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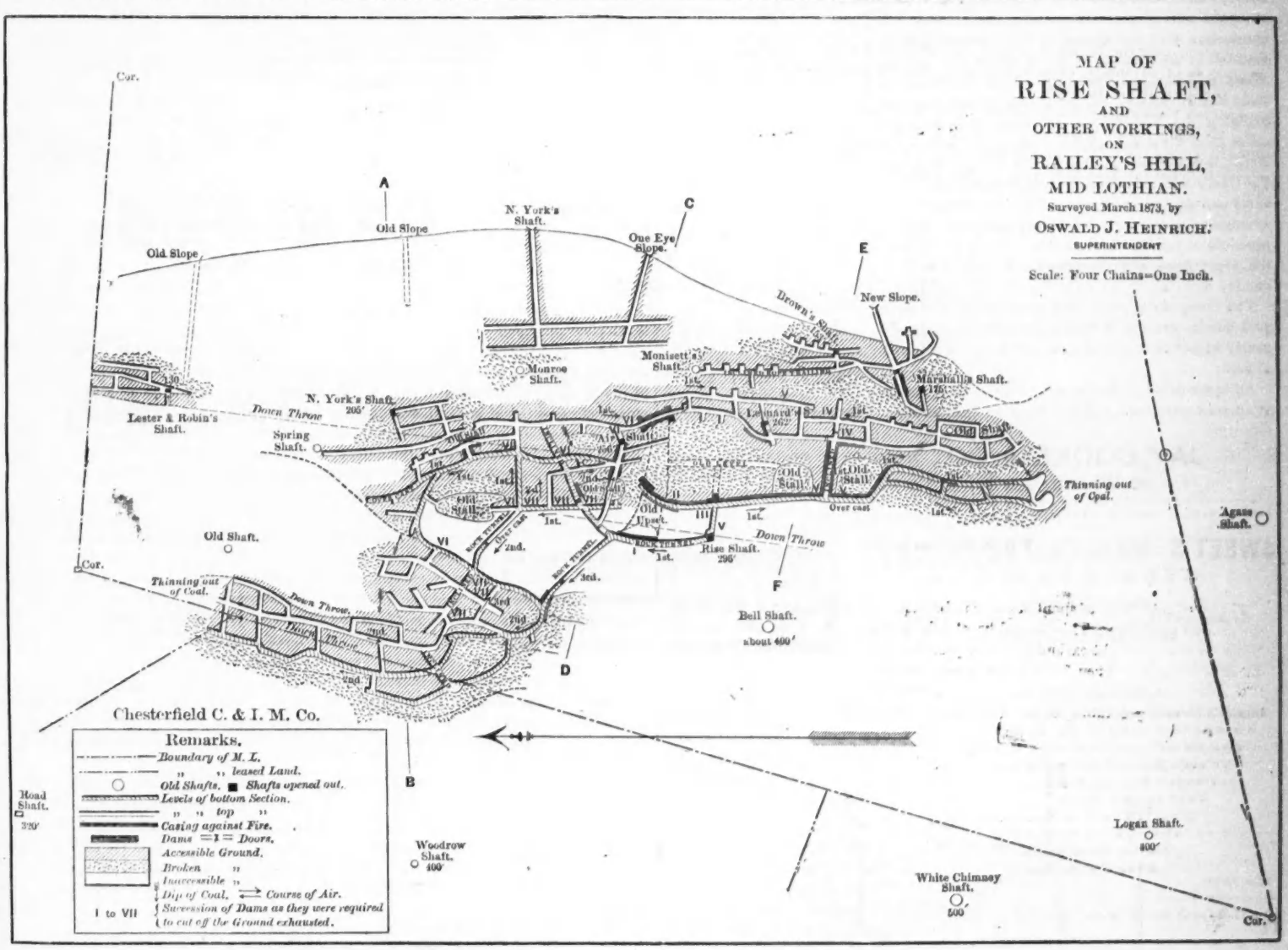


The Midlothian Colliery, Virginia.*

By Oswald J. Heinrich, Superintending Engineer.

The origin of spontaneous combustion in collieries is, of course, chiefly due to bad system in laying out the pits, unclean workings, insufficient ventilation, and neglect in damming off works after they are exhausted of the main coal. This is particularly indispensable in the Richmond field, because it is difficult and dangerous here, on account of the inferior roof, to remove the last vestiges of coal; and, we are compelled also, to retain all the slates and bands, as far as possible, in the pit, to help fill up, although such material is liable to fire. This, however, can be prevented to a great extend, as mentioned below.

I am satisfied that the only system of working this thick coal is by cross-cutting (*Querbau, ouvrage à travers*) or working in benches, as practiced in France (Creusot, Rive de Gier, St. Etienne), in Silesia (Königsgrube), which I have used as far as it is practicable in an old pit, almost torn to pieces by former workings. Modifications may, of course, be needed, even in the same pit, on account of irregularities in the seam. I am also satisfied for economical reasons (on account of the heavy cost for timbering) that pits here ought to be worked upwards, even if it requires a longer period of time to win the coal and a greater outlay of capital to commence with. The various saddle-shaped "troubles" making natural minor basins in the main basin, aid in the execution of this plan. A pit worked once, ought to be worked out clean, given up and dammed off forever.

If sections of proper height are assumed, according to the required amount of production for a certain period of time, they ought to be worked out and filled in as much as possible, dammed off, and ultimately allowed to fill up with water, in order to protect the upper works in future from fire in the gob below. This I consider indispensable, because we may not be able profitably to fill in all the ground. To do so, we have to use the waste of the mine, although it is liable to fire in time. In using this stuff, it ought to be surrounded by walls of rock not liable to take fire, laid firmly in clay, the gob being in the middle, and firmly covered and packed with clay on top. In this way it will answer for a considerable time—until the section is cut off, or the water allowed to rise; the latter means will also help materially to support the lower works.

We experience here also, as elsewhere, the greater danger of spontaneous

* A Supplementary paper, read at the Meeting of the American Institute of Mining Engineers, Philadelphia, May 21, 1873.

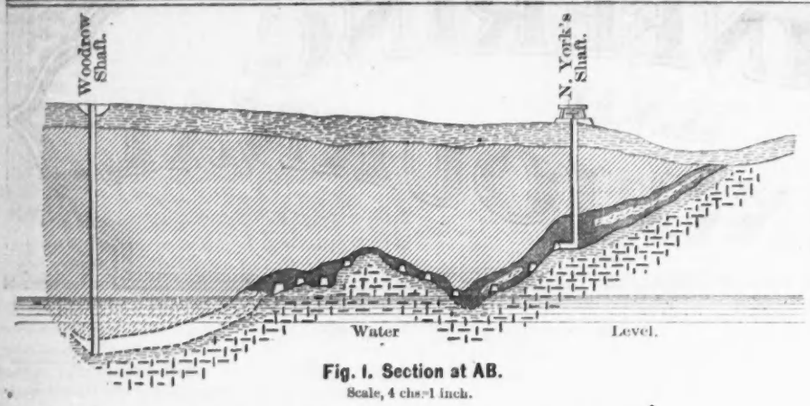


Fig. 1. Section at AB.
Scale, 4 chs.=1 inch.

combustion near the troubled ground. In such instances, the casing used by me may be of advantage, even in new pits. In new ground, it is easily carried out without much extra work.

A strong ventilation to every corner of the pit would also be indispensable, to keep the temperature as low as possible, if it were not so for other reasons. All upward workings not lying in communication, or ventilated by brattice, must be avoided, being the most dangerous for fire, particularly near troubled ground.

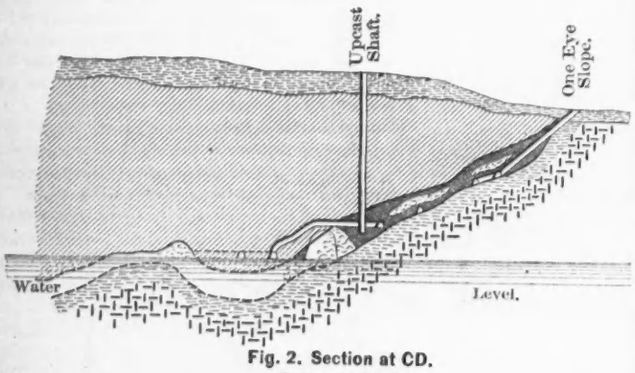


Fig. 2. Section at CD.
Scale, 4 chs.=1 inch.

The first indication of spontaneous combustion is the sweating of the coal or the ground near to it. This should be closely watched. Left a while, the peculiar odor of the light carburetted oils, perceived in the distillation of coal for oil, is perceptible. Then follows the generation of carburetted hydrogen gas. It will fire, but generally not explode, on account of its being mixed with carbonic acid gas, generating at the same time. We have continued to work in

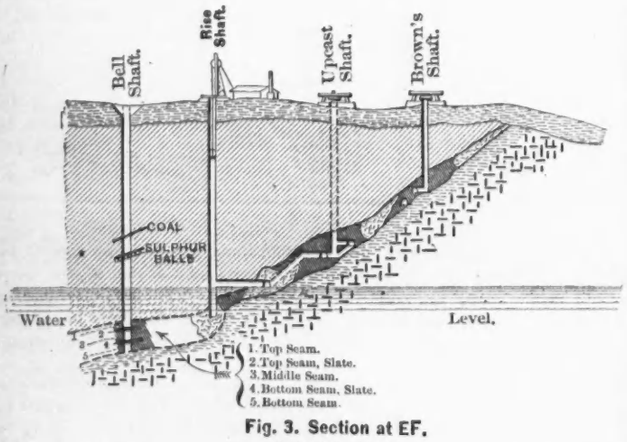
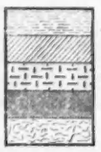


Fig. 3. Section at EF.
Scale, 4 chs.=1 inch.

such an atmosphere, by taking the necessary care to watch the gas and keep up a fresh ventilation. Ultimately carbonic acid predominates, so far as to prevent further working. If remedies are not supplied in time the ground will soon be found a mass of fire. All our attention is required to watch those indications constantly. The increasing temperature perceptible by the hand, or still better, the thermometer, the flame of the lamp and the smell, will give sufficient and timely warning.

The timber used near spontaneous combustion, if practicable, should be of oak, pine timber being more dangerous on account of its resin. All kinds should be barked before using.

If the plan of working the coal upwards from the lowest shaft bottom is followed, all new sections must be connected with the shaft by cross-cutting the measures.



Alluvial & Tertiary Formations.
Jurassic Formation. (*Coal Measures.*)
Granite & Granitic Gniess.
Coal Seam, partly or totally workable.
Exhausted or unworkable ground.
(*mostly on Fire.*)

This work progressively going on will at such times furnish valuable materials for purposes mentioned before. The cost of driving the cross-cuts has almost been saved out of the material obtained.

TO BE CONTINUED.

Metallurgy Extraordinary.

AN extraordinary general metallurgical process is proposed by PAGEN & ROUX, based on the following reaction: "Alkaline oxides, hydrates or carbonates act upon the metals or ores which they transform into hydrates. The alkaline bath, in fusion, provokes the successive oxidation of the oxidisable metals, and permits their separation from those less oxidisable. The metals are attacked in the following order: 1, arsenic; 2, manganese; 3, zinc; 4, tin; 5, iron; 6, molybdenum; 7, tungsten; 8, chrome; 9, cobalt; 10, nickel; 11, antimony; 12, copper; 13, cadmium; 14, bismuth.

"The three last mentioned metals are only oxidised by the contact of air or the addition of an oxidising agent to the alkaline bath. Lead, mercury and silver are not sensibly oxidised, except sometimes indirectly. The metals 1 to 9 oxidise themselves in presence of alkaline carbonates, which they render caustic, giving off at the same time carbonic oxide. All metals of the series decompose alkaline hydrates, oxidising themselves, giving off hydrogen gas and replacing the water of the hydrate in variable proportions, the excess of oxide remaining in suspension. On blowing steam into an alkaline bath the water which has been decomposed is restored, and the action continues as long as the bath remains sufficiently fluid. In like manner the authors force currents of air into the melted metal to promote oxidation and desulphurisation or to attack lead. They sometimes add nitrate of soda to the alkaline bath to conclude the operation. A remarkable reaction is produced when a current of steam is passed into a mixture of alkaline carbonates and hydrates. The carbonates are rendered caustic. To extract the precious metals from pattisonised lead it is melted with its own weight of alkaline flux, and a current of compressed air is forced in till the metal contains 25 per cent. of the precious metals. This enriched portion is separately treated in the same manner, and the operation terminated by the addition of nitrate of soda. The slag, on treatment with water, yields a deposit of oxide of lead and a solution of plumbate of soda containing one part oxide of lead to thirteen of soda. It is evaporated and serves for future treatments. The authors point out the application of their process to the purification of zinciferous and antimonial leads, the argentiferous dross derived from the zincage of workable lead, the treatment of argentiferous coppers, and the manufacture of alkaline chromates."

If we understand this method in its proposed application to desilverization by zinc it consists in nothing but the use of air (*plus* an oxidiser like the nitrate of soda in some cases), instead of steam, to remove the zinc and antimony. We may as well leave out nitrate of soda, which has so far always proved too expensive for common metallurgical uses. Neglecting that, the process does not seem to differ from the experiments made for the purpose of substituting air for steam, and which have, without exception, failed.

Method of Assaying Lead Ores.

THE ore or other substance is oxidized, and its metals converted into sulphates before reduction; the best agent for this purpose being sulphate of ammonia. The ore is mixed with an equal or double weight of sulphate of ammonia, according as it is supposed to be poorer or richer, and the mixture is ignited in a small crucible of porcelain, covered to prevent spirting. The mass, when cold, is treated with boiling water, acidulated with sulphuric acid and muriatic acid. By this means the sulphates and oxides of iron, copper, &c., are dissolved, while the lead and silver remain insoluble. This portion is washed by decantation, the washings being passed through a filter. This filter is next dried, and its ashes added to the dried insoluble portion. It is then mixed with muriatic acid and powdered zinc, in order to reduce the sulphate of lead and the chloride of silver. The metallic deposit is washed with water which has been boiled, or acidulated with sulphuric acid, and is then pressed into a compact mass. This is dried and heated with from 1½ to 2 parts its own weight of a flux composed of 13 grammes carbonate of potassa, 10 grammes carbonate of soda, 5 grammes of melted borax, and 5 grammes of farina. The whole is covered over with dried chloride of sodium, and the heat is raised by degrees to redness. When the whole is in a state of quiet fusion, it is submitted for a moment to a higher temperature. This process serves for determining lead and silver in white lead, red lead, ores rich in gold and silver, also antimony, tin, and copper. If, in the assay of ores of gold and silver, the amount of lead is insufficient, pure oxide of lead is added.—*Ant. Mascazzini.*

The Baldwin Locomotive Works, Philadelphia.

In 1832 only twenty hands were employed, and one engine required a year to build. At this time there are about 2,000 skilled mechanics employed, and the present firm are turning out an average of 1¾ engines per day. From a single, narrow-contracted shop, where a hammer could scarcely be slung aloft without striking the wall, the works now cover 8⅝ acres, and from a pay roll of $200 per week it has grown to $40,000 per week, or over two million dollars per year. In order to show the enormous extent of the work done in all these years it may be stated that there have been built, of all sizes and kinds, 3,342 engines, the lowest selling for $3,500, and the highest for $34,000. Averaging these engines at about $12,000 each, it will be seen that the one concern has manufactured within forty years engines to the value of $41,104,000, or over $1,000,000 work per year. During these years the firm have paid out for labor alone about $15,000,000, and some of the employees have seen the full forty years of service with the firm. One Mr. LEWIS O. HOWELL, who forged the iron for the first engine, is still a foreman, a hale hearty man of seventy-one years, who looks as though he was equal to another quarter of a century. As showing the imperfections of the early engines made, this gentleman states that a large party of celebrities who made a trial trip over the old State road on the third engine built, had large holes burnt in their clothing by the sparks from the engine, there being no "spark arrester" known then. To further exhibit the increase of demand for the later perfected engines, it is stated that in 1866 there were 118 engines built, 127 in 1867, 124 in 1868, 235 in 1869, 280 in 1870, 331 in 1871, 422 in 1872, and the number for 1873 will exceed 500.

The 1,000th engine was furnished in February, 1861, the 2,000th on October 30, 1869, and the 3,000th November 13, 1872, and the last one completed up to this writing numbered 3,342, on July 18. It is stated that one other immense firm in Berlin has turned out over 3,000, having on exhibition their 3,000th locomotive at the Vienna Exhibition; but this firm employs ten thousand men to do less work and at greater cost in the same time than the Baldwin works, thus proving conclusively the superiority in skill, the perfection in machinery, and even Europe itself acknowledges the superiority in perfection of the American built engine.

The Baldwin works cover over an area of 8⅝ acres or nearly 4 squares, the real estate possession amounting in the aggregate to about $1,400,000, of which about $425,000 is in buildings. The works front on Broad street, from Pennsylvania Avenue to Spring Garden street, 760 feet, looking like a busy city all to itself. The several lots occupied by the works have a superficial ground area, all told, of about 400,000 square feet, and upon them are erected substantial brick structures, one, two, three and four stories high, filled with the most perfect and expensive machinery.

The following table will show the number of shops, the area of each, the purposes for which they are used, the number of men employed in each and the number of machines:

No. of Buildings.	Area in square ft.	Number of men employed.	Machines.
1 Frame shop	18,463	99	55
2 Connecting rod shop	19,213	124	63
3 Wood pattern shop	19,213	125	30
4 Steam hammer shop	28,600	190	15
5 Office buildings	2,166	19	..
6 Store room	1,600	14	..
7 Wheel department	10,890	63	70
8 Smith and boiler shop	56,167	486	45
9 Drawing room	2,166	18	..
10 Standard guage shop	1,600	13	10
11 Piston and guide shop	14,486	86	68
12 Valves motion shop	10,216	115	43
13 Erecting shop	23,800	285	30
14 Grinding room	4,148	10	9
15 Pipe shop	4,148	28	5
16 Sheet iron shop	6,800	32	5
17 Paint shop	8,296	19	5
18 Machine repair shop	6,800	46	21
19 Brass work shop	6,800	34	35
20 Brass foundry	2,800	17	..
21 Tool repair shop	6,800	12	9
22 Pattern loft	6,800	7	..
23 Iron foundry	18,000	265	38
24 Smith shop	16,400	146	6
25 Forge shop	9,600	119	10
26 Spring shop	10,004	36	18
27 Tender paint shop	9,790	10	..
28 Truck wheel shop	13,706	80	27
29 Tank shops	9,790	64	21
30 Stack shops	9,790	38	12
31 Tender frame shop	9,790	35	44
32 Punching and shearing shop	4,800	16	5
33 Blacksmith shop	1,700	6	..
34 Smith shop (No. 2)	8,140	18	4
35 Stables	7,000	27	..
Total	390,482	2,700	703

In addition to the above, there are 18 stationary engines; 26 boilers and 115 laboring men are not enumerated, whilst a force of over 200 men are given employment at times, increasing the entire force to over 3,000 persons.

The consumption of material in the works is of course enormous, and to give some idea figures are again resorted to. The average annual consumption of the principal articles used is as follows:

Coal	18,000 tons.
Bar iron	3,000 "
Pig iron	5,800 "
Boiler iron	1,150 "
Boiler plate steel	420 "
Copper	384,000 lb.
Spring steel	350,000 "
Lead	100,000 "
Pig tin	55,000 "
Spelter	42,000 "
Coke	40,000 bush.
Charcoal	5,000 bbls.
Steel tires	2,100
Chilled wheels	5,000
Flues	58,000

As a matter of course the larger number of the engines manufactured are sold and used in the United States, but there have been a great many sent to foreign countries. An investigation goes to prove that since the year 1860 the firm have sent abroad 154 engines, as follows: To Canada, 39; to Cuba, 25; to Brazil, 50; to Peru, 13; to Russia, 10; to Finland, 9; to Nova Scotia, 4, and to New Brunswick, 4. There are now being constructed 50 for Canada, 11 for South America, and several smaller orders for other countries. Mr. BALDWIN, the founder, died in 1866, after a long life of usefulness, and, after many changes, Mr. M. BAIRD, a former apprentice in the business, became a prominent member of the firm. A few months since, the latter gentleman also retired, disposing of his interest in the business, amounting to one-third, for $1,125,000. The present firm is composed almost entirely of young men, who have grown up with the business, from office or apprentice boys. Mr. GEORGE BURNHAM, the senior, who has been in the concern for thirty-five years, is the financier, Mr. CHARLES T. PARRY, another member, is general manager. He is now abroad in Europe on a business tour. Dr. EDWARD H. WILLIAMS, an experienced railroad official, is now the selling or contracting partner. Mr. WILLIAM P. HENSZEY is the mechanical engineer. Mr. EDWARD LONGSTRETH, a former apprentice, who was made a foreman before he was free, is now a partner and general superintendent. Mr. JOHN H. CONVERSE is an old journalist.

Some of the machines used in the establishment are well worth notice. One steam hammer has a weight of over 3,000 pounds, to pack and cram the red hot iron into a sufficiently compact mass to sustain great weight. Another, a tram engine, picks up an entire engine boiler and carries it from point to point. A third holds the boiler suspended, whilst a massive upright steam riveter clinks with one great blow the red hot rivet through the boiler, saving hours of manual labor. The punches, the shears, the planers, and the great wheel lathes, all are huge, and yet all apparently perfect for the purpose intended, and yet improvements are being constantly made. The work goes through no less than thirty-five different shops before completion, each department of which is presided over by an experienced and competent head. Nearly all the employees are Americans, and the skill displayed by them in the several branches marks Yankee superiority over all other nations.—*Public Ledger.*

The Minerva Furnace, Milwaukee.

A few weeks ago a new blast furnace, the Minerva, was successfully blown in at Milwaukee, and is now working to the entire satisfaction of the company. The stack is 55 feet high by 15 feet width of bosh, and runs about 300 tons per week of coke and anthracite iron, made from Iron Ridge and Lake Superior ores. The blast is heated by two stoves, designed by Mr. WILLIAM TAIT, of Pittsburgh, which contain together 42 pipes, weighing three tons each. The machinery of the works consists of four engines, two for blowing, one for the elevator, and one on the dock. The blowing engines are of 200 horse-power each, and were made by the Cuyahoga Steam Furnace Company, at Cleveland. The steam cylinders are 40 inches in diameter, the stroke being four feet. The blowing cylinders are each 64 inches in diameter and four feet stroke. A blowing cylinder is placed above each steam cylinder of the blast engines, and one piston connects them both. These engines, the four fly wheels of which measure 14 feet six inches in diameter, cost $15,000, and are beautiful specimens of workmanship. They work very well.

The six cylinder boilers, which are 42 inches in diameter, by 50 feet long, were made by the Marine Boiler Works, of Milwaukee, and are fitted up with all the modern improvements. Leading from each boiler to a main pipe extending along the division wall between the engine room and boiler house, is a separate pipe, and from this main pipe, which is suspended on brackets and hangers to allow it to sway several inches upon expansion or contraction, is a branch running to a steam box in the engine room, from which all steam used is drawn. In this steam box are seven valves, by means of which the supply of one engine or more can be cut off at a moment's notice, leaving the others supplied. The furnaces under the boilers are so arranged that four of the boilers are entirely independent of the two others; the furnace upon which the four lie being detached from the boiler of the other two, and there are valves in the main steam pipe above mentioned, to shut off the steam from each boiler separately. The flue in which the gas from the blast is brought down to the boilers is 55 feet long, and five feet in diameter inside the lining.

The capital of the Minerva Furnace Company is $200,000. Its docks, buildings and yards cover five acres. The engine house is 47 feet long, 25 feet wide, and 47 feet high, built of brick and roofed with slate. The boiler house measures 70 feet in length, 47 feet in width, and 35 feet in height. The dimensions of the cast house are in length 100 feet, 50 feet in width and 40 feet in

height. Both of these houses are brick and roofed with corrugated iron. The dockage is 425 feet in extent. On the docks are erected three derricks for the purpose of unloading vessels. The derricks extend above inclined trusses 15 feet high, upon which there are five railroads leading into the yard, one of which is from the main branch of the Wisconsin Union Railroad. In the yard are blacksmith and carpenter shops, and a handsome office building will soon be erected. One hundred men will be employed in alternate gangs of 50 each. The company consists of Messrs. R. W. PIERCE, H. J. HILBERT, S. A. HARRISON, and T. M. AULT.

Engineering and Mechanical Notes.

A round iron clad has been designed by the Russian Admiral POPOFF and built for the navy of that country. The ship is perfectly circular, and is driven through the water by six screw propellers. So far as handiness is concerned, nothing could be more perfect. The propellers disposed around the ship—it would be useless to talk of stem, or stern, or beam—afford unlimited power of locomotion. Ahead, astern, or spinning around like a top, the vessel is equally at home. In a seaway the behavior of circular ships is said to be peculiar, but for buoyancy they are difficult to surpass.

English papers report that a feat in the production of Bessemer steel has just been performed at the works of Messrs. WILSON and CAMMELL, Dronfield, under the management of Mr. S. DUFFIELD, not less than 200 tons of Bessemer steel having been manufactured in the course of twenty three hours, during which forty "blows" took place, two converting vessels and two cupolas only being used. This is believed to be the only instance, in England, in which so great an amount of Bessemer steel has been produced in the same space of time by the appliances named.

The pavement question is as a great stumbling block in London as in New York. The Belgian, Russ, Macadam, asphalte, and even wood pavements have all been under trial. All have their advocates and also their enemies. The London Commissioners of Sewers lately received a memorial from the owners of 15,000 horses, which shows that asphalte is not the thing for that city. The slipperiness of asphalte when slightly wet is a serious drawback in a country where dampness is the normal condition of things. Messrs. PICKFORD and Co. and the London General Omnibus Company make the startling statement that accidents to their horses have not only increased 50 per cent. since the introduction of asphalte, but have become more severe in their character. Experience in London, as in New York, shows that in the long run the Belgian pavement answers best.

The Union Rolling Mill Co., Chicago, are putting in a large blooming hammer, the anvil block of which weighs 60 tons. It will increase the capacity of the mills ten tons of steel and iron rails per day.

A "workman" having asked, in the *Iron Age*, for the size of the largest plate rolled in a 3-high mill, Mr. J. N. LAUTH answers that "the largest plate, in surface, but not in weight, which I know to have been rolled on B. LAUTH'S 3 high plate rolls, is now on exhibition in the Belgian department of the Vienna Exposition. This plate is 39 feet long, 32 inches wide and $\frac{1}{8}$ inch thick. It was rolled at Ougree Works, near Liege, under the superintendence of MM. RASE and MOCKEL. Plates and sheets are being rolled on the 3-high at the L'Esparence Works, Liege, 9 feet long, 6 feed wide, No. 18 gauge, and sheets for tinning No. 26 gauge. Messrs. SINGER, NIMICK & Co., of Pittsburgh, are working six sets of LAUTH'S 3-high, and are rolling 6 feet circular saw plates. Messrs. A. WOOD & Co., Conshohocken, Pa., have rolled single sheets No. 2 gauge. The roller at CHOTEAU, HARRISON & VALLE'S, St. Louis, Mo., has reported making No. 24 gauge by "doubling." Messrs. GRAFF, BENNETT & Co., of this place, can finish plates of any required thickness and of any width up to 6 feet, as they "break-down" as well as finish plates with the 3-high. This firm has four sets in operation. The largest set of 3-high rolls for plates, in the United States, are being used by the Abbott Iron Co., Baltimore, Md., where they can make plates of any required thickness up to 7 feet wide. There are now 26 sets of 3 high rolls in operation.

Work on the Saint Gothard Tunnel is progressing with vigor. Four perforators of the Dubois and François model have been at work on the Airolo side since the 24th June, and two MacKean machines were set up at the other end, at the end of the same month. The next report, therefore, may be expected to tell of largely increased results. The greatest number of workmen employed so far is 1,036, and on the Italian side the heading has been driven 219 meters, and enlarged for 215 meters.

A firm in Syracuse is making seven large windmills, designed for crushing gold ore, which are to be sent to the Island of Oruba in the Caribbean Sea. The prevalence of trade winds in that section, and the high price of fuel, have induced the quartz-crushing company to introduce windmills for ore-crushing purposes. The diameter of the wheel, which is of the "rosette" pattern, is 36 feet long, thus securing power equal to a 20 horse-power engine. The weight of each mill is about 9,000 lb., the cost of construction being about $1,600.

The Fulton Foundry, Virginia, Nevada, was lately the scene of an accident, caused by a loaded shell exploding in the cupola. The language in which the occurrence is described, in the daily papers, so exactly fits *all* cases of the kind, that we will copy it. "It appears that a large lot of cannon-balls and shells of all kinds and sizes was bought at a Government sale at one of the military posts near San Francisco, and shipped to Virginia City to be melted up as old iron. The supposition was that none of the shells were charged, and, so far as they were examined, all proved to be empty. So many of them had been melted without accident that all fear of them among the workmen had died out. But on the day in question a loaded shell got into the cupola, and in due time made its presence manifest by exploding with terrific force and a report like a cannon. No damage was done and no one was hurt, but a more frightened set of men has seldom been seen. The cupola withstood the shock bravely, proving itself no meanly contrived iron-clad. The main force of the explosion appeared to be upward, as all the hot iron and other missiles discharged took their flight out at the top of the cupola."

The importance of the controversy on the subject of ore dressing may be seen from the fact that $200,000 worth of tin ore floats away from the works every year in Wales. Nothing but improvement in the dressing works, combined with a better system of leasing the mines can prevent this, and unless it is prevented, say the foreign papers, many struggling mines must go to the wall.

The Geological Survey of Japan.

PRIVATE letters from Mr. LYMAN report his progress up to the 25th of May, at which time the corps of geological assistants had reached Kayanoma, near Iwanai in Jesso.

From Otarunai Mr. LYMAN went 23 miles to Sapporo, the capital of the island, expecting to go northwards up the valley of the Ishcari, the largest river of Jesso, but the Governor declared it to be for the present impossible, owing to freshets produced by the melting of the snows in the interior.

Mr. LYMAN, therefore, went to examine the important coal mines of Kayonomo to determine their value in comparison with others on the Ishcari river, for an immediate proposed outlay. The authorities seemed desirous to afford every facility and show every courtesy to the surveying party. The country was as safe as any part of New England, and those who did not wish to live *a la Japonois*, sitting cross-legged on the floor and eating rice with chopsticks, might have European food carried along.

The mines are seventy-five miles south of the capital, two days' journey, Otaruna being on the line of march, the road being partly along or near the sea shore and partly across a low mountain, the backbone of a peninsula in which snow banks still lay. A hotel, quite comfortable, in Japanese style, is kept at Iwanai, a large fishing village eight miles from the mines. All such public quarters have been found good.

This is the most northern point reached by BLAKE and PUMPELLY in the former survey of the island of Jesso. But no mines had been opened at that time. Dr. ANTISELL also reported on no mineral locality north of it. The whole region to the north of Kayanoma is therefore virgin ground and of the highest geological interest to Dr. LYMAN, and in great part quite unknown to the Japanese themselves; it is so wild. The new survey will therefore begin by studying it, instead of going over the old ground, already sufficiently well understood for the present. The mails from Sapporo are poor and infrequent, and communication will therefore be slow and rare, as the party is now probably far in the interior, which is covered with forests and inhabited by strange hairy Aino aborigines, photographs of whom are sent on by Mr. LYMAN to show that they are men and not wild beasts; and very decent-looking, kindly sort of men they are, too.

The assistants of the party, young Japanese students put into Mr. LYMAN'S hands to train for future mining engineering, scatter every morning and make separate surveys, bringing in their notes in the evening, to be worked up on rainy days.

Mr. LYMAN takes five of these assistants in his expedition up the Ischari river, the rest going southward with Mr. MUNROE to make preliminary map surveys of places known to be important enough for subsequent special investigation.—*U. S. R. R. and Mining Register.*

The Danks Furnace in England.

BRITISH Ironmasters have shown a very noticeable suspicion that all is not right with the Danks Furnace, and never lose an opportunity to ask questions about its operation in this country. We are sorry to say that, with the exception of the commission of experts which visited us, they do not seem to obtain much information; for no one has been found to answer the question—"Why is its use in America so restricted?" However, they now have a chance to ascertain its merits from their own experience, since our foreign exchanges say that the "Danks furnaces at the Tees-side Iron Works are turning out very strong tough iron. A double-headed 65 lb. rail rolled right away from the heated bloom without piling, when placed under the "monkey," 648 lb. in weight, on 3 feet 3 inch bearings, stood a blow from the "monkey" from the height of 10 feet, and four blows from the height of 18 feet alternately on either head, without any other result than being bent to an angle of about 60 deg. When really broken, which it ultimately was, by being nicked all around before being put under the "monkey," the rail showed a fine steely fracture thoroughly homogeneous. The web of the rail appeared more fibrous, probably on account of the extra amount of pressure on it in the course of rolling. It was, in fact, a weldless rail made as close to the character of a steel rail as the quality of the iron used would admit. A rail of this kind, tough and hard at the same time, must wear its head down almost to the very web ere it presents the least appearance of failing. The introduction of Danks iron in quantity is fast approaching. The Carleton and Gorman works are expected to be started in a fortnight or so."

THE COAL TRADE.

NEW YORK, August 28, 1873.

The auction sale was not very well attended, and though the coal offered was all taken at an average advance of 6½ cents, the bidding was confined to a very few parties. Either the prices obtained at the last sale made dealers think that coal would be too high to be worth having, or perhaps there was an anti-combination which stayed away in order to keep prices from going too high at the sale. The following is the average as made up by Mr. JOHN MOORE, room 94, Trinity Building:

	Tons	August $	September $	Advance
Lump				
Steamer	10,000	4.76½	4.87½	11c
Broken	25,000	4.98	5.04	6 c
Egg	7,000	5.26½	5.38	11½c
Stove	35,000	5.38	5.45	7 c
Chestnut	13,000	4.74	4.77	3 c
Total	90,000	5.10½	5.17	6½c

Business continues good, and the general attention drawn to the circumstances of the trade by the antagonism of some daily papers to a supposed combination, undoubtedly helps to make the demand active. It is not extravagant to suppose, that the general examination of the coal question by the public will have the happiest effect upon the trade, and indeed upon the American industries, so far as it goes. People compare the prices here with those paid by the English, and finding they are about half as much as those abroad, are naturally led to the conclusion that there is a solid basis for anticipating good profits in manufacturing. The coal companies seem to be heartily glad of the extremely favorable "notices" given them by the press in spite of itself. Where the discussion temperately conducted it would be welcomed on all sides.

Bituminous Coal.

It is rare that the aspects of a great business change almost in the twinkling of an eye from dull to bright. But that has been the experience of this business during the last week, and the change bids fair to be something more than ephemeral. The cause is the break in the Chesapeake and Ohio Canal, which proved to be so bad that it is thought navigation will not open again much before the first of October. It is this certainty of continued embarrassment more than the effect of depleted stocks, that causes the present agitation in the market. Coal is now confined to two means of transportation—sailing vessels from Baltimore and the all rail route, opened by the Penn. Central, last winter, to South Amboy. Both these routes are now heavily taxed to maintain the current demand for steamers' use, and when the fall trade opens the two combined will be insufficient to supply the demand. Looking to the low stocks and this long interruption to traffic, it is hard to see how the companies can make the transportation facilities keep pace with their demands. Prices, which a week ago were hardly quotable, have now advanced to $7,50 by the cargo, and are firm at that. This unexpected change in the conditions of the Cumberland trade, combined with the increasing demand for, and stiffening prices of, anthracite, can hardly fail to confirm the prospect announced by us two months ago of a rise in the soft coal this fall.

Anthracite Coal Trade for 1872 and 1873.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending, 1873, August 23, compared with the week ending August 24, 1872.

COMPANIES.	1872. WEEK.	1872. TOTAL.	1873. WEEK.	1873. TOTAL.
Phila & Reading R.R†	105,218	3,030,162	126,141	3,373,018
Schuylkill Canal	16,700	515,296	20,787	444 023
Lehigh Valley R. R.	55.647	2,205,764	73,180	2,.78 099
Lehigh & Sus. R. R.	33,904	1,081,210	33,649	1,.64,435
" " Canal	2 610	459 272	26.764	411 456
Scranton North	16,157	485,527	27,397	5?0,108
" South	40,960	1.3?9,311	39,448	1,38 ,225
Penn. Coal Co., rail	19,?6?	7?2,966	28,493	781,451
" " " canal	238	3.594	?38	4 93?
Del. & Hud C. Co. Canal	36,4??	856 650	39,608	860 ?55
" " East	10,713	268 692	11 919	259,937
" " West	9 187	244,?35	16,929	311,508
" " South	8,934	?40,2 1	?78	138,127
Shamokin	12,389	350,380	13,733	391,593
Trevorton	....	....	....	....
Lykens Valley Coal Co.	....	....	....	....
Wyoming North	....	....	....	....
Wyoming South	....	....	....	....
P. N. Y. C. & R. R. Co.	10,718	420,611	17,359	468,059
Williamstown Col'y	....	....	....	....
Big Lick Col	....	....	....	....
Total	402,401	12,?7?,?31	474,377	12,984,557
1872			402 401	12,378,331
Increase			71,976	606,?56
Decrease				

These figures are for the week and fiscal period commencing Nov. 30.

† Less coal transported for Company's use and Bituminous coal.

Bituminous Coal Trade, 1872 and 1873.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending August 23, 1873, compared with week ending August 24, 1872.

COMPANIES.	1872. Week.	1872. Year.	1873. Week.	1873. Year.
C. & O. Canal	15,306	403,759	4 459	378,356
B. & O. R. R.	?6,810	8 8,813	39,050	929,442
Penn. S. Line	....	.....	1,494	52,144
H. & B. T. R. R.	6,5?6	192,930	8 335	284,62
*Harrisburg & D.	8 327	313,481	3,902	221,084
*L. V. R. R.	398	19.?97	1,217	20 799
P. & N.Y.C. & R. Co.	6,562	218 974	5,653	210,700
Cumberl'd Branch Canal.	6,165	13?,068	1.687	74,791
" Railroad	..	11,560	1,707	6 1,569
Total	70,164	2,135,482	67,804	2,232,514
	67,504			2,135,482
Decrease	2.669			97,032
Increase	....			

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, August 23, 1873.

BY RAILROAD.—ANTHRACITE.

PASSING OVER MAIN LINE AND LEB. VAL. BRANCH.

	Tons.	Cwt.
From St. Clair	35,025	11
" Port Carbon	3,274	14
" Pottsville	2,?76	04
" Schuylkill Haven	32,597	13
" Pine Grove	6,784	18
" Tamaqua	14,098	17
" Harrisburg	39	00
" Dauphin	8,147	01
Total	102,242	18

FOR SHIPMENT BY CANAL.

Passing Frackville Scales	,366	14
" Mill Creek "	7,046	01
" Schuylkill Valley Scales	1 ?98	00
" Mt. Carbon "	?61	04
" Cressona "	10,919	12
" Pine Grove "		
" Tamaqua "	2,417	06
Total	23,308	16

SHIPPED WESTWARD VIA CATAWISSA AND WILLIAMSPORT BRANCH AND NORTHERN CENTRAL RAILROAD.

Via Catawissa & Williamsport Br.	?72	17
" N. C. R. R. passing Locust Gap	2.399	00
" " " Shamokin	4,066	01
" " " Herndon	....	
Total	6,6 4	13

SHIPPED WEST OR SOUTH FROM PINE GROVE.

Via Schuylkill & Susquehanna R. R.	2.241	06
Lebanon & Pine Grove Branch	1,13?	09
Total	3,373	15

CONSUMED ON LATERALS.

From Frackville Scales	977	13
" Mill Creek "	?72	11
" Schuylkill Valley Scales	8 3	05
" Mt. Carbon "	1,?8	16
" Cressona "	3?2	10
" Pine Grove "	20	04
" Tamaqua "	453	17
Total	4,98	16

LEHIGH AND WYOMING COAL.

Received via Silverbrook Junction, Sent East	8,065	07
Cat. & Wpt. Br. Sent West	....	
" " Rupert, Cat. & Wpt Br.	....	
" " Allentown E. Penn'a Br.	38	16
" " Alburtis, " "	?8	00
" " Oreland, G. & N. Br.	850	15
" " Willow Street R. R.	?80	00
Total	9,740	18

BITUMINOUS.

From Harrisburg	3,902	01
" Connecting R. R., G. & N. Br.		
" Junction R. R.	....	
Total	3,902	01

COAL FOR COMPANY'S USE.

Anthracite	8,044	12
Bituminous	?37	09
Total	8,?82	01

RECAPITULATION.

	Total for Week.	Corres'p'g week last year.	Increase and Decrease.
Passing over Main Line and Leh. Val. Branch	?02,?42 18	?3 178 13	i 9,064 05
For Shipment by Canal	23,?08 16	?8,?72 19	i 4,835 17
Shipped Westward via Northern Central R. R.	6,?84 18	5,947 19	i ?36 19
Shipped West or South from Pine Grove	3,373 15	1,489 12	i 1,884 03
Consumed on Laterals	4,?98 15	2,883 15	i 1,215 01
Lehigh and Wyoming Coal	9,740 18	1,?18 12	i 8,022 06
Total Anthracite paying freig't	149,4?0 01	123,691 10	i ?5,?58 11
Bituminous	3,?02 01	8,?27 00	d 4,424 19
Total of all kinds paying freig't	153,35? 02	132,?18 10	i 21,333 12
Coal for Company's use	8,?82 01	4,631 09	i 3 650 12
Total Tonnage for Week	161,634 03	?36,649 19	i ?4,984 04
Previously this year	4?8?6,9 09	4013?11 08	i ?76,?88 01
Total to date	4?49?3? 12	4?47?61 07	i ?01,?72 05

SHIPPED BY CANAL.

From Schuylkill Haven	?8,547 00	15 ?78 00	i 3,?69 00
" Port Clinton	2,?40 00	?00 00	i 1,540 00
Total Tonnage per Week	?0 ?87 00	15,?78 00	i 4,?09 00
Previously this year	4?3,?36 15	5?2,655 05	d ?9,418 10
Total to date	4?4,023 15	5?8,633 05	d ?4,609 10

Northern Central Railway, Shamokin Division.

Below is the return of Coal sent over the Shamokin Division of the N. C. R. W., for the 7 days ending August 23, 1873.

	Tons.	Cwt.	Tons.	Cwt.
East	1,?76	04		
West	12,1?3	17		
			12,?30	01
Same time last year			12,388	15
Increase			1,?41	06
Decrease				
Total amount shipped to date			391,?92	12
Same time last year			350,379	15
Increase			41,?12	17
Decrease				

Report of Coal Transported over the Lehigh Canal

For the week ending August 22, 1873.

REGIONS SHIPPED FROM.	TIDE. tons. ct.	LOCAL. tons. ct.	TL. WEEK tons cwt.	TL. DATE tons, cwt.
Mauch Chunk Region	5,?25 07	4,056 06	9,?91 13	132,?84 16
Mauch Chunk Region Hazardville	988 02	576 13	1,564 15	19,991 06
Beaver Meadow Region	1,?58 16	3,832 16	5,591 02	?1 807 03
Mahanoy Region	95 17	476 11	572 06	12,819 15
Hazleton Region	1,076 02	4,241 16	5,317 18	110,687 10
Upper Lehigh Region	99 10	585 01	684 11	16,372 13
Wyoming Region	2,044 02	1,002 00	3,046 02	55,527 18
Wyoming Region, Hazardville	197 15		197 15	935 16
Total	11995 11	14,770 13	26,?66 04	411,456 06
Previously reported	137141 02	247648 00	384,?89 02	
Total to date	149137 13	2?2?18 13	411,4?6 06	
Corresponding week last year	176?09 01	283?53 09	459 ?73 10	
Increase				
Decrease	?7,571 08	20,?41 16	47,916 04	

DISTRIBUTION.	WEEK 1873.	WEEK 1872.	YEAR. 1873.	YEAR. 1872.
Consumed on line of Lehigh Canal	1,?06 07	2,533 10	43,?06 08	44,?69 09
Passed into Morris Canal to Tidal Points		130 12	1,?89 10	3,494 10
Passed into Morris Canal to Local Points	1,155 03	809 02	17,498 ?0	13,993 04
Passed into Del. & Rar. Canal to Tidal Points	11,995 11	10,981 13	147,?76 03	173,?54 11
Passed into Del & Rar. Canal to Local Points	?79 10	136 04	?,431 12	9,?47 08
Consumed on line Delaware Div. Canal	1,480 12	1,168 19	24,?31 08	19,095 08
Passed through to Bristol	9,448 15	10,?49 09	169,551 12	185,488 19
	26,?66 04	25,610 09	411,4?6 06	459,?72 10

Report of Coal Transported over Central R.R. of N. J. (Lehigh and Susq. Div.)

Week ending August 23—Compared with same time last year

REGION SHIPPED FROM.	TIDE. tons ct.	LOCAL. tons ct.	CANAL. tons ct.	TL WEEK tons cwt.	TL. DATE tons, cwt.
Wyoming	20597 09	7?42 19	4?14 08	31?24 16	1127?68 10
Upper Lehigh		3349 15	3?22 01	6?71 16	126?69 16
Beaver Meadow	2357 03	2031 13	2?66 17	7?55 13	181197 10
Hazleton		?02 05	5?68 13	6470 18	118242 08
Mauch Chunk	493 11	2470 12	1001 18	1?65 01	350833 01
Total	23?8 03	16?07 04	23184 17	69390 04	1?66038 13
Previously reported	?84667 05	621?87 06	3?69?3 18	1?42658 09	
Total to date	906115 08	638194 10	359?39 15	1?1?854 13	
Same time .1872	?6.?12 00	5?2?81 09	?95?31 00	16008.7 09	
Increase	145?03 08	95?00 01	64417 15	3?5221 04	
Decrease					

DISTRIBUTION.	WEEK 1873.	WEEK 1872.	YEAR 1873	YEAR 1872.
Forwarded East by Rail to Tidal points	?3148 03	?2?54 03	?08115 08	?63?12 00
Forwarded East by Rail to Local points	8?24 15	9?17 00	?51?63 04	?6?789 09
Forwarded East by Rail use Central Division	1100 06	1420 02	57185 15	40949 02
Forwarded East by Rail use L. & S.	176 10	?13 09	?672 06	5459 13
Delivered at and above Mauch Chunk	1631 12	2048 08	49?86 15	35672 19
Delivered at Coalport & Hazard for Canal	23124 17	18?20 08	?09?25 18	?30403 02
Delivered to L. V. R. R. at Packerton	?09 12	?91 04	16?32 19	9?55 07
Delivered to L. V. R. Rd at Sugar Notch	?875 10		65645 00	
Delivered to L. & B. R. R.at Plymouth Bridge	1 45 18	5?53 09	1?6?0 18	143?75 17
Total	?3?80 04	?9954 03	1?06?28 13	1?0?817 00

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending August 23, 1873, with Totals to date, compared with same time last year.

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL. Tons. Cwt.
Total Wyoming	16,194 13	605,?64 00
" Hazleton	54,?50 13	1,513,135 13
" Upper Lehigh	?72 11	4,?02 03
" Beaver Meadow	14,187 03	492,?81 03
" Mahanoy	11,114 02	340,?65 12
" Mauch Chunk	107 02	2.?55 08
Total	96,?56 04	2,?36,?59 16
Same time last year	?7,034 01	2,??2,193 05
Increase	19,?22 03	144,?67 11
Decrease	.....	.....
Forwarded East from Mauch Chunk by rail	?3,150 17	2,?78,?09 05
Same time last year	55,?27 10	2,?05,?63 12
Increase	.....	?2,?35 13
Decrease	17,?03 07	.....

DISTRIBUTED AS FOLLOWS.

Local East of Mauch Chunk	1,?66 13	54,?43 13
Forwarded East for use L. V. R.	?63 05	?7,?55 07
Delivered to Furnaces and Manufacturing Companies	14,?36 11	497,?66 07
Delivered to Cat & Fog. R. R.	?01 15	4,?89 03
" " East Penn R. R.	54 18	6,?02 19
" " North Pennsylvania Railroad	6,?03 17	?28,?64 10
" " Port Del	?,?46 00	?18,?96 19
" " East Amboy Railroad		
" " Morris and Essex Railroad	4,?93 09	?01,?20 17
" " Bel. Del Railroad	?8,?94 07	?20,?95 02
" " Central Railroad	10,?16 03	?39,?11 06
Delivered at and above Mauch Chunk for use of L. V. R.R.	1,?54 17	48,?89 19
To P. & N. Y. R. R.	12,043 02	?26,?83 03
To Northern Central R. R.	?05 16	12,194 02
To D. H. & W. R. R.	?41 11	?4,?03 06
To L. & S. R. R. at Packerton for rail	186 03	9,?07 ?9
To Individuals at Mauch Chunk	10 01	1,?51 09
To Individuals above Mauch Chunk	?54 10	10,107 11
To L. & S. R. R., at Penn Hav., for railroad		1,?41 10
Do. for canal	5,?17 18	110,?97 10
To Lehigh Canal Mauch Chunk	?,179 05	44,?75 03
To Catawissa Railroad		?0 00
To L. & S. R.R. at Lack. June		?0,116 02
Total	?6,?56 04	?,?20,?59 16

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, August 23, 1873.

	WEEK.	SEASON
North	59,962 07	1,701,324 17
South	778 02	134,126 23
Total 1873	60,740 09	1,835,451 10
Corresponding time in 1872:		
North	52,914 12	1,656,356 03
South	8,933 17	240,200 11
Total, 1872	61,848 09	1,896,556 14
Increase North	7,047 15	44,968 10
Decrease North		
Increase South		
Decrease South	8,155 15	106,073 14
Increase		
Decrease	1,108 00	61,105 04

Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna, & Western Railroad for the week ending Saturday, August 23, 1873.

	WEEK. Tons. Cwt.	YEAR. Tons. Cwt.
Shipped North	27,397 00	570,108 09
Shipped South	39,448 02	1,381,225 02
Total	65,845 02	1,951,333 11
For the Corresponding time last Year:		
Shipped North	6,167 06	455,527 09
Shipped South	40 959 13	1,389,311 04
Total	57 116 19	1,844,838 13
Increase	9,628 03	106,494 18
Decrease		

Penn. and F. Y. R. R.—Coxton, Pa.

Coal tonnage for week ending August 23, 1873.

	Week. Tons. Cwt.	Total. Tons. Cwt.
Anthracite received:		
From Lehigh Valley R. R.	12,042 02	326,083 09
" Lack. & B. R. R.	1,141 01	24,6 8 02
" Pleasant Valley R. R.	2,814 09	112,773 12
" Sul. & Erie R. R.	761 03	24,564 02
Total	17,359 15	488,059 06
Same time last year	10,717 12	420,641 04
Increase	6,642 03	67,418 02
Decrease		
Distributed:		
To Lehigh Valley R. R.		23,568 01
To Lack. & B. R. R.	88 06	1,098 05
To S. Central R. R.	3,373 19	105,313 06
To Ithaca & A. R. R.	3,384 13	97,381 18
To Erie R. W. Pockets for shipm't.	7,384 01	177,847 15
To Erie Railway, Watkins direct.	916 05	6,717 01
To individuals on line of road	642 04	19,688 08
To points at & above Coxton for use of Co	462 03	19,048 16
To points between Waverley and Elmira	508 04	37,396 02
Total	17,359 15	488,059 06
Bituminous received from BARCLAY R. R.		
Shipped north from Towanda	5,578 08	209,021 03
Shipped south from Towanda	75 02	1,575 16
Northern Central R. R.		105 04
Total	5,653 10	210,700 03
Same time last year	6,562 01	248,973 13
Increase		
Decrease	908 11	38,273 10
Distributed:		
To Erie Railway	5,560 08	188,965 05
To So. Central R. R.		19,640 15
To Ithaca Valley R. R.		351 06
Lehigh Valley, R. R.	69 02	793 05
To individuals on line of Railroad.	24 00	831 08
To points on line of road for use of Company		118 04
Total	5,653 10	210,700 03
Grand totals transported		
Anthracite	17,359 15	488,059 06
Bituminous	5,653 10	210,700 03
Total	23,013 05	698,759 09
Same time last year	17,259 13	669,614 17
Increase	5,753 12	29,144 12
Decrease		

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday August 23, and during the year 1873, compared with the corresponding period of 1872.

WEEK.

	C. & O. C'l Tons. Cwt	B. & O. R. R. Tons. Cwt.	Pa. S. Line Tons. Cwt	Total. Tons. Cwt.
1873	4,458 18	39,049 16	1,493 12	45,001 06
1872	15,305 12	26,843 04	....	42,145 16
Increase		12,209 12	1,493 12	2,856 10
Decrease	10,846 14	....	....	

YEAR.

1873	378,356 13	929,441 19	52,144 09	1,359,943 01
1872	403,759 10	8 8,813 05	....	1,212,572 15
Increase	....	121,628 14	52,144 09	147,370 05
Decrease	25,402 17	....	....	....

Cumberland Branch R. R.

WEEK.

	To C. & O. Canal. Tons. Cwt.	To B. & O. R. R. Co Tons. Cwt.	Total. Tons. Cwt.
1873	1,687 01	1,706 19	3,394 00
1872	6,165 15		6,165 15
Increase		1,706 19	2,771 15
Decrease	4,478 14	....	....

YEAR.

1873	74,791 10	60,568 19	135,360 09
1872	136,087 18	11,599 16	147,687 14
Increase		48,969 03	
Decrease	61,276 08		12,307 05

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, August 23, 1873.

	WEEK.	SEASON.
By Delaware and Hudson Canal	39,608	860,285
By Railroad, East	11,949	259 837
" West	14,929	331,906
" South	778	134,127
Total 1873	67,234	1,586,155
Corresponding time in 1872:		
By Delaware and Hudson Canal	36,400	856,650
By Railroad, East	10, 13	368,692
" West	9,167	248,735
" South	8,934	240,201
Total	65,215	1,714,278
Decrease	128,123	

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending August 23, 1873.

	1873. WEEK.	1873. YEAR.	1872. WEEK.	1872. YEAR
By Railway	28,497 17	781,451 13	19,666 01	752,856 04
" Canal	238 02	4,934 11	238 04	3,593 15
	28,735 19	786,386 14	19,904 05	756,439 19
Increase, 1873	8,831 14	29,946 15		

Prices of Coal by the Cargo.

(CORRECTED WEEKLY.)

	AT NEW YORK R. A.	AT NEW YORK W. A.	AT PHILADELPHIA. R. A.	AT PHILADELPHIA. W. A.
SCHUYLKILL.				
Lump	$—	$—	— —	4 55
Steamer	— —	— —	— —	4 55
Broken	—	—	4 60	4 60
Egg	—	—	4 75	4 90
Stove	—	—	4 95	4 80
Chestnut	—	—	3 85	3 85
Pea	— —	— —	— —	— —
LEHIGH.				
Freight to New York 50 cents.			— —	— —
Lump, (on board)	— —	— —	— —	— —
Broken	— —	— —	— —	— —
Egg	— —	— —	— —	— —
Stove	— —	— —	— —	— —
Chestnut	— —	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS *				
Honey Brook, Le'h W. A.	5 80@5 05		— —	— —
Spring Mountain " "	5 80@5 10		— —	— —
Sugar Loaf " "	4 90@5 90		— —	— —
Room Run " "	5 05@5 75		— —	— —
Hill & Harris " "	—		— —	— —
Shamokin " "	4 10@4 70		— —	— —
Lykens Valley " "	4 70@5 05		— —	— —
Broad T " "	—		— —	— —

Company Coals.

Sept. 1873.

	L.	Sef.	Gra.	Eg.	Sto.	Chest
*Scranton at E. Port	— —	— —	— —	— —	— —	— —
Pittston at Newburgh	4 90	4 10	5 10	5 10	5 40	4 90
*Lackawana at Rondout	5 15	5 25	5 35	5 40	5 70	5 10
Wilk'b're at Pt. John'n	4 95	5 05	5 15	5 30	5 50	4 95
Old Co. Lehigh at Pt. John'n	5 90	5 75	5 75	5 85	5 10	—
New York Coal Exchange	5 90	5 75	5 75	5 85	5 10	—

For freights to different points see "Freights"
*To contractors only.

Prices at Baltimore—Sept. 1873.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 50@5 75
Pittston and Plymouth, do	5 35@5 50
Shamokin Red or White Ash, do	5 35@5 65
*Lykens Valley Red Ash, do	@6 00
By retail, all kinds per ton of 2,240 lbs	7 00@8 00
*George's Creek and Cumberland f. o. b. at Locust Point for cargoes	4 85@5 00
West Va. and Youghiogheny gas f. o. b. at L. Point	6 50
Kanawha Cannel, coarse	@12 00

* Freight to New York $2 15.

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein, f. o. b. at Phila	$
Lemon " " "	
Cumberland Vein Coal	
Tyrconnel f. o. b.	$7 00

Prices at Georgetown, D.C., and Alexandria, Va.

Sept. 1873.

George's Creek and Cumberland f. o. b. for shipping $4 65@4 75

Prices at Havre de Grace, Md.

Sept. 1873

Wilkesbarre and other White Ash for Cargoes	$5 00@5 25
Lykens Valley	5 25@5 50
Shamokin Red or White Ash	5 75@6 00

Bituminous Coals (Cumberland).

Georgetown, F. o. b.	$4 60
Baltimore "	5 00
New York "	7 45
South Amboy "	7 50

Prices of Foreign Coals.

Sept. 1873.

Duty 75 c. per ton.

Corrected weekly by ALFRED FARMELE, No. 32 Pine street, N. Y.

Liverpool Gas Caking	— —@— —
" " Cannel	17 00@— —
" " House	20 00@22 00
" " Orrel	20 00@— —

Per ton 2,240 lbs. ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$21 00@22 00
" Cannel, "	22 00@25 00

Per ton 2,000 lbs. delivered.

Prices of Gas Coals.

Sept. 1873.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N. Y

	Coarse	Slack
Block House, f. o. b. at Cow Bay	$2 50	$1 25
Gowrie	2 00	0 00

Corrected by Bird, Perkins & Job, 27 South street.

	Coarse.	Culm of Coal.
Pictou	$3 00	1 50
Sydney	3 25	1 00
Lingan	2 75	1 00
Caledonia	2 75	1 25

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty on all slack coal or Culm: 40c. per ton of 28 bushels, 80 pounds to the bushel. On all bituminous coal or shale: 75 cents per ton of 28 bushels.

AMERICAN.	Nominal quo Currency.
Westmoreland, f. o. b.	$6 00 @7 00
Fairmount Gas Coal Co. of N. Y. "	6 50 @7 00
Despard Coal Co. "	6 50 @7 00
Penn. "	6 50 @7 00
Newburg Orrel Gas. "	6 50 @7 00
West Fairmount Gas Coal. "	6 50 @7 00
Redbank Cannel, at Pa. "	12 00 @0 00
AT PHILADELPHIA.	
Westmoreland	7 50 @0 00

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven Lump and St., net, $1 60; Br., Egg and Ch., $1 65; Stove, $1 75
Shipping at Pt. R., 20c., for use at Phil., $2 18 from Pt. Carbon.

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Phillipsburgh	$0 72
C. R. R., N. J., Phillipsburgh to Elizabethport	65
Shipping expenses at Elizabethport	25
Wharfage	10
Total	$2 23

MAUCH CHUNK TO PORT JOHNSTON.

L. V. R. R., or L. & S. R. R. from M. C. to Phillipsb'g	$0 72
C. R. R., of N. J., Phillipsburgh to Pt. Johnson	1 06
Shipping expenses	25
Wharfage	10
Total	$2 23

TO HOBOKEN

L. V. R. R., Mauch Chunk to Phillipsburgh	72
Morris & Essex R. R. Phillipsburgh to Hoboken	6
Shipping expenses	25
Wharfage	00
Total	$2 23

TO SOUTH AMBOY.

L. V. R. R.	
B. & D. R. R.	
Cam. & Am R. R.	
Shipping Expenses	35
Total	42 23

PENN HAVEN TO ELIZABETHPORT.

L. V. R R. Penn Haven to Phillipsburgh	84
C. RR. of N. J. Phillipsburgh to Elizabethport	1 06
Shipping expenses	15
Wharfage	20
Total	$2 25

Freights.—Sept. 1873

TO EASTERN PORTS.	Cumberland. From Georgetown.	Cumberland. From Baltimore	Anthracite. From Philada.	Anthracite. From Alex. Ports, Port Johnston, Weehawken, and Hoboken.	Anthracite. From Newburgh.	Anthracite. From Rondout.
Amesbury	—	—	—	1 80	—	—
Bangor	—	—	—	1 80	—	—
Bat	—	2 75	—	1 90	—	—
Boston	—	2 85	—	1 80*	2 25	2 05
Bridgeport	—	2 50	—	1 00	—	1 25
Bristol	—	—	—	1 25	—	1 45
Connasset Narrows	—	—	—	—	—	—
Derby	—	—	—	1 25†	—	—
Dighton	—	—	—	—	—	—
East Cambridge	—	—	—	1 85	2 25	—
Fall River	—	2 50	—	1 25	1 60	1 45
Hackensack	—	—	—	—	—	—
Hartford	—	3 25	—	1 50	—	1 70
Hoboken	—	—	—	50	—	65
Jersey City	—	—	—	50	—	65
Lynn	—	—	—	—	—	—
Middletown	—	—	—	1 25	—	1 45
Mystic	—	—	—	1 25	—	—
New Bedford	—	2 90	—	1 30	—	1 50
Newburyport	—	3 00	—	2 00	—	2 15
New Haven	—	2 50	—	1 00	1 20	1 25
New London	—	2 50	—	1 15	1 40	1 35
Newport	—	—	—	1 25	1 60	1 40
New York	—	2 15	—	50	—	65
Norwalk	—	2 50	—	1 00	—	1 25
Norwich	—	2 50	—	1 00	1 50	1 60
Pawtucket	—	2 75	—	1 35‡	—	—
Portland	—	2 90	—	1 45	—	—
Portsmouth, N. H	—	3 00	—	1 95	—	—
Providence	—	2 50	—	1 25	1 60	1 45
Rockport	—	—	—	—	—	—
Saco	—	—	—	—	—	—
Sag Harbor	—	—	—	1 15	—	—
Salem	—	3 00	—	1 80	—	—
Stamford	—	—	—	1 00	1 20	2 05
Stonington	—	—	—	1 25	—	1 50
Taunton	—	—	—	1 65	—	—
Warren	—	—	—	1 25	—	—
TO RIVER PORTS						
Albany	—	2 60	—	—	—	55
Catskill	—	—	—	—	—	50
Cocksackie	—	—	—	—	—	50
Coeyman's	—	—	—	—	—	65
Cold Spring	—	—	—	—	—	50
Fishkill	—	—	—	—	—	20
Haverstraw	—	—	—	—	—	40
Hudson	—	2 60	—	—	—	40
New York vessels	—	—	—	—	—	65
Nyack	—	—	—	—	—	45
Poughkeepsie	—	—	—	—	—	50
Rhinebeck	—	—	—	—	—	30
Rondout	—	—	—	—	—	—
Saugerties	—	—	—	—	—	40
Sing Sing	—	—	—	—	—	50
Stuyvesant	—	—	—	—	—	55
Tarrytown	—	—	—	—	—	50
Troy	—	2 60	—	—	—	60
West Point	—	—	—	—	—	20
Yonkers	—	—	—	—	—	50

† 3 c. per bridge per ton in addition to freight.
† New Haven rate and towing 25 c. extra per ton,
‡ Towing from Providence and return, extra,
|| And towing.

St. Thomas	$— — Gold
Martinique	— — "
Demerara	— — "
New Orleans	— — "
Mobile	— — "

Foreign and Provincial Freight

Sept, 1873.

Foreign.
Newcastle and Ports on Tyne, per keel of 21 1-5 tons £
Liverpool, 5 per cent primage

TO NEW YORK.

Provincial

Sydney	
Lingan	$ 5
Cow Bay	4 00
Port Caledonia	4 00
Little Glace Bay	4 00

			TO BOSTON.							4 00
Sydney	..	..	..	..	..	..	..	..	..	3 50
Lingan	..	..	..	..	..	..	..	..	..	3 60
Cow Bay	..	..	..	..	..	..	..	..	..	3 50
Port Caledonia	.	..	..	..	..	..	..	..	..	3 50
Little Glace Bay		..	..	..	..	..	..	.		3 50
			TO MONTREAL.							
Caledonia	..	..	..	..	..	..	..	..	..	3 75 gold
			TO CUBA.							
Caledonia	..	..	..	..	..	..	..	..	..	9 50 gold.

MARKET REVIEW.

NEW YORK, Aug 27, 1873.

IRON—Scotch Pig is dull, and prices are somewhat nominal; the stocks are not very large, but they are sufficient for the present demand, which is very light; we quote Eglinton $42@$43, Glengarnock $44@$45, Gartsherrie 47.75@$48 (little here and all in one hand), and Coltness $50@$51, without sales except in a jobbing way. American Pig is weak, and still in buyers' favor; the market is very dull, which is something unusual at this season, this being generally a pretty busy month; No. 1 may be quoted $42@$45—No. 2 X is accumulating, and with a very small outlet, prices have fallen off considerably during the last month or two; we cannot quote above $38, this price being the outside figure. New Rails are in more demand, but prices show no improvement; 3,500 tons English sold at a price under $70 gold; 2,000 tons American are reported at a private price; and we have also to report large contracts for future delivery, both for cash and credit, the particulars of which we could not learn at present. Old Rails have moved to the extent of about 750 tons both T. and Bridge, but on terms we could not learn. Scrap is quiet; we quote from yard $40@$45, dealers are paying $35@$37.50 for dock lots of Wrought, and $25@$30 for Cast.

LONDON, Aug. 11.—From the monthly circular of S. W. HOPKINS & Co. :—

EXPORT OF RAILS FROM GREAT BRITAIN.

	Month ending July 31.		7 mos. ending July 31.	
	1872.	1873.	1872.	1873.
To United States .....tons.	41,305	13,925	300,316	134.393
All other countries.....	43,258	63,868	232,289	291,157
Total.....tons.	84 563	77,793	532,605	425,550
Old Iron to all countries ...	12,937	2,123	68,958	43,478
Pig Iron to United States..	22,645	7,985	141,823	71,168

LEAD—Pig has been in active request and prices are higher. The sales noted in our last embraced about 1000 tons; since then the sales are 350 tons Foreign (Spanish, &c.,) at 6¾ cents, now held at 6⅞@7; and 200 do. American, 6¼, now firm at 6⅜@6½, all gold. Bar, and Pipe and Sheet, continue steady at old prices, viz., 9¼ and 10½ cents, respectively, and tin-lined Pipe 16½, all less 10 per cent. to the Trade.

Withdrawals from bond for consumption 22nd, 23rd and 25th August—

Lead, Spain.....pigs.1,425

COPPER—New Sheathing is steady at 38 cents, and Bolts and Braziers 40, Bronze and Yellow Metal Sheathing 27, and Y. M. Bolts 32. The market for Ingot is nearly at a stand, and we have only to notice sales of small lots Lake at 27 cents.

TIN—We are still without business to report in Pig, except small jobbing lots; 150 slabs Straits sold at 31¼ cents; Refined English 29½, L. & F. 28@28½, all gold; Refined English, at the difference in price, is being substituted for Straits to a considerable extent; still, holders of the latter do not seem disposed to make any concession. Plates have moved more freely, and prices are steady; the English markets are reported firm at prices relatively above those now current here; sales have been made of 1000 bxs. ¼d X and extra Charcoal Tin at $11 for I. C.; 500 do. Charcoal Terne, $10; 250 do. S. T. P., $10.12½; 250 do. Coke Tin, 14 by 20, $8.75, all gold; and 1000 do. on private terms.

Withdrawals from bond for consumption 22nd, 23rd and 25th August—

Tin from England.....bxs.430

STEEL—English Cast continues in small supply, and prices are firm, though unchanged. American is steady at quoted figures, There have been several parcels of "Black Diamond" Fire-box Plates shipped to England recently, these possessing more toughness, than is possessed by the English makes.

SPELTER—Whole parcels are dull; sales have been made of 50 tons prime Silesian at 7¼ cents gold. Domestic, of Western make, is selling at 8¼ cents currency.

REGULUS ANTIMONY—We note small sales at 13½ cents gold.

ZINC—Sheet is steady at previous quotations—100 casks Mosselman sold for arrival, at agent's price. Manganese 4@4½

METALS.

NEW YORK, August 27, 1873.

IRON.—Duty: Bars, 1 to 1½ cents ℔ lb; Railroad, 70 cents ℔ 1c lbs.: Boiler and Plate, 1½ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ℔ lb; Pig, $7 ℔ ton; Polished Sheet, 3 cts. ℔ lb; Galvanized 2¾; Scrap Cast, $6; Scrap Wrought, $8 per ton. All less 10 per cent. No Bar Iron to pay a less duty than 35 per cent. ad val.

	Store Prices.
Pig, Scotch—Coltness ℔ ton	50 00@51 00
Gartsherrie	47 75@48 00
Glengarnock	44 00@45 00
Eglinton	42 00@43 00
Pig, American, No. 1	— —@45 00
Pig, American, No. 2	36 00@38 00
Pig, American, Forge	33 00@35 00
Bar Refined, English and American	— —@— —
Bar Swedes, assorted sizes gold	— —@137 50
	Store Prices, Cash.
Bar, Swedes, 1¾ to 5 x ⅜ & ¾ 2 sq. & 6 to 12 x ⅜ & ½	175 00@— —
Bar, Refined, ⅜ to 2 in. rd. & sq. 1 to 6 in. x ⅛ to 1 in.	82 50@85 00
Bar, Refined, 1½ to 6 by ¼	87 50@— —
Bar, Refined, 2½ to 2⅞ round 1 & 1½ by ¼ & 5:16	90 00@— —
Large Rounds	102 50@107 50
Scroll	102 50@145 00
Ovals and half-round	102 50@135 00
Squares	110 00@130 50
Horse Shoe	102 50@105 00
Rods, ⅜ to 3-16inch	92 50@135 00
Hoop	— —@160 00
Nailrod	— @ 9
Sheet, Russia, as to assortment (gold)	17 @ 18
Sheet, Singles, D. and T. Common	—8¾@— 7
Sheet, D. and T. Charcoal	—7 @— 8¾
Sheet, Galv'd, list 10 per cent, discount	— —@— —
Rails, English (gold), ℔ ton	67 00@ 68 00
Rails, American, at Works in Pennsylvania, currency	77 50@— —

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 4 cents ℔ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ℔ lb	— @— 38
Copper Bolts	— @— 40
Copper Braziers, 16oz. and over	— @— 40
Copper Nails	— @— 45
Copper, Old Sheathing, &c. mixed lots	26 @— 27
Copper, Old, for chemical purposes, 14@16 oz.	— @— —
Copper, American Ingot	27 @ —27¼
Copper English Pig	— @— —
Yellow Metal, New Sheathing & Bronze	— @— 27
Yellow Metal Bolts	— @— 32
Yellow Metal Nails, Sheathing and Slat'g	27 @— 30

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1½ cents ℔ lb Pipe and Sheet, 2¾ cents ℔ lb.

Spanish (gold)	6 75 @6 87½
German, do.	6 75 @6 87½
Domestic do.	6 37½@6 50
Foreign, Refin'd	7 25 @— —
English do.	6 75 @7 00
Bar.....(net)	9 25 @— —
Pipe.....(not)	— — @10 50
Sheet	— — @10 50

STEEL.—Duty: Bars and ingots, valued at 7 cents ℔ lb or under 2¼ cents; over 7 cents and not above 11, 3 cents ℔ lb; over 11 cents, 3½ cents ℔ lb, and 10 ℔ cent ad val. Store prices.

English Cast (2d and 1st quality) ℔ lb	—	18½@— 23
English Spring (2d and 1st quality)	—	9½@— 10½
English Blister (2d and 1st quality)	—	11 @— 18½
English Machinery	—	14½@— —
English German (2d an 1ist quality)	—	12½@— 14½
American Blister "Black Diamond"	—	— @— 11½
American, Cast, Tool do.	—	— @— 17
American, Spring, do.	—	— @— 11
American Machinery do.	—	11½@— 12
American German, do	—	9 @— —

TIN.—Duty: Pig, Bars, and Blocks, 15 ℔ cent. ad val.; Plate and Sheets and Terne Plates, 25 ℔ cent.; Roofing 25. ad val.

	Gold ℔ lb.
Banca	34½@35
Straits	31¼@—
English	28 @28¼

PLATES. *Fair to Good Brands.*	*Gold.*	*Currency*
I. C. Charcoal, ℔ box	$10 87½@11 25	$12 75 @13 25
I. C Coke	8 50 @ 9 00	10 00 @10 75
Coke Terne	7 50 @ 8 50	9 00 @10 25
Charcoal Terne	9 62½@10 37½	11 50 @12 75
SPELTER—Duty: In Pigs, Bars & Plates,		$1.50 p. 100lb
Plates, Foreign.....(gold)	.....p. 100 lb.	7 25 @—7 50
Plates, Domestic	.....p lb.	8¾@—11

ZINC—Duty: Pig or Block, $1.50 per 100 lb.; Sheet 2½c. per lb Sheet.....per lb.—10¼@10¾

San Francisco Stock Market.

BY TELEGRAPH.

NEW YORK. Aug. 27, 1873.

The following reports from the San Francisco Stock Board are dated the 21st and 26th. Excepting a slight advance in Savage, the tendency of the list is downward, the figures however have scarcely changed from our last quotations.

	Aug. 21.		Aug. 26.
Savage	35	—	40
Crown Point	83	—	82
Yellow Jacket	47	—	45
Kentuck, "New Issue"	7¼	—	7¼
Cholliar Potosi	36	—	36
Gould & Curry "New Issue"	9½	—	10½
Belcher "New Issue"	64½	—	68
Imperial	4½	—	4¼
Raymond & Ely	70½	—	71¾
Meadow Valley	16¾	—	17
Eureka G. V.	18	—	—
Ophir	—	—	—
Hale and Norcross	—	—	—

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. The ENGINEERING AND MINING JOURNAL, which is the Organ of the Institute, and contains its proceedings, transactions and notices of meetings, will be sent to each Member and Associate on the payment of his annual dues. Back numbers cannot, as a rule, be sent.

II. Dues are payable in advance at the annual (May) meeting. Remittances should be made, as far as possible, by P. O. Order, payable to the Secretary.

III. The first volume of Transactions of the Institute is in course of preparation and will be sent, as soon as issued, to all members not in arrears.

IV. General meetings are held on the fourth Tuesday of February, May and October. Authors of papers are requested to notify the Secretary, in advance of meetings, of the subject and length of their papers.

THOMAS M. DROWN, Secretary.

1123 Girard street, Philadelphia, Pa.

MISCELLANEOUS.

THE ENGINEERING AND MINING JOURNAL.

ROSSITER W. RAYMOND, Ph. D.
JOHN A. CHURCH, E. M. Editors.

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THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.* It is the Organ of the American Institute of Mining Engineers, and is regularly received and read *by all the members and associates* of that large and powerful society, *the only one of the kind in this country.* It is therefore the best medium for advertising all kinds of machinery, tools and materials used by Engineers or their employees.

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THE SCIENTIFIC PUBLISHING COMPANY.

WILLIAM VENTZ, SECRETARY.

27 Park Place,

P. O. Box 4104. NEW YORK CITY.

CONTENTS FOR THIS WEEK.

WE print elsewhere an article from an English paper on the condition of the iron mines of Great Britain. The opinion has gained ground in some quarters that there was more danger of exhausting the ore than the coal, and this article shows that it was well founded, with the exception of one district—Cleveland, whence so much that is valuable to iron makers has proceeded. The article is every way interesting and seems to be written with neither prejudice nor alarm.

THE supplementary paper of Mr. OSWALD J. HEINRICH, which we publish in part to-day, together with the drawings illustrating his long and successful battle with fire and fire-damp in the Midlothian Colliery, will be very welcome to members of the Institute of Mining Engineers. The fresh and practical nature of Mr. HEINRICH'S communications, and the important nature of their subject, have attracted to them a good deal of attention. At the May meeting of the Institute, the author made his first appearance in person, having come from his distant field of labor for the purpose of meeting his professional brethren. It may fairly be said that he was the hero of the occasion; and he must have felt himself repaid, in the cordial acknowledgements of his achievements freely rendered on all sides, for the arduous and perilous labors and the almost utter isolation of years. We trust his valuable contribution will be followed by many such chapters out of actual practice, from him and from other members.

ENGLISH courts of law certainly witness some extraordinary scenes. Lately, "a feeble looking man," a collier, was summoned for breach of contract, and it turned out that a foreman having taken pity on him, gave him work out of charity. He left it without notice, stayed away several days, and his employer claimed no less than £6 damages! We are not surprised to read that the following observations were made in court:—The Magistrate's Clerk (Mr. WATSON): It is absurd to talk about claiming such a large amount from a man like that. What is the minimum profit you would get from his labor for a fortnight? Witness: £6.—The Clerk: What! out of a man like that? Witness: Yes.—The Clerk: Then what is the minimum profit you derive from an ordinary pitman? Witness: He would be a very ordinary pitman indeed if we did not get £18 profit.—The Clerk: Then from what you say, however high pitmen's wages be at present, I think they are too low yet.—Our coal companies have to bear a good deal of obloquy, but what would they not suffer if it could be proved that they made $45 a week upon the labor of each pitman?

The Ohio Geological Survey.

PART I. of Volume I., of the Report on the Geological Survey of Ohio,* containing five chapters on the general, and twenty-four chapters on the local geology of the State, has been published by the Legislature. Part second will treat of Paleontology, and will be followed by three other volumes whose subjects will be as follows: Volume II., Geology and Paleontology; Volume III., Economic geology; Volume IV., Agriculture, Botany and Zoology. Dr. NEWBERRY, the Chief Geologist, is, we believe, an advocate for a liberal interpretation of a geologist's duties, and belongs to that school of men who think that when the people of a State order a survey, they have a right to expect something more than a bare inquiry into the order of stratification and the figuring of new specimens. His Report is addressed directly to the people of the State, and as they have not been educated in schools of science, he has taken pains to write an introduction explanatory of the science of Geology, discussing those physical features of the State—topography, soils, climate, etc.—which rest incessantly under common observation, and explaining the unusual prominence which the Ohio Survey necessarily has as the field on which disputed questions are settled. It seems to us that this method is happily chosen. The Legislature has shown an increasing interest in the work as the three appropriations of $14,000, $18,000 and $21,000 for the years 1869, 1870, and 1871 show. Of the present volume, 20,000 copies are printed and the engravings have been generously provided for. The Chief Geologist seems to fear that this unexpected liberality may prove harmful if the present Legislature is succeeded by one less enlightened, and such fears are not unreasonable. But, as it stands, the volume before us cannot fail to be of great service as a disseminator of sound knowledge on a subject upon which few people in ordinary life have correct views.

The first subject of general interest treated is that of prairies, the causes of their formation and the possibility of growing planted forests upon them. We propose to revert to this subject at a future day and will only say here that while Dr. NEWBERRY does not doubt that the area of treeless plains may be greatly lessened by cultivation, he does not believe the planting of forests in the heart of the treeless region can have any *immediate* success. Forests may be made to take hold by planting them from the border of the area and gradually working toward the center, but the process must be one for generations and perhaps for centuries to perfect.

One of the most important labors of the survey, as far as its work is developed in the present volume, is the study and defining of the Cincinnati Anticlinal. Though known and studied by the former survey, ordered in 1835, its age and structure were misapprehended, and have been definitely settled only by Dr. NEWBERRY and Prof. ORTON. The Cincinnati Anticlinal is a line of upheaval passing from the southern border of Tennessee, in a direction somewhat east of north, through Nashville and Cincinnati to Lake Erie. It is nearly parallel with the Alleghanies, and hitherto has been accepted as belonging to that system of upheaval. This placed its age after the Carboniferous period, but it is now found to date from immediately after Lower Silurian time. The crown of the arch was probably in Kentucky, where the Lower Silurian rocks cover a breadth of one hundred and thirty miles. From the region of Cincinnati the ridge sloped gradually away to the north. Erosion has been greatest in its southern part, the east and west breadth of the Lower Silurian area at Cincinnati being almost ninety miles, and near the lake shore fifty miles; but the altitude of what is left in the south is nevertheless greater than that of the measures towards the north. The Lebanon beds, which form in Ohio the uppermost Lower Silurian measures, once covered the whole breadth of the arch. Following the Lebanon beds are calcareous shales, which correspond in position with the Medina sandstone of New York, though not yet identified with it, by the evidence of fossils. The Clinton group, however, is well identified, and affords conclusive proof that the Cincinnati arch had been at least partially raised before that time. A conglomerate was formed in the Clinton, which was made up of limestone pebbles and worn fossils of the Cincinnati group, which must therefore have formed a wave-worn prominence in the early part of the Upper Silurian age. Prof. ORTON says of the formation of this mountain range: "In the first place, it may be remarked that all of the facts known in regard to the Cincinnati axis go to prove that it was of very slow and gradual formation. It was a gentle flexure of the earth's crust, involving the Upper and Lower Silurian, and to some extent the Devonian formations of Ohio. To the southward its emergence as an island in the ancient sea was probably of earlier date than in Ohio; just as in southern Ohio its emergence was earlier than in the northern part of the State. Thus different portions of the geological series of this general region have been involved in the different stages of its history. There is a measure of probability in the view that the movement of elevation was synchronous with certain great movements of depression on the eastern border, which have come to be recognized in the explanation of the geological phenomena of that part of the continent. Such views, however, can only be counted *probable* in the present state of our knowledge."

The fact that different formations were involved in the upward movement in various parts of the anticlinal proves that the upheaval underwent some oscillations, but always resulting in an increasing elevation. The only appreciable dip in the upper beds of the Cincinnati group is northerly, and this varies only between three and five feet to the mile.

The geology of the Cincinnati Anticlinal is important in connection with the

* Report of the Geological Survey of Ohio. Volume I, Geology and Paleontology. Part 1, Geology. Columbus, Ohio: Nevins & Myers, State Printers. 1873.

history of the coal measures. It is proved that during the Lower Carboniferous period the arch suffered its greatest depression, and that this depression was greatest in the southern portion, while the central portions of the Blue Limestone regions were never covered by the rocks of this period. The Cincinnati arch stood above the level of the Lower Carboniferous sea from about the southern line of Pennsylvania to Lake Erie. This settles the oft-mooted question: "Were the Alleghany and Illinois coal fields ever a unit?" Dr. NEWBERRY shows that they were not, but formed two separate and individual coal making areas. These seas may have united their waters in Alabama, but even that is doubtful. This fact may be studied with profit by those who look upon each coal field as a continental sheet of fuel, which needs only to be found in one quarter of the country to be thenceforth counted upon as a store of wealth in all the other States. The discovery of the Ohio geologists conflicts with the view previously held by some of the best geological authorities in our country, and we will therefore quote one paragraph from the report:

"But it will be said that the limestones interstratified with the coal seams mark periods of submergence in the Coal Measure Epoch, and that the sea in these intervals might have rolled completely over the Cincinnati arch. Prof. ROGERS even sees in the thickening of the coal measure limestones in Pennsylvania evidence of a wide-spread open sea at the west during their deposition. Our observations in Ohio prove, however, that Prof. ROGERS was mistaken in the facts, and therefore in his conclusions; for the limestones of the coal measures are most numerous and thickest in the center of the basin, thinning out on the west as on the east. Even the great limestone overlying the Pittsburgh coal—that upon which Prof. ROGERS specially based his conclusions—after passing the center of the trough diminishes rapidly in force, and is largely replaced by mechanical sediments as the western margin of the coal field is approached. These facts prove that the Alleghany coal field was in the Coal Measure Epoch as it is now, and has always been since the Lower Silurian age, a synclinal trough. During the limestone making intervals of the Coal Measure Epoch this trough was still occupied by an arm of the sea, but was then a gulf or tongue of far more restricted dimensions than before. Of this gulf the Cincinnati arch was the western shore, and one which rose high above it. The degradation of this shore—as I shall show more fully in another place—contributed a large part of the materials interstratified with the limestones and beds of coal."

The existence of a range of mountains stretching from the central axis of the present United States northward into Canada (Dr. NEWBERRY thinks the line of disturbance noticed in the vicinity of the Enniskillen oil region may be its northern prolongation) had a marked effect upon the formation of the great lakes. In its elevation the massive limestones of the Devonian and Upper Silurian series were brought up in such a way as to form a barrier transverse to the line of glacier movement. East of this barrier lay the shales of the Huron, Erie and Waverly groups, more than a thousand feet thick, and in this soft material the moving ice excavated the basin of Lake Erie. The uniformity of the excavated materials, and the simplicity of the excavating agent, have resulted in the formation of a plain and little variegated trough. Few islands are found in the water which now fills it. In the judgment of the Chief Geologist of Ohio, these islands are parts of the ancient barrier. "They are all wrought by glacial action out of Carboniferous limestone and Waterlime, of which the latter here forms the crown of the anticlinal. They are separated by comparatively narrow channels, and all of this part of the lake basin is much less deeply excavated than the middle and eastern portions."

The lowest rocks exposed in Ohio are those of the Cincinnati group, corresponding to the rocks of the Hudson period; from that all the periods of the New York geologists, except the Catskill, up to the Permian measures, are represented; the Permian, and all above it, are wanting until the glacial drift is reached, after which the record is again minutely filled.

Ohio has not proved to be an oil-producing district, and artesian wells have also failed in the State for reasons fully explained in the report. Its wealth in coal, however, is well known to be very great, and it has been the good fortune of this survey to point out that the State possesses unexpected wealth in this fuel. The work of Dr. ANDREWS lying in Gallia, Meigs, Athens, Morgan and Muskingum Counties, brought the most important developments of Ohio coal mines under his observation. He has described many of them, adding a great number of analyses by Prof. WORMLEY. A great deal has been said about the analyses made for this survey, and the results have undeniable importance, both in proving conclusively that the ashes of coal may contain marked quantities of phosphorus, and that the coal itself contains sulphur, in addition to that combined in the ash. We cannot, however, agree with Dr. ANDREWS in looking upon the mechanical improvement of coal by washing, as a failure in those cases where a considerable percentage of sulphur exists in some other form than pyrites. It is pretty certain that the injury done in a blast furnace by an impurity often depends upon the state of combination in which it exists; and it seems to be also established that this newly found sulphur in coal is eliminated, or nearly so, in coking. Probably it exists as an organic compound, and is volatile at the temperature of the coke oven. If washing removes one sulphur compound and coking the other, we do not see why the use of the two means of purification should not give a fairly pure product. Nor can we agree with the Doctor in urging so much caution in copying "blindly the forms of foreign furnaces, which have succeeded under entirely different conditions." So far as we have heard from Ohio, her furnacemen have been only too slow to copy the development of furnace construction abroad. While no work so important as the building of a blast furnace should be recklessly carried out, we think that the warning required is of the opposite kind.

As a whole, the first volume of the report on the Ohio Survey fulfils in a high degree the expectations formed of it. In style it is clear and concise, and, while not presenting that beautiful typograpical execution which characterizes some official work, the liberality of the legislature has permitted the employment of the best workmen in preparing the plates of fossils, some advance sheets of which we have seen. These are admirably done.

The officers of the survey are: J. S. NEWBERRY, Chief Geologist; EDWARD ORTON and E B. ANDREWS, Assistant Geologists; T. G. WORMLEY, Chemist, and F. B. MEEK, Paleontologist.

George Fritz.

IN the death of Mr. GEORGE FRITZ, Superintendent of the Cambria Iron Works, the iron trade loses the services of one of the most successful mill managers and mechanical engineers we have ever had, and the metallurgical profession loses a fellow-worker, who has proved himself to be one of the most energetic and thoughtful students of metallurgical and mechanical science in this country. His achievements are inseparable from those of his brother, Mr. JOHN FRITZ, with whom he worked for many years, and to show how active their industry was, we will enumerate some of the things they have done. The American rail mill is almost their creation. Their improvements cover every detail of proportion and arrangement, and, laying the foundations of American mill practice, they met one objection or difficulty after another and overcame it. The 3-high mill was by them made a prime factor in successful mill-work in this country, as Mr. A. L. HOLLEY showed in his paper read before the Institute of Mining Engineers in October, 1872. Messrs. FRITZ also introduced the carrying rollers, and re-arranged the whole system of guides and guards. They were the first to apply direct-acting engines to rail trains, they adapted the steam engine to this service, and the general features of their engine, thus adapted, have entered into all good mill engines since. They also applied quick-working engines to saws and finishing machinery. They organized the whole system of roll-turning, changing the proportions of reductions, and securing better work. They overhauled the puddling and heating furnace, doubling their capacity. They left their mark on every detail. They took rail making up when it was almost a failure everywhere, and in a few years they made Cambria a great success. All other mills adopted their plans, and the business thus became generally successful. These details sufficiently mark the standing of the brothers in the calling they followed.

GEORGE FRITZ was born in November, 1828, in Chester County, Penn. He worked on a farm until he was eighteen years old, then learned carpentry in Philadelphia, and worked at the trade five years. His brother JOHN, having become a leading foreman in the iron business wished GEORGE to enter it also, and advised him to change his carpentry into pattern-making, which he did in 1851. Shortly after, the brothers went into the machine business for themselves, at Catasaqua, but as some of their patrons did not keep their engagements, and as JOHN was pressed to go to Cambria to take charge of the works there, he did so, taking GEORGE with him in 1854. The latter worked at pattern-making, roll-turning, drawing, and one after another at all branches of the iron business, which he very soon mastered. During all this time he was his brother's principal assistant, and the two worked out together the improvements mentioned. JOHN FRITZ left Cambria to build the Bethlehem Iron Works, in 1860, and GEORGE, having then become not only an expert, but a recognized master in all branches of construction and manufacture, was appointed Chief Engineer of the Cambria Iron Works. At the time of his death, he had sole charge of all the engineering connected with blast furnace, coal and ore mines, coking, coal washing, and the enormous iron producing plant, which turns out more than any other in the United States, (viz., 2000 tons of rails per week) and the Bessemer steel plant which also produces more than any other, although there are others of the same nominal size. He also had general charge of the manufacture and the men employed in it, as well as of the engineering.

GEORGE FRITZ, some three years since, invented and introduced the blooming tables now generally used on mills for rolling Bessemer ingots. The ingot is fed into the rolls, from a vertically moving table, and is turned over, by simple machinery operated by levers in the hands of boys. A man and two boys roll a 3-rail ingot, weighing a ton, from 14 inches square, to 7 inches square, in 3 to 4 minutes.

GEORGE FRITZ had a great leaning to architecture, and was remarkably well read in its history, and thoroughly appreciative of its æsthetical features. His excellent taste and thorough cultivation in the spirit of it, as a fine art, joined to his extraordinary engineering capacity, would have perhaps led him into a more brilliant career as an architect. All the new Cambria Works buildings show how far the beautiful can be joined to the useful in business and manufacturing structures. He also designed various church roofs and residences.

Besides his capacity as an engineer, he had great power as a manager of men, on account of his invariable manliness and fairness toward them as well as for his pluck and resources in meeting emergencies.

THE Niagara railroad Suspension Bridge has been for months past undergoing improvement. It has been thoroughly inspected, with a purpose to discover the condition of its anchorage and concealed parts. Everything was found to be as perfect as when laid, twenty years ago. The entire woodwork has been replaced with new, and there is nothing about the bridge which is not just as perfect as on the day it was first completed. A strong new chord has been put under the carriage-way of the bridge, and the one above has been rebuilt. Engineers declare that the bridge could not fall if the cables were wholly removed.

CORRESPONDENCE.

The Geological Survey of Texas.

TO THE EDITOR:

SIR—Some time during the last year I informed you that I had prepared a bill providing for a geological survey of the State of Texas, which bill passed the Legislature and became a law about a year since. By virtue of this law the Governor has just appointed the chief geologist to conduct this important work, whose name is JOHN H. GLENN, a gentleman very little, or not at all, known to scientific men. It is to be hoped that this appointment may not prove disastrous to the State of Texas, which is in such great need of a thorough survey by reliable scientific men. Unfortunately, as in many other cases, this appointment was made on account of friendship and politics, leaving merit out of the scale. Of course, the benefit of a geological survey depends entirely upon the competence of the man in charge. Texas possesses vast mineral wealth and boundless agricultural resources, and what she most needs is such investigation and publication of its results to the world in the form of an official report, on the authority of some eminent scientific geologist, well known not only in America but in Europe—a full, complete geological report.

The following is a copy of the bill:

SECTION 1. The Governor is hereby authorized and directed to appoint, by and with the advice and consent of the Senate, some suitable and competent person as State Geologist, who shall hold his office until the completion of the geological survey of the State by this act authorized, or until his successor is appointed and qualified, in case of his removal, as hereinafter specified, and who shall perform the duties herein prescribed, and during his occupancy of said office shall hold no other office; and before entering upon his duties as State Geologist shall enter into bond, with security to be approved by the Governor, in the sum of five thousand dollars, for the faithful performance of the duties of said office.

SEC. 2. That said State Geologist shall, as soon as possible after his appointment and qualification, appoint two principal assistants, one of whom shall be an expert practical and scientific chemist and mineralogist, and the other a competent geologist, and shall have full authority to appoint such sub-assistants as may from time to time become necessary. He shall also have the authority, if not himself well versed in paleontology, (which ought to be the case,) to procure the services of some well known and reliable expert in the department.

SEC. 3. That said State Geologist shall, with the aid of his assistants, make as rapidly as may be consistent with accuracy, a thorough geological, mineralogical and agricultural survey of the State, embracing a scientific and descriptive survey of the rocks, minerals, mineral waters and fossils of the same, full and complete assays of the ores and minerals, and analysis of the soils and subsoils, with a classification of the same, stating their adaptation to particular crops, and the best methods of preserving and increasing their fertility. They shall also determine the relative ages, order of succession, thickness, dip, strike and composition of the various building stones, ores, minerals, fossils, fertilizers and mineral waters, with specimens of the useful native and introduced plants, and all other substances and objects that may be necessary to illustrate the economic and scientific geology, and render the collection a complete museum of practical geology.

SEC. 4. That the Governor shall procure safe and suitable rooms, at the capital of the State, for the permanent deposit and arrangement of the collections above mentioned; that said collections shall be arranged and classified in the same by the said State Geologist and his assistants, and that this museum shall be the office and headquarters of the survey, and always kept open and freely accessible at seasonable hours to the public, excepting when the members of the geological corps are all absent attending to field duties.

SEC. 5. That the duplicate specimens collected by the survey shall be classified and labeled, when called for, to be distributed to each of the colleges of the State that have been duly authorized to grant diplomas, provided that each distribution shall only be made after due application of said colleges has been made to the Governor.

SEC. 6. That the said State Geologist shall present to the Governor, at each regular session of the Legislature, a report of progress made up to that time, including an account of the more important results accomplished, and that said preliminary reports, if desirable or necessary to their proper understanding, shall be accompanied with maps and other illustrations, and that these, as well as all other reports of said survey that may be made and presented by said State Geologist and assistants, shall be the exclusive property of the State; provided, that said State Geologist shall not be prohibited from publishing any such facts, with maps and illustrations, that may be his duty to present.

SEC. 7. That the salary of the said State Geologist shall be three thousand dollars per annum, and that of the principal assistants each eighteen hundred dollars per annum, together with all travelling and incidental expenses of the said State Geologist and his assistants while engaged in the field explorations, to be paid quarterly after they enter upon the duties of their office. All money hereafter appropriated to carry into effect this act, shall be expended in the payment of the salaries of the State Geologist and principal assistants, and of such sub-assistants and other aid as it may be necessary to employ, in the purchase of the necessary chemical apparatus, chemicals and instruments, the transportation of specimens, and the payment of incidental expenses, and upon the presentation by said State Geologist of proper vouchers, approved by the Governor, the Comptroller is hereby authorized to draw his warrant upon the Treasury for all bills for sums due or expended as above specified; provided, that the whole amount expended shall not during any one year exceed the sum of twelve thousand dollars.

SEC. 8. That the said State Geologist and his assistants, before entering upon their duties of office, shall make oath before some competent officer that they will not purchase any lands or mining interests in the State, with the view of speculation, during the time they hold office, and that they shall not conceal or suppress any information relative to any discovery which they may make pertaining to the objects of the survey, either from the State or from individuals, upon whose lands said discovery may be made, and that they will so conduct the survey as to give as much publicity as possible to the important results of the same.

SEC. 9. That on the completion of said survey, or at proper intervals during its progress, as facts may accumulate, said State Geologist shall prepare and present to the Governor more complete reports, to be considered final as far as they go, if presented during the progress of the survey, or final and complete if presented after the whole State shall have been surveyed, which reports shall embody the results of the entire survey, or of that portion of it completed, and shall be accompanied by all such maps, sections, diagrams, and other drawings, as may be necessary for a full and complete understanding of the same. And the Secretary of the State is hereby directed to secure a copyright in the name of the State for all reports presented by the State Geologist, and published at the expense and by the authority of the State.

SEC. 10. That whenever any such reports are published, the Governor may cause them to be sold to the citizens of the State, at a price not exceeding the cost of paper, printing and binding, and to others, on such terms as may be advantageous to the interests of the State, and all moneys that may be received from the sale of said reports shall be placed in the common School Fund of the State.

SEC. 11. That said State Geologist shall be allowed fifty copies of all reports of said geological survey for distribution to scientific men in this country and in Europe; and that twenty copies of the same shall be in like manner allowed to each of the principal assistants in said survey, in accordance with the usual custom in such surveys.

SEC. 12. That the State Geologist shall superintend the publication of his report, provided for in this act, and shall present to the Legislature an estimate of the cost of the publication of the same, at the time such report shall be presented.

SEC. 13. That in case of the death or resignation of said State Geologist, before the completion of said survey, the Governor may appoint his successor; and the Governor shall have power to remove said State Geologist from office for neglect of duty, incompetence, dishonesty, or any kind of malfeasance in office, should he be found guilty of such charges brought against him, provided due notice has been given to him that such charges have been made; and he shall be allowed full opportunity to confront his accuser, and make his defense; and in case of such removal of the State Geologist, he shall deliver over to the Governor, or to his successor in office, all specimens, instruments, apparatus, maps, sections, diagrams, and other property belonging to the State, and relating to the survey.

SEC. 14. That all former laws of the State relating to a State geological survey are here hereby repealed, and that this act take effect and be in force from and after its passage.

Very respectfully,

July 19, 1873. A. R. ROESSLER.

The Prospects of the Iron Trade of Great Britain.

(From the Newcastle Daily Telegraph.)

PROBABLY no subject is so much talked about, and yet no subject is so little understood as the conditions under which the iron trade of the country is carried on. A favorite alarmist theory is, that although England is now, undoubtedly, superior in all that relates to the manufacture of iron to the nations with which she is chiefly brought into competition, she is losing ground so fast that they will eventually overtake her. Some there are, indeed, who affirm that if we were, even now, weighed in the balance with Belgium and Rhenish Prussia, we would kick the beam; while others point to Spain as the ferruginous Golconda of the future. It is not well that on a matter of such vital moment to our industrial interests there should be so much misapprehension; and, on this account, we propose to examine and analyse the gravamen of the indictment, on account of which our leading industry has been placed upon its trial.

Scotland, Staffordshire, Wales, and the North of England are the present centers of the iron trade of Great Britain. The Forest of Dean, Northamptonshire, and Lincolnshire are prospective and undeveloped sources of supply. So far as Scotland is concerned, there is very little prospect of any considerable increase of production. The blackbands of that country, with the discovery and original use of which the well-known name of Mushet is associated, are fast approaching exhaustion. No new ironstone fields of any extent or value have been opened up within recent years. The clay-bands, although more abundant, are an inferior quality of ore, and when the ironmasters of Scotland come to place their main dependence upon them, their prestige must decay. Scotland owes its fame as an iron-producing country entirely to the superior quality of its iron, which commands a higher price in the markets of the world than the brands of any other district within the limits of the United Kingdom. In economy of production, Scotland cannot compete successfully with the North of England; and it follows, therefore, that when the exhaustion of blackband ironstone involves, as its necessary corollary, a deteriorated quality of iron, Scotland must go to the wall. It would be needless panic-mongering to speak of that exhaustion as a near event. The pig iron aristocracy of Scotland may hold up their heads as proudly as they now do for many years yet to come. But the exhaustion of the blackband ores is at least sufficiently proximate to prevent any considerable or noteworthy effort in the direction of an extended production. Thus we find that whereas the total make of pig iron in Scotland reached 1,206,000 tons in 1870, it fell in 1871 to 1,160,000 tons; and in 1882 it dwindled still further to 1,090,000. The number of furnaces in blast diminished to a more than corresponding extent; for while 126 furnaces were blowing in 1871, only 115 were in blast in 1872. When it is considered that the demand for pig iron in 1872 was altogether unparalleled, and that the profits of ironmakers were large without precedent, it is obvious that the decline of production could only follow from some inherent weakness; and although it has been variously accounted for, we believe that the falling off was due more to a lack of confidence in the permanence of the natural resources at the disposal of the ironmasters of Scotland, than to anything else. In the face of a probability that they will soon find the foundations of their prestige and prosperity giving way, ironmasters cannot see their way to undertake anything like a large extension of operations. It is true that they have another seam of ironstone, called the "slaty-band," to fall back upon when they can no longer work the "blackband" at a profit; but as the position of the "slaty-band" is about 100 fathoms under the blackband, it would cost much more to bring it to the surface, and it is, at the best, an inferior quality of ore. These data will be found, we

think, to supply the *raison d'être* that the pig iron trade of Scotland has recently shown signs of retrogression; and nothing more is needed to show cause why these signs should be permanent. The whole history of the iron trade of Scotland is almost like a flash in the pan, only it is much more full of substance. In 1830, there were only twenty-seven furnaces in Scotland, producing 39,500 tons crude iron per annum; twenty years later there were 105 furnaces in blast, and the annual production was 595,000 tons; while thirty years later, we find 131 furnaces blowing, and the annual make of pig iron had reached a million tons!

Of the prospects of the Staffordshire iron trade, it is due to speak in more hopeful terms. The oldest iron-producing district in Great Britain, Staffordshire is yet in many respects the first. But it is proper to distinguish between the Northern and the Southern Divisions of the County, for their destinies are likely to be very dissimilar. Only a few years have elapsed since South Staffordshire was the leading district for the production of ore and pig iron, as it is now for the manufacture of finished iron; but its deposits of ironstone have been thinning out so fast, that it no longer holds the same position relatively to other districts that it once did. Its iron manufacturers are now compelled to import large quantities of ore in order to keep their furnaces going. North Staffordshire, on the other hand, has yet immense stores of ironstone, black and clay-band, and hydrated oxide still untouched, while in close proximity to the ironstone fields, there are vast coal measures. The total quantity of ironstone raised in South Staffordshire in 1866 was 599,000 tons; in 1868, 304,578 tons; and in 1871, 705,665 tons. In North Staffordshire, only 612,243 tons of ore were raised in 1866, as compared with 1,513,080 tons in 1871. Although the production of pig iron does not show a corresponding increase in favor of the Northern Division, it is, in metallurgy, a condition as fixed and unalterable as the laws of the Medes and Persians, that the development of valuable and extensive mineral resources follows upon the proof of their possession. Staffordshire is likely to contribute much more in the future than she has done in the past to the annual aggregate of our mineralogical and metallurgical products. Her progress has been somewhat hindered, hitherto, by the neglect of those sources of economy that have secured for the North of England such a pre-eminent position. But this reproach is being wiped off. The ironmasters of Staffordshire have recently shown themselves alive to the fact that if they would continue to hold their own they must abandon obsolete and unprofitable usages, notwithstanding that they may be stamped with the sign-manual of old Father Time. In mechanical improvements, and in more labor-saving, and other economical processes, Staffordshire is coming quickly in view of the goal that the North of England has already attained.

South Wales is less a center of the crude iron than of the finished iron trade. The total quantity of pig iron made in the bituminous coal districts of Glamorganshire, Brecknockshire, and Monmouthshire in 1871 was 1,087,809 tons, inclusive of 34,761 tons produced by anthracite furnaces. The quantity of iron ore raised in South Wales and Monmouthshire for the same year was only 997,714 tons. The production of North Wales is a mere bagatelle, being only 41,800 tons of pig iron, and 51,887 tons of iron ore for 1871. It is extremely doubtful whether we shall witness any extensive amplification of the local supply of ironstone. Unlike the North of England, the ironstone available for working is very limited in South Wales, while the supply of coal is practically inexhaustible. The blast furnaces of the Principality are more than ever dependent upon the importation of foreign ores; and it is almost needless to say that a condition so unfavorable must operate to the detriment of the pig iron manufacture, and hamper its still further extension.

The last and the greatest of the chief centers of the metallurgical industry of Great Britain, is the Cleveland district. The natural resources of Cleveland are superior to those of any iron-producing district in the world. It possesses this advantage over nearly all other districts, that its supply of iron is nearly inexhaustible. From the many scientific opinions given as to the probable extent and duration of the ironstone of Cleveland, we prefer to select that of Mr. BEWICK, a geologist who spoke as one having authority. Mr. BEWICK's estimate was that the area over which ironstone was likely to be found would not be short of 420 miles, and that the yield would average 20,000 tons per acre. On this calculation it follows that 5,000,000,000 tons of stone are contained in the main seam of Cleveland. Mr. WILLIAM COCKBURN, manager of the Upleatham and Skinningrove mines, has calculated that an ample supply of first-class stone would be found in the Cleveland Hill for more than seventy years to come, allowing 75,000 tons per week as the average consumption. The present out-put of stone from the Cleveland mines, when the blast furnaces are all in full work, is very little short of this quantity; but it is to be observed that the ratio of increase in the future is not likely to be equal to that of the past, as arrangements are being made by nearly all the principal iron-making firms for using, in combination with the native ironstone, an admixture of Spanish or other foreign ore; and as the Cleveland ironmasters are becoming more and more alive to the expediency of improving the quality of this iron, it is quite probable that 20 per cent. or even more of the ore used in the North of England, will be imported from other districts. But even after the first-class stone has been exhausted, there is an illimitable storehouse of second-class, or inferior ore, to fall back upon—stone that is not now considered to be worth the trouble of working, on account of its geological formation, and its limited percentage of metallic iron. It is estimated that there are now about 3,000,000,000 tons of Cleveland ironstone under lease and unworked, which is equal to thirty-seven years' consumption at the rate of 7,740,000 tons per annum. We are yet, however, some considerable distance from the rate of consumption, as the total quantity of ore raised in Cleveland last year was very little over 6,000,000 tons. It is probably needless to say more in proof of the fact that the iron trade of Cleveland has nothing to fear from an exhaustion of the vast resources of ironstone with which nature has so bountifully endowed her. There are those who have predicted danger from the failure of the supply of coal available for smelting the ores of Cleveland, and a very curious calculation, made by one of our principal geologists and statisticians, leads to the conclusion that there are in the northern coal field 6,000,000,000 tons of coal left for iron-making purposes, or just enough to smelt the 5,000,000,-tons of first-class ore contained in the main seam of Cleveland; but there is no saying what further economies in the consumption of coal may be practiced before that danger becomes imminent, and it is, in any case, a danger so remote as to be hardly deserving of consideration here.

The geological conditions under which the ironstone of Cleveland is found and worked will always give the North of England an advantage not only over all other districts in the United Kingdom, but also over the whole mineralogical world, so far as we know at present. The main seam of ironstone in Cleveland varies from 8 to 10 ft. in height, and occasionally reaches 16 ft. or even more. This immense thickness enables the ore to be mined at a much less cost than is involved in the mining of the blackband seams of Scotland, which are only from 6 to 18 and 30 in. thick; or the ironstone measures of Staffordshire, which are seldom more than a yard in thickness. So far, therefore, as abundance and cheapness of the ironstone is concerned, the North of England must ever maintain its superiority over the other parts of the kingdom. There are other advantages almost equally important in favor of Cleveland, but the consideration of these and other branches of our subject must be reserved for another article.

Cornish Tin Mining.

THE annual meeting of the British Institution of Mechanical Engineers was held this year in Penzance, Wales, and, as was but natural, the leading subject under consideration was tin mining, both in its history and practice. The first paper was on "The Mining District of Cornwall and West Devon," the author being Mr. J. H. COLLINS, of St. Austell, and *Engineering* says the paper was a very comprehensive view of the subject in question, the author first giving a geological description of the mineral district lying between Exeter and Land's End. In the next place he described the nature of the minerals met with in that district—which are chiefly copper, tin, china clay and iron—and the manner in which they occur, illustrating his observations by diagrams showing plans and sections of various districts, as well as of several mines in those districts. He then described the methods adopted in working the mineral deposits, observing that the shafts were usually square, and were sunk vertically, although there were instances—as, for example, at the Botallack mine—where they were sunk at an angle on the course of the lode. The drainage of mines was then referred to, and it was stated that in a mining district in Germany there is an adit level, or small tunnel, fourteen miles long, which drains a large area of the country. This, however, is eclipsed by one in Cornwall, which is a similar adit, 30 miles in length, which affords means of drainage to more than 5,500 acres of land. The paper brought out the fact that the yield of tin and lead has decreased very considerably of late years in Cornwall. On the other hand, however, the yield of iron has increased, whilst china clay, which was formerly treated as waste, is now extensively worked at a good profit. The last-named substance is at present the subject of litigation, and it has yet to be determined whether it is to be considered as a mineral or not; the result of the decision will, of course, make a difference to those who hold mineral rights, and have to pay mineral dues.

Two serious obstacles appear to present themselves in tin mining, and to prevent its being carried on so successfully as it otherwise might be. These are the difficulty of separating wolfram from the tin, and the inability of the miners to prevent a considerable loss of the latter metal in washing. The separation of wolfram from tin has for a long time taxed the ingenuity of the miner, and, although every kind of mechanical arrangement has been tried, nothing but failure has resulted, the chief reason being the similarity of specific gravity of the two substances. The question has, however, been recently solved by chemistry, the desired separation now being effected by calcining the ore in company with a small quantity of soda ash. The ash combines with the wolfram, and forms tungstate of soda, which is soluble in water; great care, however, is required in the operation, because if too much soda ash be added it will combine with the tin, and will form tannate of soda. What the exact proportions are is known only to those who have succeeded in carrying out the process in practice, and who exhibit a natural, and perhaps pardonable, reticence on the subject. The second obstacle—the loss of tin in washing—remains without a remedy, although many have been tried. In the process of separating the tin from the earthy impurities, a slime is formed, which carries away with it the finer portions of tin, portions which ought not to be reduced so finely as they are. The consequence is that these atoms float away down streams and rivers, and are lost to the miners. They are, however, recovered by others than those to whom they originally belonged, being intercepted on their way down rivers by outsiders. But what the loss to the miners is may be gathered from the fact that 40,000*l.* worth of tin was recovered from the Red River alone during last year. This, of course, means so much less profit to the tin mines of the immediate district. It is held that the present system of mechanical separation is imperfect, and that, to render it perfect, the ore should be reduced to a uniform size, and the

slime be prevented from forming. Here, then, is a problem for the members of the Institution to solve; the opportunity is afforded, and they will doubtless avail themselves of it. It appears to us, however, that the remedy for the present evil lies, not so much in the direction of a system of catch pits and extensive settling areas, as in the use of blankets to intercept the atoms of tin thus suspended in the outflowing water.

The second paper was by Mr. H. T. FERGUSON, the subject being "The Machinery used in Dressing Tin and Copper Ores." This, like the previous paper, treated the subject very comprehensively, and was well illustrated. It described the process to which the ores were subjected from the time they were taken from the lode, to the time when they were sent to the market. The principle of separating the ores from the impurities is based upon the fact that the specific gravities of the constituents of the lode differ. The reduced ore is subjected to a series of washings over floors and in buddles, which in time remove all the foreign substances, leaving the tin free from all admixture. The buddles are circular curved floors, either convex or concave, over which the ore is washed, and on the surface of which it is deposited. The most recent mechanical contrivance for effecting the separation of the ore is the propeller knife buddle, which is a very perfect contrivance, and answers well. It consists of a series of knives or scrapers attached at a slight angle to arms carried on a horizontal shaft, and revolving in a segmental trough. The apparatus would be well represented by a screw cut with a slow thread, and having several slightly curved cuts made through the threads in the direction of the length of the screw; the center of the knife frame, however, is not solid. The ore is fed into the trough with a continuous supply of water, and the blades one after the other agitate the ore and water, presenting the former continuously to the action of the latter, so that the lighter impurities flow over the side of the trough, whilst the heavier tin is carried by the blades by slow degrees to the end, where it falls into receivers. The various machines referred to in the paper were shown by diagrams, and some also by models. A noteworthy point referred to by the author was the poorness of the Cornish ores; tin, for example, yielding only from 1 to 1½ per cent. of mineral from the ore as raised. By the time it has been washed down for market, however, it contains 95 per cent, or only 5 per cent. of impurities as against 98½ or 99 per cent. at the outset. In the discussion which followed the reading of Mr. FERGUSON'S paper, it was stated that the present stamping and dressing machinery was very imperfect, and that unless improvements were effected, there would unquestionably be a further decrease in the returns of Cornish ores. At the close of the discussion the President announced that the meeting of the Institution would take place next year at Cardiff.

The time allotted to the reading of papers having expired, the meeting was adjourned, and the members proceeded to carry out the second part of the day's programme, which consisted in visiting works of interest in the district. The members, therefore, proceeded, among other places, to Restronguet Creek. There they visited the Restronguet tin stream mine, which possesses some noteworthy features. In consequence of the two papers already referred to having occupied the whole time of the morning sitting, the third paper, which was descriptive of the Restronguet mine, could not be read. It was, however, at the suggestion of the President, read on board the steamer on the way to the works. It was written by Mr. C. D. TAYLOR. The peculiarity of this mine is, that it is worked for stream tin below the present bed of the river, although in its previous bed. The works consist of a cast iron ring shaft, six feet in diameter, sunk in the middle of the river, through several feet of clay deposit into the gravel below. On shore a shaft is sunk, and a level driven from its bottom—which is thirteen fathoms from surface—to the bottom of the iron shaft. From this level the mine workings are extended in various directions. On the mine the visitors found one of the propeller knife buddles already referred to, besides other ore-dressing machines of an improved character.

Foreign Items.

ACCORDING to the Board of Trade returns the British exports of coal and iron for July have been as follows for three years back:

		1871.	1872.	1873.
Coal	tons	1,126,901	1,164,233	1,181,622
	value	£35,883	£850,376	£1,215,027
Pig and puddled iron,	tons	115,160	133,084	98,861
Bar, angle, bolt and rod iron,	"	35,532	30,262	25,276
Railroad iron,	"	88,281	84,562	77,793
Other iron and tin plates,	"	32,967	28,397	31,544
Unwrought steel,	"	3,637	3,915	3,730
Manufactured "	"	1,493	1,032	844
Total iron and steel tons		312,237	316,562	267,560
Value		£2,505,637	£3,325,981	£3,408,725

A week or two since a case was brought under our own notice, which is sufficiently suggestive in itself to render comment superfluous. A Canadian merchant requiring 15,000 axles, having obtained quotations from several English producers—most of whom were badly in want of orders at the time—has given out the order to a firm in the Northern States at a price twenty per cent. below the lowest English tender. American locks and bolts are finding their way not only to Canada and California, but even to Australia and New Zealand, and people go so far as to predict that the tables will, a few years hence, be so completely turned that English consumers of iron will send to America for their supplies.—*Colliery Guardian.*

M. DORMOY, inventor of the revolving rabble, is also inventor of what is known in England as Casson's New Puddling Furnace, a specimen of which has been built at the Round Oak Iron Works. In it a preparing or heating chamber is combined with the ordinary puddling chamber, the two chambers being separated by a high bridge. In the preparing chamber the pig iron or steel is heated to incipient fusion by the waste heat or gases passing from the puddling chamber, the heated pig iron or steel being charged into the puddling chamber by lifting it over the bridge between the two chambers. The temperature may be regulated by means of a movable regulator or reverberator situated at the contracted end or neck of each of the chambers.

MESSRS. WITHERBEE SHERMAN & Co., of the Port Henry Works, on Lake Champlain, have settled with their workmen on their own basis, and work has been resumed. On the 30th of July they, and several other firms, discharged 1700 men, members of the Miners' Association, who had struck, because one of the foremen discharged a man for some reason. Straightway upon this occurrence the Miners' Association held a meeting, decided that the foreman was wrong, expelled him from the association, and demanded that because he was not a member of the association he should not work in the mines, and he must be discharged immediately. This the proprietors, after a strict investigation into the cause of the trouble, decided not to do. Then came the strike and then the re-awakening of the men to comon sense and fairness.

MINING SUMMARY.

New Mexico.

THE OLD GUADALUPE MINE.—The ancient shaft of the Guadalupe Mine, about two miles north of El Paso, has been re-opened by Judge S. B. NEWCOMB, of El Paso, Mr. COOK of Nevada, and others, who have located 320 acres upon the lode. History and tradition record the mine as being one of the richest known to the Spaniards, and an assay of some of the ore taken from the surface and ninety feet below prove the record to be correct. It has been discovered that this lode is a well-defined and extensive one. Its course is north and south, with a dip to the west of about 45 degrees, and has been traced some four miles, with an average width of forty feet; and a person can walk upon the lode for most of the distance on the outcropings. It is supposed to extend south under El Paso, under the Rio Grande, under the church at El Paso, Mexico, and re-appear in the mountains back of the latter place, where an old shaft shows that extensive work was done many years ago on what is now supposed to be the same lode mentioned above. Arrangements are being made by the gentlemen above named, to work the ore now being taken out as they develop the mine, being satisfied that it will pay by the simple process of reduction by arastras all expenses, and a handsome profit beside. Like the celebrated Comstock lode, of Nevada, it shows gold above in the out-croppings; but lower down, it is rich in silver, and yields the best mining ores. Dr. W. M. CARPENTER and Captain FRENCH, have located 640 acres on the extension of this lode; adjoining NEWCOMB, COOL, LOBENSTEIN & Co. Dr. D. C. MARSH has located beyond them on the same lode. The vast outcroppings on the mountains rise up, and extend some 800 or 1,000 feet above the shaft referred to—one may say it is a mountain of silver ore. The owners desire to fully develop the mine before giving a full statement to the public. About three miles west from this lode a company is sinking a coal shaft with every indication of success.—*El Paso Sentinel.*

Colorado.

THE SEATON MINE, CLEAR CREEK COUNTY.

From the *Register* of August 18:

There are few lodes in the valley of Clear Creek which have acquired greater prominence through development or the richness of their yields than the Seaton. It was discovered in 1862, and named from Dr. Seaton of Louisville, Kentucky, at that time mining and milling on the creek a short distance below Idaho. Several attempts have been made to sell it in England, but unsuccessful. That portion of the vein of which Mr. J. B. Lewis is one of the managers, is now developed by a shaft two hundred and seventy feet deep, from which, at the depth of one hundred and twenty feet, a level is now being driven eastwardly in rich ground. Its length is sixty feet, and covers a vein of mineral, chiefly argentiferous galena and gray copper, from two to three feet wide. This ore yields at the smelting works 150 to 200 ounces silver, and two or three ounces gold, per ton. The gangue matter is hard but not difficult to work. Ten feet from the bottom of the shaft another level has explored the crevice the distance of twenty feet, opening a vein of pure mineral twenty inches wide, and bearing the same general characteristics as that first described. All the assorted ore is treated at the Boston and Colorado works, where it is regarded as among the most desirable offered from Clear Creek County. Within the main crevice are streaks of exceedingly rich material, assays of which have returned from ten to twelve thousand dollars per ton.

Experts who have recently visited this mine pronounce it one of the strongest and best developed in the country. It drains very little water, is well timbered, and admirably situated for tunneling, either from the level of Clear Creek or the intermediate ravine which intersects Virginia Canyon near the Crystal mine. From the latter point a tunnel has been started and driven two hundred feet, but long since abandoned from prudential reasons. If ever completed it will penetrate the Seaton lode, at a depth of a thousand feet or more. Twelve men are employed in and about the mine On the dump are several hundred tons of second class material, carrying from fifty to seventy-five ounces silver, and a considerable percentage of gold, which will be put through Collom's concentrators, and then sold to Professor Hill. Mr. Lewis expresses great confidence in the ultimate success of these separation works, and considers the enterprise one of great moment to the miners throughout the country. So far as run they appear to answer the purpose of the inventor very satisfactorily, and with the few unimportant additions to the machinery, now being supplied, will be able to work continuously upon the ores brought for reduction. Mr. Collom is laboring very industriously to bring every part of the machinery to that state of perfection which will insure economical and efficient operation. It is to be hoped this will be accomplished at an early day, for the miners are looking anxiously in this direction for materia assistance.

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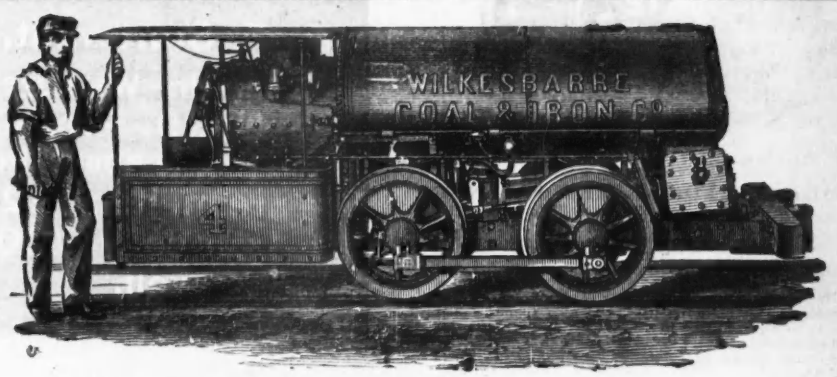

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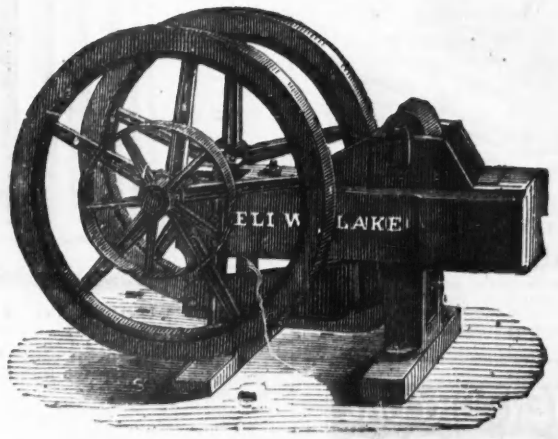

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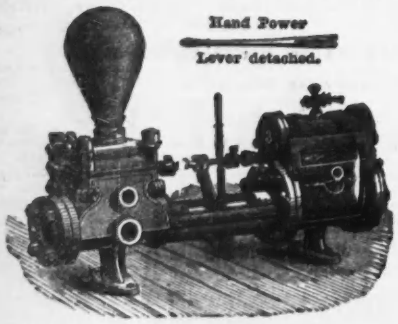

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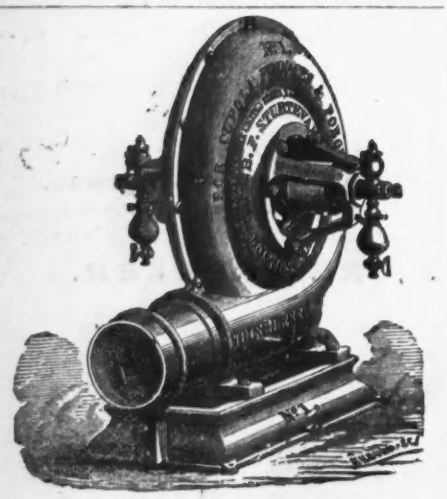

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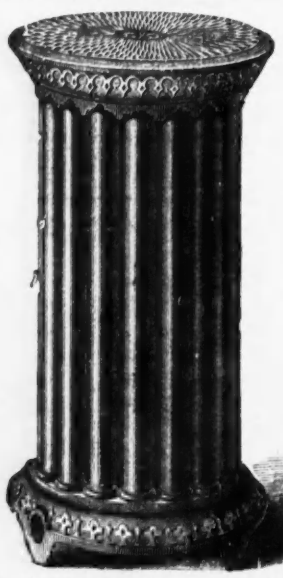

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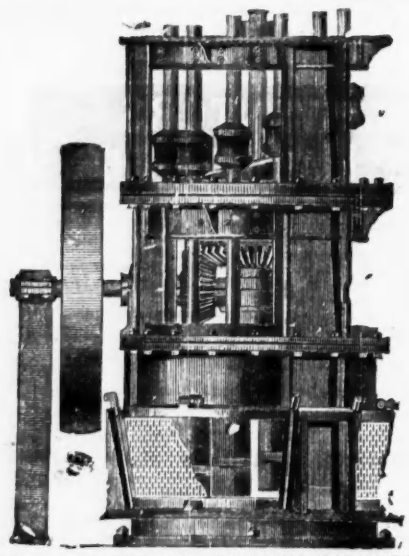

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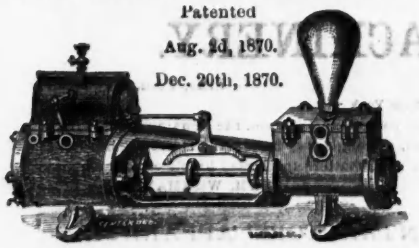

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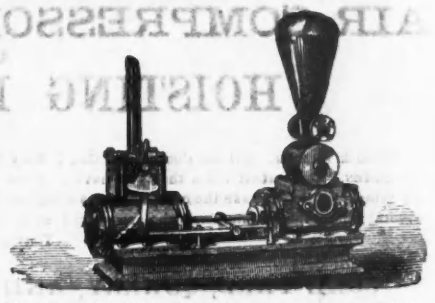

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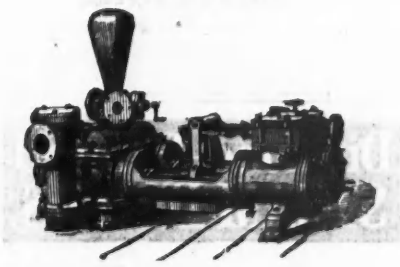

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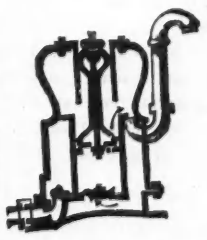

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