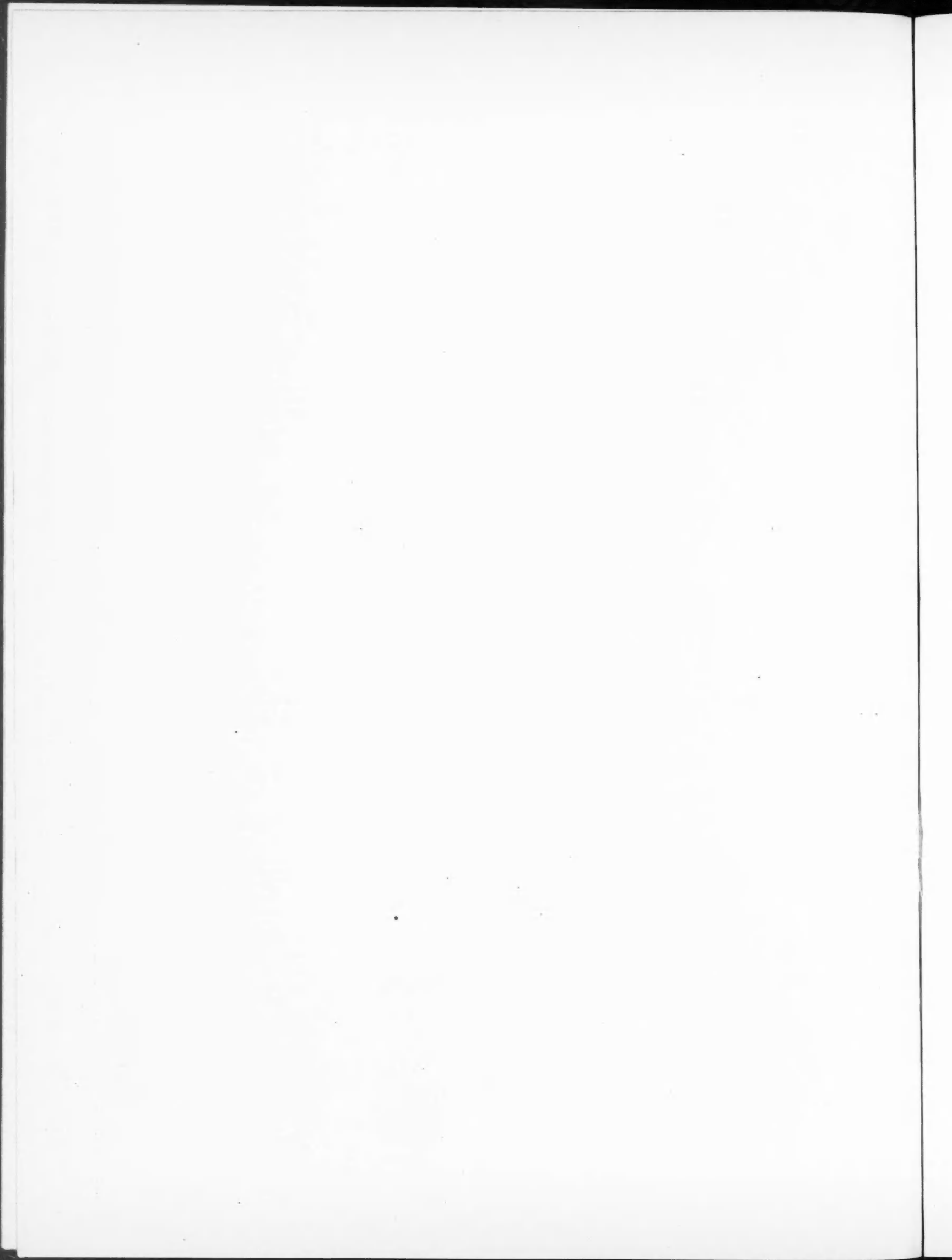


THE ROB ROY COAL

EXPLANATION -

S.-Shaft, 130 ft. deep
F.-Furnace for Ventilation
Scale of Plat. 90 ft. to 1 inch
Scale of Section, 20 ft. to 1 inch





STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines. Comparative Statement for the week ending June 2, and years from Jan 1st.

Tons of 2,240 lb.	1877.		1876.	
	Week.	Year.	Week.	Year.
Wyoming Region.				
D. & H. Canal Co.	49,836	895,346	31,299	776,475
D. L. & W. RR. Co.	54,095	890,109	25,792	520,476
Penn. Coal Co.	30,712	420,982	14,415	376,647
L. V. RR. Co.	17,608	406,831	24,316	377,376
P. & N. Y. RR. Co.	1,584	20,870	575	10,347
C. RR. of N. J.	36,903	616,470	33,197	489,480
Penn. Canal Co.	10,826	103,219	14,795	93,496
	201,564	3,353,824	144,389	2,644,777
Lehigh Region.				
L. V. RR. Co.	63,910	1,197,080	70,634	849,157
C. RR. of N. J.	28,411	603,572	33,455	450,284
D. H. & W. B. RR.	265	6,561	212	14,063
	92,586	1,807,213	104,301	1,313,504
Schuylkill Region.				
P. & R. RR. Co.	141,614	2,299,087	119,011	1,607,294
Shamokin & Lykens Val.	15,395	231,497	18,665	297,993
	157,009	2,530,584	137,676	1,905,287
Sullivan Region.				
Sul. & Erie RR. Co.	14	4,858	1,365	25,105
Total	451,173	7,696,479	387,731	5,888,673
Increase	63,442	1,807,806		
Decrease				

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

Receipts of Coal at Boston, for the week ending June 1, and years from Jan. 1.

Tons of 2,240 lb.	1877.		1876.	
	Week.	Year.	Week.	Year.
From				
Alexandria and Georgetown	3,572	11,760	2,730	17,158
Philadelphia	19,399	199,753	20,871	181,273
Baltimore	6,249	47,238	2,620	44,116
Other places	11,271	98,416	7,399	102,433
Great Britain		1,197		3,509
Nova Scotia	388	4,478	370	9,339
Total	40,876	362,892	33,990	349,418

The Exports of Coal from Baltimore for the week ending June 1, were 836 tons, and since January 1st, 18,248 tons as against 14,249 tons for the corresponding period of 1876.

Perth Amboy business: Tons.
 Received for the week 22,686
 Shipped for the week 26,240
 On hand June 2 133,315

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Piedmont Railroads amounts to 33,570 tons, as compared with the corresponding period in 1876.

Belvidere Delaware RR. report for week ending June 2.	Week	Year.	Year
Coal for shipment at Coal Port (Trenton)	923	9,153	76,231
" " " South Amboy	15,257	276,469	185,832
Coal for distribution	3,381	74,171	59,178
Coal for Company's use	1,382	33,454	21,912

The production of Bituminous Coal for the week ending June 2, was as follows:

Tons of 2,000 lb., except where otherwise designated.	Week.	Tons.	Year.	Tons.
Cumberland Region, Md.				
Tons of 2,240 lb.		42,097		529,793
Barclay Region, Pa.				
Barclay RR. tons of 2,240 lb.		4,310		140,947
Broad Top Region, Pa.				
Huntingdon and Broad Top RR.		2,745		69,251
*East Broad Top		947		20,334
Clearfield Region, Pa.				
*Snow Shoe		686		18,591
*Tyrone and Clearfield		21,404		522,219
Allegheny Region, Pa.				
*Pennsylvania RR.		4,325		81,016
Pittsburg Region, Pa.				
*West Penn. RR.		2,048		78,046
*Southwest Penn. RR.		569		17,935
*Penn. & Westmoreland gas coal, Pa. RR.		13,664		306,373
*Pennsylvania RR.		5,444		152,768
*For the week ending May 28.				
† This report has not been received for three weeks.				

The Production of Coke for the week ending May 28.

Tons of 2,000 lb.	Week.	Year.
West Penn. RR.	472	27,364
Southwest Penn. RR.	13,882	245,756
Penn. & Westmoreland Region, Penn. RR.	949	33,384
Pittsburg, Penn. RR.	2,523	58,542
Total	17,886	365,046

COAL TRADE REVIEW.

NEW YORK, Friday Evening, June 8, 1877.

Anthracite.

It is quite natural that, after the market was gorged last week with so large a quantity of coal, business should have become very quiet; and, as the production has been but little if any reduced, it is not strange that prices are weaker. Prices lower than were realized at the Delaware, Lackawanna & Western Rail-

road Company's sale are freely talked of, while Lehigh prices are from 5c. to 10c. per ton lower than a week ago. To intensify this state of affairs comes the announcement that the Pennsylvania Coal Company will sell at auction, on the 13th inst., 200,000 tons of coal, to be delivered between the 15th of this month and August 1. The Delaware, Lackawanna & Western Railroad Company will not, probably, announce its sale inside of two weeks. It is intimated, however, that it will sell, on the 27th inst., 200,000 tons, which is not improbable if it should continue its present output while it has so large a stock of coal on hand. In addition to the above we know of other lots of coal that may also be offered at auction, as the question has been under consideration. Of course the other producers do not intend to let the sellers by auction have things all their own way, and will certainly devise some means by which to hold a certain portion of the trade.

These vigorous efforts to sell coal and to sound the depths of the market, should certainly succeed in finding "bottom." The only question now is as to the nature of the bottom when found. Is it a "hard pan" or rock on which the foundations of the trade can be safely laid, or is it a quicksand which will swallow up in quick destruction the companies which are so industriously building their "castles" of "future prosperity" upon it?

At present the indications are that, should prices be allowed to find their natural level at the next auctions, and the other companies continue to offer their coal at the average auction prices, we may expect to see coal selling at the shipping ports in New York harbor at from 82 to 82.25 per ton.

Is this bottom, hard pan, or quicksand?

The war waxes warm all along the line, and we may soon expect to see the wounded carried to the rear. From the present outlook the P. & Reading Company seem to have much the best of it. It has enormously increased its output of coal this year and has disposed of it; for, as our Philadelphia correspondent informs us, the stocks at Port Richmond are smaller than usual, indeed with certain sizes of coal (broken and egg particularly), the Company is oversold.

Basing our estimates upon reliable data and such official figures as are attainable, it appears certain that the Reading Company can put coal at tide water at nearly one dollar per ton less than the Lackawanna companies, and after supplying at reasonably profitable figures its Southern and Philadelphia markets—which it has almost exclusive control of—it can deliver its surplus in New York at a lower cost than the other companies; and in the Eastern markets it has an advantage over these of from 50c. to 60c. per ton.

Freights from Philadelphia to New York discharged are 60 cents, as compared with 35 cents from Hoboken and near-by shipping ports, and 50 cents from Rondout and Newburg. Freights from Philadelphia to Boston are \$1.50 per ton, as compared with \$1.25 from New York and Hudson River shipping ports. It is scarcely too much to say that there is no important market in the East, North, West, or South, in which the Reading cannot compete on at least equal terms with the other companies, and there are many which it has practically exclusive control of.

The well-defined policy of this company seems to be to increase its business at all costs, and it is therefore of great interest to purchasers of coal to know as nearly as possible the probable course of prices. From this it is very easy to understand why the Lackawanna companies should be so very desirous of tying the hands of their redoubtable rival, but it is not so easily seen how this is to be accomplished, if, as is currently reported, Mr. Gowen has succeeded in effecting arrangements with his bondholders for funding their interest, and for providing for the floating indebtedness of the company.

It is quite evident that, should the present competition continue, several of the companies will pass through the ordeal that has overtaken the New Jersey Central, and this view of the case seems to be penetrating the "inner circle" of these companies, for we find it echoed in the columns of our well-informed contemporary, the *Seranton Republican*, whose relations to some of the companies are so intimate that we may consider it as a kind of first cousin to the railroad company. It says:

"Mr. Gowen's ability to cope successfully with his competitors should not be underestimated. He has shown himself master of the situation thus far this year by pushing his sales of coal up the North River into the very heart of a supposed exclusive market for

Lackawanna coal. He is also crowding his sales East and West. He is sustained by English capitalists, who are not solicitous for present returns from an investment which they consider of great promise in future years. It looks to us, therefore, as if the gauntlet should be thrown down to Mr. Gowen, that he will fight, and if it comes to this, one or more of the coal corporations will go down. The bankruptcy and ruin which will follow can accomplish no good results even for the winners. The vast mines and railroads will still remain to re-enter the trade under a changed management, and upon a basis which the victorious interests will find harder than ever to compete with. . . . Take, for instance, one of these companies whose principal incumbrance now is its leased lines. The struggle might necessitate the management to raise money for the contest by newly mortgaging or bonding the company's line, property, and real estate, now almost clear of debt. These obligations would be taken by the large fish in the pool when default would have to be made upon their obligations to their leased lines. The leased roads would then have to release the contracting company, or buy it out."

The production of anthracite coal for the week ending June 2 shows a falling off as compared with the previous week, although in excess of the corresponding week of 1876. Delaware, Lackawanna & Western Railroad and Penn. Coal Company show increases last week over the previous one, aggregating 18,212 tons, while the falling off from the Lehigh and Schuylkill regions amounts to 57,343 tons, the Reading alone losing 29,540 tons. The total production last week was 451,173 tons, as against 492,657 tons for the previous week, and 387,731 tons for the corresponding week last year. The production from January 1 to end of last week was 7,696,479 tons, as against 5,888,673 tons for the like period of 1876, showing a gain this year of 1,807,806 tons.

Bituminous.

The business doing is only in a small way and in cases where only this class of coal is suitable. The Cumberland production is not so great as last year, and from January 1 to June 5 shows a falling off of over 36,000 tons. The production of Clearfield coal for the week ending May 28 was nearly 6,000 tons less than for the corresponding week of 1876. The total production from this region from January 1, however, still shows an excess of more than 61,000 tons over the like period of last year.

New York and Philadelphia.

Wholesale Prices of Anthracite Coal f. o. b. at the Tide Water Shipping Ports per ton of 2240 lb.

	Lump.	Steamer.	Grate.	Egg.	Slove.	Chestnut.
Wyoming Coals.						
*Lackawanna at Rondout	2 65	2 65	2 75	2 75	2 85	2 75
*Scranton at Hoboken	2 48	2 38	2 51	2 51	2 70	2 37
Wilkesbarre at Port Johnston	2 65	2 65	2 75	2 75	2 85	2 60
Plymouth, R. A.	2 75	2 75	2 75	2 75	2 95	2 70
Susque. Coal Co., (S. H. Brown & Co.) At Amboy	2 65	2 65	2 75	2 75	2 85	2 75
Kingston at Hoboken	2 65	2 65	2 75	2 75	2 85	2 65
Pittston at Newburgh:						
A. S. Swords	2 75	2 75	2 75	2 80	2 80	2 70
*Penn. Coal Co.	2 75	2 75	2 68	2 80	2 75	2 70
Lehigh Coals.						
Old Company at port Johnston	3 25	2 85	2 85	2 85	2 85	2 60
Old Company's Room Run	3 25	2 85	2 85	2 85	2 85	2 60
Sugar Loaf, Hobok. & Amb.	3 25	2 85	2 85	2 85	2 85	2 60
Lehigh at Perth Amboy	3 25	2 85	2 85	2 85	2 85	2 60
Honey Brook Lehigh	3 25	2 85	2 85	2 85	2 85	2 60
Mount Pleasant at Hoboken	3 25	2 85	2 85	2 85	2 85	2 75
Cross Creek at Port Johnston	3 25	2 75	2 85	2 85	2 85	2 75
Schuylkill Coals at Port Richmond, Philadelphia.						
Schuylkill white ash						
Schuylkill red ash						
Lorberr						
Lykens Valley						

Wholesale Prices of Bituminous Coal. Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn. at Greenwich.		
Philadelphia	\$4 50	\$5 30
" " at S. Amboy	5 00	5 50
Red Bank Cannel Pa. at Philadelphia	8 00	8 50
Youghiogheny, Waverly Co., at Balt.	4 50	5 65
Despard, West Va.	4 50	6 00
Murphy Run, West Va., at Baltimore	4 50	5 86
Fairmount, West Va., " "	4 40	5 70
Newburg Orrel, Md.	4 50	6 00
Cannelton Cannel, West Va.		10 00
" Splint " at Richmond	6 00	7 00
" Gas Coal at Richmond	4 14	5 65
Peytona Cannel W. Va. at Richmond		10 00
Manufacturing and Steam Coals.		
Cumberland at Georgetown and Alexandria, Va.	3 00@3 15	4 40
Cumberland, at Baltimore	3 15@3 25	4 70
Clearfield f. o. b. Canton, Baltimore	3 25@	4 50
Clearfield "Eureka" at mines per ton 2,000 lb., 75c.; f.o.b. Baltimore and Philadelphia per ton of 2,240 lb., \$3.25; f.o.b. South Amboy, \$4.25; alongside at New York, \$4.50.		

Rates of Transportation on Coal via the Erie Canal, from New York and shipping points in its vicinity, per ton of 2,240 lb., alongside at destination.

	Miles from Albany.			Miles from Oswego.			
	Freights, Cents.	Tolls, Cents.		Freights, Cents.	Tolls, Cents.		
To Albany.....	50	0'4		204	60	11'4	
" Troy.....	7	40	0'4	" Rochester.....	259	50	14'5
" Utica.....	110	50	6'1	" Lockport.....	321	50	17'9
" Syracuse.....	166	50	9'3	" Buffalo.....	352	60	19'7

For freights on Schuylkill Coal we refer to our issue of May 26.

For freights on coal via Geneva, Ithaca and Sayre Railroad we refer to our issue of June 2.

For freights on Pennsylvania & New York Railroad we refer to our issue of June 2.

For freights from Newbury and Rondout we refer to our issue of June 2.

Towing.

For rates of Towing we refer to issue of June 2.

Rates of Toll

On the Erie, Champlain, Oswego, Cayuga, and Seneca Canals. Toll is to be computed upon the weight, 1,000 lb. per mile.

	Cents.		Cents.
Acid, sulphuric.....	0'1	*Iron & steel in sheets, bars, and bundles.....	0'1
*Car axles.....	0'1	Iron ore.....	0'025
Car wheels (iron).....	0'05	" bloom and pig.....	0'05
Castings, all iron castings.....	0'1	" boiler.....	0'1
Cement, fireproof.....	0'1	" bridge and railing.....	0'1
Clay.....	0'05	" bolts.....	0'1
Coal.....	0'025	Lime, manufactured.....	0'1
Coal oil.....	0'05	Lumber.....	0'25 to 1'25
Copper ore, pig and smelted.....	0'05	Petroleum, crude or refined.....	0'05
Fire-brick.....	0'05	Powder & gunpowder.....	0'4
Gas pipes.....	0'05	Salt, foreign.....	0'25
Gypsum, ground and unground.....	0'1	" manufactured in New York State.....	0'05
Gypsum, product of New York State.....	0'05	Slate.....	0'05
Iron, articles exclusively manufactured of wrought iron not specifically enumerated when cleared at tidewater.....	0'05	Stone.....	0'05
		Tin plates, going from tidewater.....	0'05

* The rate on these articles, when cleared at tide water, is 0'05 cent. Lead, bar and pig, is transported free of toll.

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, June 8, 1877.

American Pig.—We only learn of sales of about 500 tons in lots. The outlook, although far from encouraging, has had no perceptible effect on prices. There is an effort being made to have the pipe works suspend operations for two or three months. We quote No. 1 foundry at \$18.50@19; No. 2 foundry, \$17.50@18; and forge, \$16.50@17.50.

Scotch Pig.—There is only a retail business doing in this class of iron which is quoted at \$25 for Eglinton; \$27 for Glengarnock; and \$28.50 for Coltness.

Rails.—Without business these appear to be weaker in price. We quote steel at \$44@48 at mills, and iron at \$33@36.

Old Rails are very quiet and quoted at \$19.

Scrap Iron.—In the absence of transactions we quote at \$24.

Baltimore, Md.

June 6, 1877.

Specially reported by Messrs. R. C. HOFFMAN & Co.

We have no change in our iron market. Business dull and quiet with light sales at about quotations.

Baltimore Charcoal.....	\$29@31	Mottled and White.....	\$16@17 00
Virginia Charcoal.....	28@32	Charcoal B. Blooms.....	58@60 00
Anthracite No. 1.....	20@21	" Billets.....	60@65 00
" 2.....	19@20	Refined Blooms.....	45@50 00
Anthracite No. 3.....	18@19	Scrap Blooms.....	43@45 00

Boston.

June 2, 1877.

Pig is fully as dull as last week, and some dealers quote it weaker than ever. We quote \$22.50@24 for No. 1, \$22 for No. 2 and \$21@22 for gray forge. Scotch pig is firm, but very dull. We quote \$27@30 for store lots, these being the best figures that could be actually obtained. The foreign markets are not quite so firm.

Bar is dull, quoting \$46@47 for refined, and \$37@38 for common. Nails are in light demand at unchanged prices.—Commercial Bulletin.

Chattanooga, Tenn.,

June 5, 1877.

Specially reported by J. F. JAMES, dealer in pig iron, ores, etc.

PIG IRON.—There has been some slight falling off in demand for standard brands during the past week, buyers still limiting their purchases to supply only present needs. No change in prices.

MANUFACTURED IRON.—Demand nearly equal to the supply at fair prices.

MUCK BAR.—Little demand and slow.

OLD CAR WHEELS, OLD RAILS AND SCRAP.—Trade limited. About 200 tons in all of old wheels has changed hands at low figures.

I quote f.o.b. as before.

Tenn., Ala. and Ga. Charcoal, No. 1 Foundry.....	\$18 00@19 00
Tenn., Ala. and Ga. Charcoal, No. 2 Foundry.....	17 00@18 00
Tenn., Ala. and Ga. Charcoal, Gray Forge.....	15 00@16 00
Tenn., Ala. and Ga. Coke, No. 1 Foundry.....	19 00@20 00
Tenn., Ala. and Ga. Coke, No. 2 Foundry.....	17 00@18 00
Tenn., Ala. and Ga. Coke, Gray Forge.....	16 00
Charcoal or Coke, white and mottled.....	14 00@15 00
Tenn., Ala. and Ga. Cold Blast (car wheel).....	22 00@28 00
Old rails.....	18 00@19 00
Old car wheels.....	16 00@17 00
Wrought scrap.....	12 00
No. 1.....	17 00
No. 2.....	17 00

Iron Ores.

Red Hematite (about 55 per cent. metallic iron) f. o. c. at mines.....	1 25
Brown Hematite (about 55 per cent. metallic iron).....	1 75

Cleveland, O.

June 1, 1877.

Specially reported by Messrs. C. E. BINGHAM & Co. Per gross ton, on four months' time. Subject to change in market. Discount for cash 4 per cent.

FOUNDRY IRON.

No. 1, L. S. Charcoal.....	\$25 00	Am. S., No. 1, Ch. Val.	24 00
No. 2, ".....	25 00	" B. 1, ".....	22 00
No. 1, Anthracite.....	24 00	" No. 2, ".....	20 00
No. 2, ".....	22 00	No. 1, Massillon.....	24 00
No. 1, Bituminous.....	23 00	B-1, ".....	22 00
No. 2, ".....	21 00	No. 2, ".....	20 00

CAR WHEEL AND MALLEABLE IRON.

No. 3 L. S. Charcoal.....	25 00	No. 5 & 6, L. S. Charcoal.....	\$27 00
No. 4, ".....	26 00		

RESAMER IRON.

Nos. 1 & 2, L. S. Char.....	\$25 00	White and Mottled.....	\$20 00
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FORGE IRON.

No. 1, Gray.....	\$19 00	White and Mottled.....	\$20 00
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Louisville, Ky.

June 5, 1877.

Specially reported by Messrs. GEORGE H. HULL & Co. The market is dull and lower. Consumers are disinclined to believe that there will be an advance in prices in the near future, and buy for immediate wants only. The usual time—four months—is allowed on the quotations below.

FOUNDRY IRONS.

No. 1 Hanging Rock, Charcoal.....	\$24 00@24 50
No. 2 ".....	21 00@22 00
No. 1 Southern Charcoal.....	21 00@22 00
No. 2 ".....	20 00@20 50
No. 1 Hanging Rock, Stonecoal and Coke.....	22 00@23 00
No. 2 ".....	20 00@21 00
No. 1 Southern Stonecoal and Coke.....	20 50@21 00
No. 2 ".....	20 00@20 50
" American Scotch".....	22 50@23 00
Silver Gray.....	19 00@21 00

MILL IRONS.

No. 1 Charcoal, Cold-short and Neutral.....	18 00@20 50
No. 1 Stonecoal and Coke, Cold-short and Neutral.....	19 00@20 00
No. 2 ".....	18 50@19 00
No. 1 Missouri and Indiana Red-short.....	22 00@23 00
White and Mottled, Cold-short and Neutral.....	16 00@17 00

CAR-WHEEL AND MALLEABLE IRON.

Hanging Rock, and Cold Blast.....	35 00@38 00
Alabama and Georgia.....	26 00@33 00
Kentucky Cold-blast.....	25 00@30 00

Montreal.

May 29, 1877.

Bars and other manufactured is in good demand at quotations. We quote Pig Iron Gartscherrie \$20 to \$20.50; Summerlee, \$19 to \$19.50; Eglinton, and Clyde \$18.50 to \$19; Langlois \$19.25 to \$19.75; Coltness, \$20.25 to \$21; Hematite, \$23 to \$24; American, \$20 to \$21. Bars—Scotch and Staffordshire, \$1.90 to \$1.95; best do., \$2.20 to \$2.25; Swedes and Norway, \$4.50 to \$5; Lowmoor and Bowling, \$6.25 to \$6.50.—Monetary Times.

Philadelphia, Pa.

[Weekly Report of the Philadelphia Iron Market, furnished for THE ENGINEERING AND MINING JOURNAL, by JUSTICE COX, JR., & Co., Iron Merchants, 333 Walnut Street, Philadelphia, Week ending June 7, 1877.]

PIG IRON.—The iron trade remains as quoted for months, dull and depressed, the small sales continue most of the furnace managers to keep about sold up, low prices ruling, so low that few, if any, idle furnace are likely to go in at this time. Large lots of iron could not be placed except at prices that no ordinary producer could live at. We report sales of about 2,500 tons at quotation. We quote No. 1, \$19 to \$20; No. 2, \$17.50 to \$18; Gray Forge, \$17 to \$19.

MANUFACTURED IRON.—The demand for bars continues exceedingly light. Large lots are not offering, nor could they be placed at anything like prices purchasers would accept. The talk of a stoppage of some works in Pittsburgh as yet has no effect on the market, consumers only buying what they need for immediate consumption. We quote; bars 2 to 2-10 c. per lb.

PLATE AND TANK IRON. though in better demand than bars, is dull, and few sales are reported. The orders taken some weeks back are about running out, with nothing new coming on the market. We quote 2 1/4 to 7 c; Muck Bars are quoted \$34.50 to \$37 in Philadelphia.

RAILS.—We hear of nothing new in Steel Rails. The orders on hand, with the few small ones coming in, insure work all summer. We quote \$46 to \$50 at mill. Iron Rails continue dull, with only orders for light sections. We quote \$34 to \$36 at mill.

OLD RAILS.—The demand for Old Rails is slack at this time. Large lots could not be placed at quotation. We quote \$20 to \$21 in Philadelphia.

SCRAP.—The supply of wrought and cast scrap is plentiful, with few takers. We report sales of 200 tons wrought at \$23, and quote \$23 to \$26 wrought, and \$14 to \$19 for cast.

OLD WHEELS are dull of sale. We quote \$17.50 to \$20.

Pittsburgh, Pa.

June 5, 1877.

Specially reported by A. H. CHILDS.

No. 1 F'dry.....	\$22 00@24 00	Mottled & White.....	\$17 50@29 00
" 2 ".....	21 00@22 00	Hot blast C'coal.....	21 00@28 00
Gray Forge.....	19 00@22 00	Cold " Western.....	40 00@45 00

Richmond, Va.

June 5, 1877.

Specially reported by ASA SNYDER, Esq.

The small orders that now make up the sum of pig iron transactions in active seasons would have been unnoticed, but their aggregate is by no means to be despised. Prices are unchanged.

Virginia Cold Blast Charcoal Pig Iron, cold blast.....	\$21 to \$25
" " " " neutral.....	30 to 32
" Warm " " " ".....	24 to 28
" Anthracite 1 X.....	21 to 22
" " 2 X.....	20 to 21
" " 3 X.....	19 to 20
" Coke Quinimont 1 X.....	23 to 24
" " 2 X.....	22 to 23

San Francisco, Cal.

From the Commercial Herald of May 31, 1877.

The general market for pig iron, tinplate, etc., is rather sluggish and quotations more or less nominal. We remark a better inquiry for goods in general at the wholesale warehouses, but without improvement in price. The City of Amoy from London brought 400 tons pig iron, and the Valparaiso from Valparaiso 100 tons pig iron and 200 tons old iron for the rolling mill.

St. Louis, Mo.

June 5, 1877.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

Our market continues dull both in price and demand. There is very little being done, most of our foundries having closed down.

COLD BLAST CHARCOAL—ALL NUMBERS.

Hanging Rock.....	25@40	Assorted Bar Iron \$2 10, rates.
Tennessee.....	28@30	No. 1 Wrought Scrap 80c. cwt.
Kentucky.....	28@30	Heavy cast " 65 "
Missouri.....	28@30	Light " 35 "
Georgia.....	28@30	Old rails.....
Alabama.....	28@30	20 50 to 21 00
		Old car wheels.....
		18 00 to 19 00

	No. 1.	No. 2.	Mill.	White and Mottl'd.
Missouri stone coal.....	\$25 00	\$23 00	\$22 00	\$21 00
" charcoal.....	23 00	22 50	22 00	20 00
Tennessee charcoal.....	23 00	22 50	22 00	20 00
Tenn. coke very soft and strong.....	25 00	23 00	22 00	20 00
Hanging Rock charcoal.....	26 00	24 50	23 50	
" cold short.....	25 00	24 00		
Alice Hanging Rock coke.....	Ex No. 1	No. 1.	B. No. 1.	No. 2.
Quinnimont, W. Va., coke.....	\$25 00	\$24 50	\$24 50	\$23 00
	25 00	24 00	23 50	22 50

METALS.

NEW YORK, FRIDAY EVENING, June 8, 1877.

Metals generally have been very quiet, with no indications of a much better state of affairs during the summer months.

Gold Coin.—During the week, under review, the prices of gold has ranged from 106 to 105 1/2, and closed at 105 1/2.

Bullion.—Silver has been very steady during the week. The market has strengthened abroad since yesterday 1/4 d. Germany continues to sell largely (about \$2,500,000 for the last week of May), and it is supposed that she has still a very large amount to dispose of. The quotations are: London, 53 3/4 d., and here 117 1/4 c. per oz., while San Francisco quotes 9 1/2 discount.

Daily Range of Silver Quotations in London and New York per oz.

Date.	London.	New York.	Date.	London.	New York.
June 1.....	53 1/2	117 1/2	June 6.....	53 1/2	117 3/4
" 4.....	53 3/4	117 3/4	" 7.....	53 3/4	117 3/4
" 5.....	53 3/4	117 1/2	" 8.....	53 3/4	117 3/4

Carson (Nevada) Mint Coinage for May.—Coin deliveries: Silver—dimes, \$175,000; quarter dollars, \$29,000; half dollars, \$41,000. Total, 1,948,000 pieces, \$224,000. Gold—Double Eagles, \$26,220. Subsidiary coin shipped, during the month, \$327,000.

Gold and Silver Movement.—The Chief of the Bureau of Statistics furnishes the following particulars of the gold and silver movement for ten months of the fiscal year ending April 30:

Imports of gold coin.....	\$23,705,000
Imports of gold bullion.....	2,034,000
Total gold import.....	\$25,739,000
Export of gold and gold bullion.....	13,236,000
Accumulation of gold.....	\$12,503,000
Export of silver and silver bullion.....	\$22,050,000
Import of silver and silver bullion.....	12,593,000

Net export of silver.....\$9,457,000
Philadelphia Mint Coinage for May.—During the month of May the Philadelphia mint coined 28,940 pieces of gold, in value, \$577,015; 2,717,000 pieces of silver, in value, \$687,000. There were no two, three, or five cent pieces coined during the month.

Copper.—We are reported sales of 250,000 lb. of spot copper of 19 1/4 c. and 200,000 lb. for June and July deliveries at 19 1/2 c. There is but very little spot copper offered at 19 1/4 c., with most held at 19 1/2 c. @ 19 1/4 c. Manufacturers appear to be looking around a little more than they were. The latest London quotations are £76 10/ for Best selected and £69 for Chili Bars. An advance of £1 on these figures is reported, but we have been unable to authenticate it.

Tin.—Straits at London is quoted at £68 10/ and at Singapore \$19.37 1/2, with exchange 4/ 1/2 d. A fair jobbing demand is reported in this market. Quotations, in gold, per lb., are as follows: Straits, on spot, 16 1/2 c., and to arrive, 16 1/4 c.; L. & F., 15 1/2 c.; refined, on spot, 16 1/2 c., and to arrive, 16 1/4 c.; Banca, 18c.

Tin Plates.—A very good business is being done in these, the Western demand being quite large. This, in conjunction with the curtailment of manufacture in England, is having a beneficial effect on prices here. We quote, in gold, per box, as follows: Charcoal tins, \$6.62 1/2 @ \$6.87 1/2, and ternes, \$6 @ \$6.25; coke tins, \$5.75 @ \$5.87 1/2, and ternes, \$5.50 @ \$5.75.

Lead.—We only note a sale of 65 tons of Sacramento lead at 5 1/2 c. The asking price is 5.70 c. @ 5.75 c., although no important quantity could be sold at these figures. The Orient has arrived with 800 tons of lead, the largest shipment ever made to this market; 600 tons of this was sold some time ago, and the balance of this cargo is still for sale.

Spelter and Zinc.—Domestic spelter continues quiet and very demoralized. The quotations range from 6c. @ 6 1/2 c., according to quantity and brand, although lots have been offered at still lower figures. Sheet zinc is even more demoralized than spelter, and it looks as though the war that is in progress in this business could only be decided by the ruin of some who are taking part in it. The quotations are 6 1/2 c. @ 6 3/4 c. currency, although even lower figures are spoken of.

Antimony.—Prices in London are higher. The business in this market has been quite fair. The quotations, in gold, in this market are 11 5/8 c. @ 11 1/2 c., according to brand, and to arrive, 11 1/2 c. @ 11 3/4 c.

Quicksilver.—The San Francisco Commercial Herald of May 31 says: "The demand this week for export has been light and prices more or less nominal. The large amount recently taken for New York is a surprise to the trade and somewhat difficult to account for unless taken as a venture. Spot stocks are light, quotable at 42c. asked, 41c. offered, small sales at 41 1/2 c. The exports for the week have been 234 flasks, valued at \$7,541, and from January 1, 21,570 flasks, valued at \$374,012, being an increase over the like period of last year of 7,926 flasks, and \$113,603 value."

Salt Lake Ore and Metal Market.

SALT LAKE CITY, UTAH, JUNE 8, 1877.

Argentiferous Lead (Base Bullion).—\$60 to \$65 per ton for lead. \$1.10 per ounce for silver. \$20 per ounce for gold. The quotations for silver are based upon the silver contents in the lead of 70 ounces per ton of 2,000 lbs.

The Inter Ocean's correspondent, under date of the 31st ult. says:

"The mines in Bingham are discharging men, and some are not shipping at all, and some only a small proportion of what they have been shipping or can ship. There are no sales of bullion, and there is no market to quote.

"The Waterman Smelting Works at Stockton burned on the 26th inst., together with the boarding houses and stock of wood and coal.

"The bullion market continues to be entirely neglected.

"The low grade mines are cutting down and closing up until lead improves.

"The shipments of ore and bullion for the week ending May 26 are as follows: 7 cars bullion to Pittsburg, 1 car to St. Louis, 5 cars to Newark, 5 cars to New York, 10 cars to Omaha, 10 cars lead ore to Pittsburg, 20 cars to Sacramento; total bullion, 582,309 pounds, lead ore, 630,000 pounds. Grand total, 1,212,309 pounds. This is the smallest week's shipment that we have had for several years."

FINANCIAL.

New York Stocks.

NEW YORK, Friday evening, June 8, 1877.

The perilous position of the coal carrying companies appears to have been more thoroughly realized this week. Prices on Saturday and Monday were only fairly steady, advancing on Tuesday under the announcement that the Delaware, Lackawanna & Western Railroad Company would pay its obligations to the Morris & Essex Rail Road on the 2nd prox. On Wednesday a reaction set in, and with the announce-

ment on Thursday that the Pennsylvania Coal Company would sell at auction, next week, 200,000 tons of coal, prices steadily declined, reaching the lowest points ever touched. The sales of D. L. & W. R. R. have aggregated 222,176 shares, at from 40% to 36 1/2 c., closing at 39 1/2 c. The sales of Delaware & Hudson Canal have amounted to 20,217 shares, at from 37 1/2 to 33 1/2 c., closing at 34 1/2 c. The dealings in N. J. C. R. R. have been quite unimportant, and within the range of 7% and 6 1/2 c.

Chesapeake and Delaware Canal.—The annual meeting of the stockholders of this company was held in Philadelphia on the 4th inst. The report of the directors shows that during the year 1876-77 the receipts from all sources were \$227,003.43, and the total expenditures, including interest on the bonds, repairs, etc., were \$213,782.65. The following named gentlemen were elected to serve as officers of the company for the ensuing year:—President, Andrew C. Gray. Directors, George Cadwalader, William Harmar, H. Pratt McKean, John F. Gilpin, Thomas A. Biddle, Isaiah V. Williamson, Charles H. Hutchinson, Edwin Swift, David Scull, Mahlon P. Hutchinson, John R. Baker, Charles Dutilh, Gustavus S. Benson, and Charles Norris.

The Charleston, S. C., Mining and Manufacturing Company, the stock of which is mostly held in Philadelphia, has announced a dividend of three dollars per share.

Union Consolidated Mining Company of Tennessee.—300 shares of the stock of this company were sold at auction during the week for \$120,000 for the lot.

AUCTION SALES OF STOCKS AND BONDS during the week have been as follows:

St. Louis and Iron Mountain Railroad Company.—\$3,000 second mortgage 7 per cent. gold bonds, due in 1891, @ 39 per cent.

Red River Iron Manufacturing Company of Kentucky.—\$1,000 first mortgage 8 per cent. bonds due in 1892 @ 5 per cent.; also, 100 shares of the stock of the same Company for 50 cents.

Milwaukee Iron Company.—352 shares at \$50 for the lot.

International Coal and Railway Company of Kentucky.—100 shares at \$20.00 for the lot.

Tygart Valley Petroleum Company.—266 shares for \$25.00 for the lot.

Bull Creek Petroleum Company.—1,000 shares for \$2.50 for the lot.

The Spring Mountain Coal Company announces a dividend 3 1/2 per cent., payable the 11th inst.

Marietta & Shawnee (Ohio) Railroad.—A company by this name has been organized to build a railroad from Marietta, O., west by north to Shawnee, in Perry County, about 45 miles. The capital stock is fixed at \$450,000. Shawnee is in the center of Hocking Valley coal and iron regions.

Green Lick (Pa.) Railroad.—This narrow-gauge road now extends from the Mount Vernon ore bank, in Fayette County, Pa., to Scottdale, southward to Connellsville, about seven miles, and it is said that work will begin soon.

Morris & Essex Railroad Company.—We note the announcement that the semi-annual interest, due on the 2d prox., on the stock of this company (amounting to \$15,000,000), will be paid by the Delaware, Lackawanna & Western Railroad Company. This will require over \$500,000 in addition to interest obligations becoming due at the same time on some of the bonded indebtedness which the Delaware, Lackawanna & Western Railroad Company has assumed.

Chesapeake & Ohio Canal.—At the annual meeting of this company, held in Baltimore on the 5th inst., the following gentlemen were elected to serve as officers for the ensuing year: President, A. P. Gorman; Directors, James G. Berret, M. Bannan, B. B. Crawford, H. D. Fernandis, P. Hammill, John Humbird; after which the meeting adjourned to meet in Cumberland on the 26th inst.

Philadelphia Stocks.

PHILADELPHIA, FRIDAY EVENING, JUNE 8, 1877.

A pretty active business has been done in the Philadelphia Coal Stocks during the past week, the total sales reaching nearly 150,000 shares. The market closes to-day somewhat improved over the lowest prices of the week, but has slightly declined from the higher prices generally prevailing yesterday. Reading stock had advanced to \$13 per share yesterday, probably under the influence of the favorable advices received from abroad. The stock closes lower to-day, being affected by the announcement of the Pennsylvania Coal Company to throw 200,000 tons of coal on a market which is now glutted. Pennsylvania Railroad Stock has ranged from 27 1/2, at the opening of the week, to 30 1/2 yesterday, closing to-day at a decline equal to 3 per cent.

Philadelphia and Reading Rail Road.—Intelligence is received from London that the funding scheme proposed by Mr. Gowen, the President of the Company, for the acceptance of its foreign bond and stockholders has been approved.

The stock and bondholders of the Company voted on the 6th inst. to approve the proposal of the managers to issue five-year six per cent. convertible scrip, to be used for the following purposes:

"First—On the general mortgage bonds and upon the Perkiomen sterling mortgage bonds, for the period of three years, the coupons to be payable half in cash, as they mature, and half in scrip, with the option to the holder of surrendering the three coupons first maturing entirely for scrip, all holders being entitled to receive, at once, scrip bearing interest from July 1 for such coupons or parts of coupons as are to be exchanged therefore.

"Second—The interest upon the debenture bonds of both the railroad and the coal and iron companies, the convertible bonds of the railroad company, the bonds due in 1885, 1902 and 1918 of the Tidewater and Susquehanna Canal Companies, and so much of the rental due to the Schuylkill Navigation Company as is applicable to the payment of dividends to the stockholders of that company and to the interest upon its mortgage loan of 1895, to be payable for five years in scrip; all holders being entitled to cut off, at once, the entire ten coupons and to receive scrip for the whole amount bearing interest from July 1, 1877.

"Third—The drawings for, and payments of, sinking funds of the improvement and general mortgage bonds to be suspended for a period not exceeding four years, if so long a time should be required for the payment of the floating debt."

Shafton Coal Company.—Twenty-four shares of the stock of this company were sold at auction during the week, at \$17 1/2 per share.

Huntington & Broad Top Mountain Railroad & Coal Company.—\$6,000 of the 7 per cent. bonds of this company were sold at auction during the week, at from 34 1/4 to 35 per cent. Also two hundred shares of the stock of the same company at \$5 1/4 per share.

Pennsylvania Canal Company.—Thirty-two shares of the stock of this company, par value \$50, were sold at auction during the week for \$10 per share.

Schuylkill Navigation Company.—\$5,000 of the 6 per cent. mortgage loan of this company, due in 1895, sold at auction at 45 1/2 per cent.

The Buck Mountain Coal Company announces a dividend of one dollar and fifty cents per share, payable on the 15th instant.

Miscellaneous Sales and Quotations.

Sales and quotations of the stocks and bonds dealt in here and at Philadelphia, for the week ending the 8th inst. are given in the following tables. The Philadelphia quotations will have a * affixed.

Table with columns: STOCKS, QUOTATIONS, High est., Low est., Clos ing., Sales Shares. Lists various companies like American Coal Co., Cambria Iron Co., etc.

Total transactions for the week. \$255,800

Copper Stocks.

Reported by Wilson W. Fay & Co., Bankers and Brokers Room 7, Traveler Building, 31 State Street.

BOSTON, THURSDAY EVENING, JUNE 7, 1877.

The market closes this evening with slight indications of more business in this line of stocks.

Calumet & Hecla fell off during the week from 166 as low as 163, but rallied again and is now firm at 168 1/2 bid. Quincy is looking decidedly weak, falling from 37 1/4 to 33 bid, there being no large sales and no apparent reason for such a fall.

Copper Falls is also a little mite weak, there being very little disposition to buy or sell, and the market closing at about 1 1/4 to 2.

Pewabic hangs steady at 1 1/2 bid and 2 asked. There seems to be no change in Ridge, or no liability to change, there being a steady bid of 2 1/4, and no stock offering less than 4. In Franklin, Humboldt, Madison, Mesnard, Minnesota, Petherick, Phoenix, Star, and the smaller stocks there is evidently no more doing than there was last week, though in the larger ones the prospects of trade are considerably more bright.

It is reported that the principal companies have large sales ahead, which may have a tendency to strengthen and enliven the market, though the warm weather will naturally make things dull anyway.

COAL TRANSPORTATION AND GENERAL MINING STOCKS.

Table with columns: Name and Location of Company, Feet on Vein, Capital Stock, Shares (No., Par Val.), Assessments (Total levied to date, Date and amount per share of last), Dividends (Total paid to date, Last Dividend, Rate per Ann.), Highest and Lowest Quo. per Share in Currency (June 2-8), and Sales. Includes sections for Coal Stocks, General Mining Stocks, and Boston Stocks.

g. Gold. s. Silver. L. Lead. c. Copper. ** Non-Assessable. Total Assessments levied to date... Total Dividends disbursed to date... Total Sales of Coal Stocks for the week... Total Sales of Mining Shares for the week...

Gold and Silver Stocks. NEW YORK, FRIDAY EVENING, June 9, 1877. In our last we noticed the introduction on the list of the American Mining Board, of the Moose Mine; since then there have been added the Memphis and Ontario, which, in total, have added considerable to the business of the board. The Moose Mine has been the especial feature of the week, the sales aggregating

19,700 shares at 3 1/2 @ 3 1/2. This mine is located in Park County, Colorado, and is organized under the laws of that State, with a capital of \$2,000,000 in shares of \$10 each. A rich strike is reported to have been made in the Leopold, which has resulted in a business of 15,300 shares for the week, advancing from 1 1/2 to 3 1/2. The Comstock stocks, upon the whole, have but held their own, although Consolidated Virginia closes at an advance of 2 1/2.

The Mariposa Land and Mining Company.—20,000 shares of the stock of this Company were sold in San Francisco on the 5th inst., for \$1 per share. We condense the following from the Gold Hill News of the 30th ult.—The daily yield of the Consolidated Virginia Mine has been increased to 500 tons, which is being crushed by the mills as fast as extracted. This Company has announced a dividend of \$2 per share. The winze below the 1650-foot level, to connect with

the main drift west, now being run at the 1750-foot level from the C. and C. shaft is still in very rich ore, showing the permanence of the bonanza and continuation to still greater depths. The California mine continues its daily output of 500 tons. The bullion yield of this mine for May will amount to \$1,500,000. A strong flow of water has been encountered in the West drift on the 1750-foot level, a much stronger flow than is now had in the bottom of the C. and C. shaft. Notwithstanding the loss of thirty stamps in the Consolidated mill to secure the payment of the regular dividend of \$2.00 for the month, the yield of bullion is amply sufficient per share. The flow of water from the face of the east drift, on the 2000-foot level of the Crown Point Mine, is intensely hot. The heat is so great that the miners cannot work more than five or ten minutes in the face without having to stop and cool. Even with this method of working, the men quit work on almost every shift and refuse to return. The hot water pours from the roof and spurts in streams from every side whenever an attempt is made to advance the face of the drift, and the pressure is so strong and the heat so fearful that it is feared that a lateral drift will have to be run outside of the ore vein to connect with the Belcher drain shaft to secure better ventilation and drainage before the ledge can be opened at that point. So far as the drift has yet advanced the prospects are decidedly favorable. Daily yield of the Justice Mine is 450 tons of ore, keeping the mills all crushing to their full capacities. The ore stops are looking well and yielding good milling ore at all points. On the 21st the Company shipped from Gold Hill fourteen bars, valued at \$40,070.42, and yesterday fourteen bars, valued at \$38,044.97, were sent below by the same Company. Total bullion shipment of Justice during the month, \$149,729.30. Everything at the Julia mine is running finely, both above and below ground. A personal examination of the ore vein on the 1800-foot level, made yesterday, showed the ledge to be not only large and well-defined, but of an excellent character. The vein is over 130 feet in width, and has been penetrated north and south for a distance of 600 feet or more. The quartz is very solid, and of a lively, healthy, mineral-bearing description. The siphon to carry the water from the pump station at the 1740-foot level of the Yellow Jacket mine across through a drift to the 1850-foot level of the Crown Point and Belcher pump shaft did not prove to be a success; consequently the heavy main pump of the shaft has to be depended upon to raise the water to the surface. The large new working shaft of the mine, to the eastward, is now down 714 feet. The rock encountered is very hard andesite, and water is coming in at the rate of 25,000 gallons each 24 hours. This is raised to the surface by means of bailing tanks. About two feet per day is the average progress made in sinking. The pumps in the Savage mine are running smoothly

and on a slow stroke, handling the water with perfect ease and holding it steadily at the depth required for the Hale & Norcross to work while repairing the cave in their main incline. The water is now 65 feet below the 1900-foot level. The repairs recently made on the old machinery have reduced the consumption of wood several cords per day. This company has levied another assessment of \$1 per share. The face of header in the Sutro Tunnel is in easy working material, consisting of ledge porphyry, with streaks of quartz and clay, giving some little increase of water. Careful and substantial timbering is called into requisition in passing through this matter. Total length of tunnel from mouth to face of header last evening, 16,913 feet.

Mr. Sutro, in a recent interview, stated that the future rate of progress is expected to average about three hundred feet a month. The work has been prosecuted for eight years at an average cost of about one thousand dollars a day. The exact time of reaching the Comstock lode proper at the Savage mine workings cannot at present be definitely fixed. One estimate is that ten months more will suffice.

Suggestions having been made by several well known practical miners that the tunnel could not be kept open when it reached the real Comstock lode formation, which has given so much trouble to miners in the past, and is still such an obstacle, Mr. Sutro explained that the tunnel company had no fears on this score. They had already passed through material similar to and quite as difficult as any met with in the main lode. The work had been slightly retarded there, and extra precautions were required in the formations met with. The swelling of the ground was undoubtedly a great disadvantage, but it could be readily overcome. They had cut several quartz veins, some of them giving tolerable assays. People must not, however, look upon the tunnel in the light of a prospecting enterprise. At present the intention is simply to push the tunnel ahead as expeditiously as possible, and disregard all side issues. The work of prospecting has never been prosecuted in any way, and would not be attempted until the tunnel was put through.

Mr. Sutro expressed the opinion that before the Savage ground was reached the tunnel might be expected to cut some valuable ore body. As to the rumors of a change in the control of the stock of the company, Mr. Sutro answered emphatically that the management could never be wrested from him.

NEW YORK MINING STOCK EXCHANGE.

The sales for the week amount to 12,825 shares, an increase of 1,615 shares as compared with the report in our last, with prices about the same.

This Board now occupy their new rooms, at 16 New street.

	Shares	Price
Atlantic	2,000	\$7 @ \$7 25
Central	440	@ \$40
National	700	@ 25c
Quincy	50	@ \$26 00

Closing Quotations.

	Bid.	Asked.		Bid.	Asked.
Allouez	5 00	8 00	Mesnard	1 00	1 00
Atlantic	7 00	7 50	National	25	50
Cal'tHecla	66 00	168 00	Oseola	16 00	18 00
Central	38 00	41 00	Pewabic	1 00	2 00
Franklin	8 00	10 00	Quincy		35 00
Madison	15	25	Ridge	2 00	4 00

INCORPORATIONS.

We note the recent organization of the following companies, in addition to the announcements in our issue of May 5th:

Name of Company.	Location.	Cap.	Stock.
Lookout Consolidated Gold & Silver Mining Co.,	California,	\$10,000,000	
Eusley Bar Mining Co.,	"	10,000,000	
Pioneer Reduction Co. of Cal.,	"	10,000,000	
California Dredging & Mg. Co.,	"	10,000,000	
Boomerang Gold & Silver Mg. Co.,	"	7,500,000	
Arctic	"	7,500,000	
Alpha Gold Mining Co.,	"	5,000,000	
Pliocene	"	6,000,000	
Coast Range Mining Co.,	"	5,000,000	
Massasoit	"	5,000,000	
Oakland Gold Mining Co.,	"	3,000,000	
Republic Mill & Co.,	"	1,000,000	
Consol. Volcano Hydraulic G. Mg. & Land Co. of Cal.,	"	1,000,000	
Coast Range Mining Co.,	"	2,000,000	
Evening Star	"	300,000	
West Point Gravel	"	200,000	
Pacific Metallurgical Co.,	"	10,000,000	
Pioneer Reduction Co.,	"	100,000	
Aztec Gold & Silver Mining Co.,	Arizona,	10,000,000	
Excelsior Mining Co.,	"	10,000,000	
Goodwin	"	10,000,000	
Bonanza King	"	10,000,000	
Arizona Chief Gold & Silver Mining Co.,	"	1,000,000	
Danube Mining Co.,	"	10,000,000	
Colorado River Copper & Gold Mining Co.	"	500,000	
May Bean Mining Co.,	"	2,500,000	
Arizona Consolidated Mining Co.,	"	5,000,000	
Silver King Mining Co.,	"	10,000,000	
Arizona Smelting Co.,	"	100,000	
Kimberly Coal Co.,	"	3,000,000	
Vazura Consolidated Mill & Mining Co.,	"	10,000,000	
Endowment	Nevada,	10,000,000	
East California Gold & Silver Mining Co.,	"	10,000,000	
Pacific Coal Co.,	"	1,000,000	
Hall & Brunk Silver Mining Co.,	Colorado,	1,000,000	
Mount Cross Tunnel Mining Co.,	"	2,000,000	
Dahlonega Gold Mining Co.,	Georgia,	250,000	

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Attorneys and Counselors:

Bloss, John B., Washington, D. C. v
Britton & Gray, Washington, D. C. v
Mendenhall, W. K., Washington, D. C. v
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Riley, Henry A., New York v

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Ensminger & Davis, Denver, Colo. 410
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Fruce Vanning Machine, Chicago, Ill. 407
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Pinkham Mining Co., Utah, 6,000,000
 Plumbago Mining & Manuf'g Co., Mexico, 2,400,000
 The Sprucemont Mining Company has reduced its capital stock from \$10,000,000 to \$1,000,000.

Gas Stocks.

NEW YORK, FRIDAY EVENING, June 8, 1877.
 Gas stocks are dull and declining. We lower the quotations of the stock of the Manhattan Company of New York, and the Metropolitan and Citizens' of Brooklyn.

Washington (D. C.) Gas Company.—Twenty-four shares of the stock of this company, par value \$20, full paid, were sold at auction in Philadelphia during the week, at \$50 per share.

The Boston (Mass.) Gas Company has declared a dividend of 2½ per cent., equal to \$62,500.

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 Foot of Houston St., East River,

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Blocks, Slabs, and Clay Retorts.

Branch Works at Kriescherville, Staten Island.

ESTABLISHED 1845.

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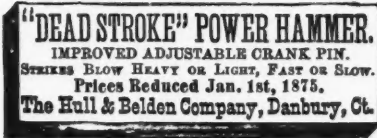
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"Savage," "Jersey," "Laclede," "Scioto," "W. Va.," etc., etc., for Blast Furnaces, Rolling Mills, Steel Works, Smelting and Refining Works, Zinc Works, Lime and Cement Kilns, etc.

Blacklead Crucibles, Retorts, &c.; Hydraulic Cements.

Gas Retorts and Settings.

Special shapes of Fire Brick, for any purpose, made to order from patterns or drawings.



OFFICE PENNSYLVANIA COAL COMPANY
 TRINITY BUILDING, 111 BROADWAY,
 NEW YORK, JUNE 8, 1877.

The Pennsylvania Coal Co.

WILL SELL, AT PUBLIC AUCTION,

By Messrs. JOHN H. DRAPER & CO., AUCTIONEERS,

AT EXCHANGE SALESROOMS,

(Basement of Trinity Building),

111 BROADWAY, NEW YORK,

On WEDNESDAY, the 13th day of June, inst.,

AT ELEVEN O'CLOCK, A. M.,

200,000 TONS

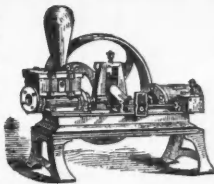
PITTSTON COAL,

of the usual sizes, deliverable at Company's Docks at Newburg, prior to the 1st day of August, 1877. The Company will endeavor to make deliveries of the coal in such manner as will best accommodate buyers, but reserves the right to decline to deliver any portion of the coal not called for within the period for which its delivery is provided for.

Delivery will be made, if desired, in Company's boats, at New York or Brooklyn, at a charge of Sixty Cents per Ton additional to the sale price.

GEO. A. HOYT,

VICE-PRESIDENT.



J. CLAYTON'S
 STEAM PUMP AND STEAM
 ENGINE COMBINED.

With disconnecting arrange-
 ment.

FIRE AND MINING PUMPS.
 SINGLE OR DUPLEX.

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 Double Acting.

AIR COMPRESSORS,

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Compressors furnished, worked by Belt or other power
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A. S. CAMERON'S

PATENT

"SPECIAL" Steam Pump,

Is the Standard of Excellence at Home and abroad.

REDUCED PRICE LIST.

Number.	PRICE.	Steam Cyl.	Pump Cyl.	Stroke.
0	\$ 50	3½ in.	2 in.	4 in.
1	75	4	2	6
2	100	5	2½	6
3	150	6	3	6
4	200	7	3½	6
5	275	7	3½	10
6	325	8	4	10
7	400	10	5	12
8	425	10	6	12
9	480	12	7	12
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11	700	16	10½	15
12	850	18	12	18

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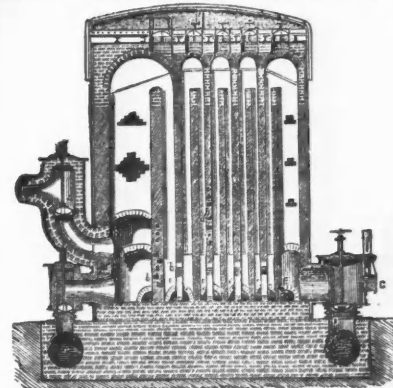
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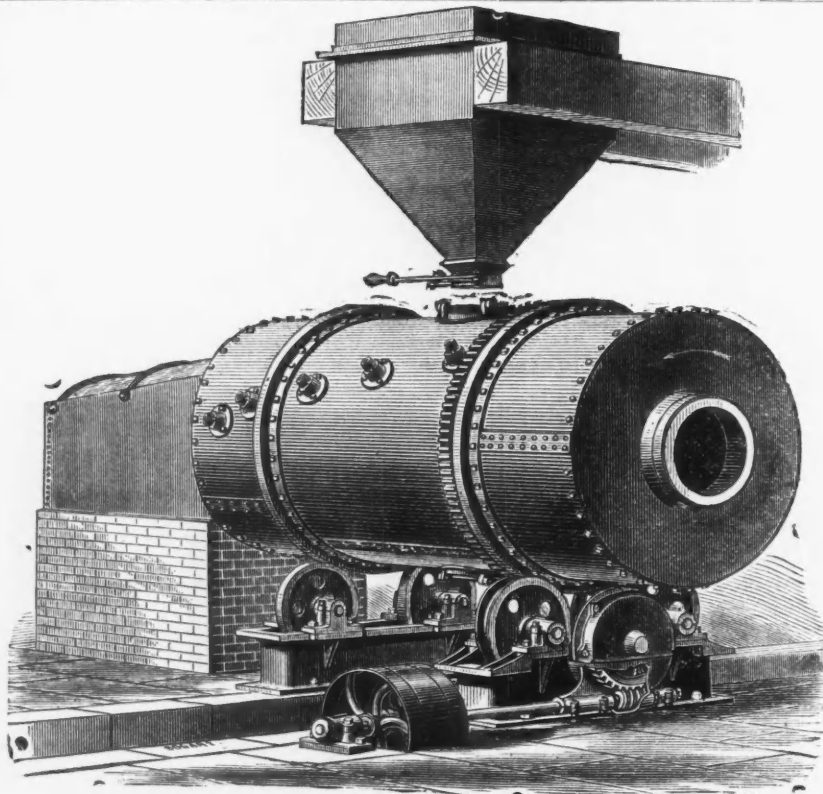
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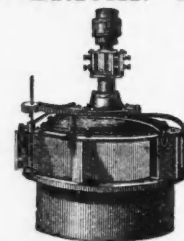
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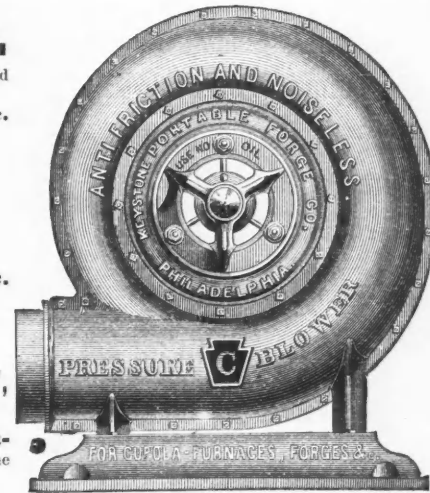
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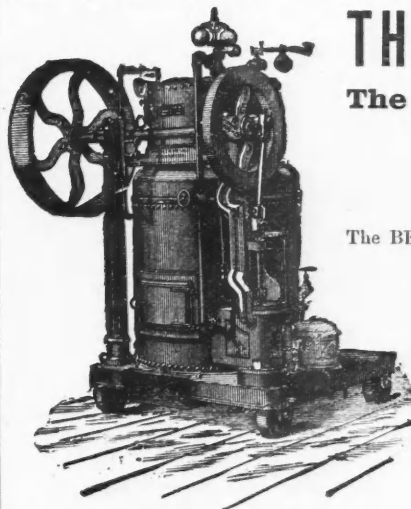
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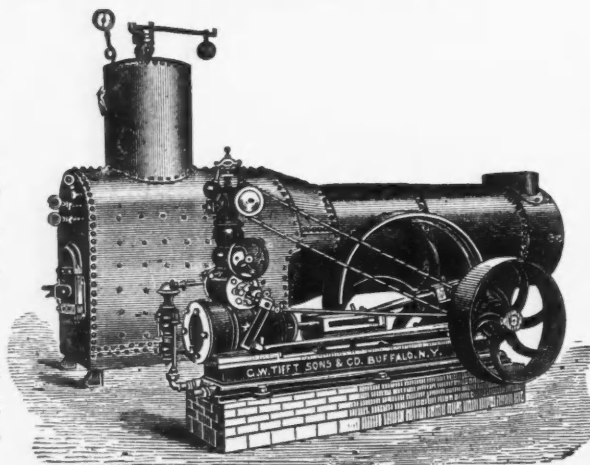
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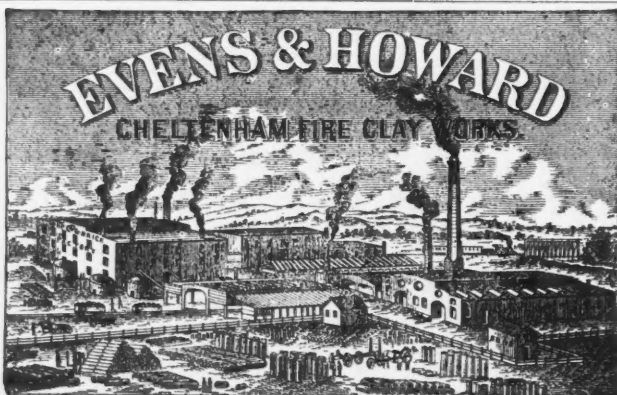


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