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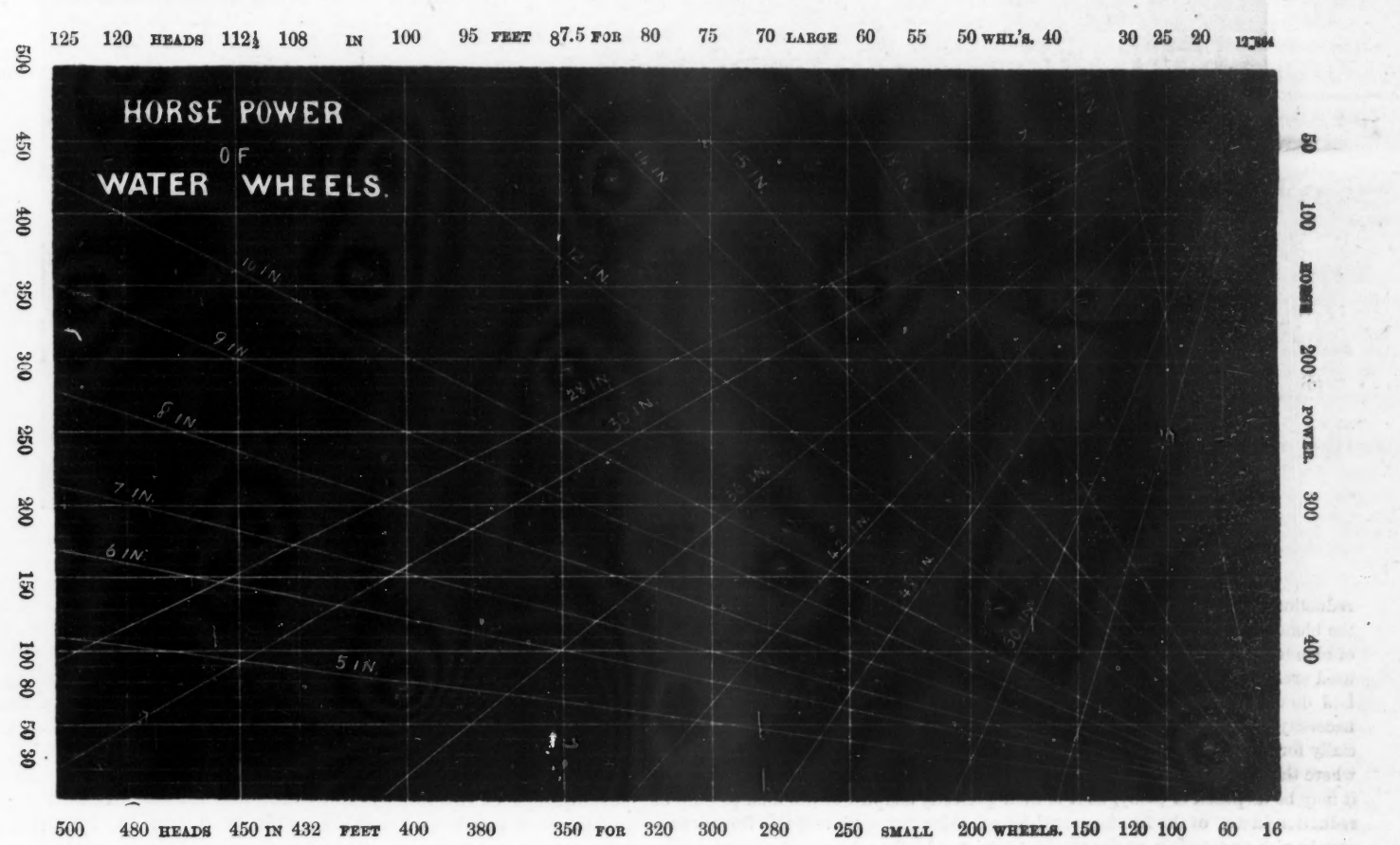
Water Wheel Diagrams.

A CONVENIENT method of ascertaining the amount of power which can be obtained by the application of a turbine wheel to a given fall of water, or conversely, what size of wheel can be used, or, in the third place, the wheel and height of fall being given, to find what power can be obtained, will, we are certain, be welcomed by many persons. The labor of figuring a result from more or less complicated formula, is often an annoyance to a man in a hurry, and if hurriedly done he does not always have confidence in the result. Messrs. H. J. BOOTH & Co., San Francisco, have prepared diagrams which afford a ready means of obtaining the desired information at once and without trouble. Figure 1 is a scale of horse powers. The vertical lines represent the heads in feet, those at the top being for large wheels and those at the bottom for small wheels. Under the latter, head are classed all sizes from 5 to 24 inches diameter and under the former sizes from 28 to 72 inches. In this scale the lines of horse power are parallel and equidistant; the lines representing the head of water are parallel and set at distances from 0 proportional to the cube of the square root in feet. The lines



of diameters intersect the lines of heads of water, at points proportional to the squares of the diameters.

To show the use of this, let us assume the case of a 30 inch wheel under a 70 foot head. Running the eye along the diagonal line marked "30 in" to its intersection with the line headed "70," we find that the point corresponds to the number "200" among the horse powers.

Figure 2 is a scale for ascertaining the number of cubic feet of water passing any wheel from 5 to 72 inches diameter, with any head from 5 to 450 feet. Taking the case of a wheel, 15 inches in diameter, working with a fall of 80 feet, we find by following the diagonal line marked 15 and 30 to its intersection with the line 80 of "heads in feet," that the wheel receives 500 cubic feet of water per minute. In this scale each diagonal line represents two diameters, the result for the smaller being read from the bottom and the larger diameter, from the top. With a head of 80 feet a 15 inch wheel uses 500 cubic feet of water, and a wheel of 30 inches uses 2000 cubic feet.

Tin in Australia.

LATE reports continue the flattering accounts of the tin fields of Australia. The mining districts are situated in the south of the colony, near the Victorian boundary, and on the tributaries of the river Murray. On the Basin Creek claims amounting to 1400 acres had been taken up by different parties, who were making preparations for pushing on their sluicing operations on a large scale, the water supply being abundant and the grounds offering great natural advantages. Some idea of the ultimate value of these claims may be derived from the fact that the ore yields seventy-two per cent. of pure tin, and that all the prospects hitherto obtained have averaged a quarter of a pound of ore to each dish. Near the same locality, at Horse Creek, four large lodes of ore have been discovered, and in tracing their course pieces of pure ruby tin were discovered of from one ounce to ten ounces in weight. The Rix Tin Company, working in the northern districts, had entered into a contract with an intelligent Chinese merchant named Chiu Ateak for the purpose of supplying their mine with Chinese labor, and they expect to save as much as £50 per week by the change. It is intended, however, that the Chinese labor is only to be called into requisition for sluicing purposes, and that the lode tin is to be obtained as formerly by means of European labor.

The *American Manufacturer* says that Messrs. ROGERS & BURCHFIELD, of Pittsburgh, a few days ago made their first consignment of finished Russian sheet iron to Liverpool, England. They can manufacture this iron and sell it to the English consumer cheaper than it can be imported from Russia to England. Their present capacity in this important specialty is two tons per days, but their facilities can be increased almost indefinitely.

Blende: Its Market Value.

The high prices at which spelter has lately been sold show that the demand for this needful metal is on the increase, not only in this country, but on the Continent. The largest works for its reduction are on the Continent. The supplies are drawn from a variety of different sources—calamine and other ores of zinc being found in many parts of the world. Blende, sulphuret of zinc, commonly known as Black Jack, which was for a long time neglected, is now being largely used, and as it contains over 60 per cent. of metal, yields a large return for working. The causes which previously prevented its being employed were the difficulty of its reduction and the limited consumption of zinc until within a comparatively short period. Both these causes have since disappeared, and blende is come to be in good request. Their effect, however, still remains in the low figure at which blende is now quoted, a figure which is not warranted by the ruling prices of the metal and the small stocks on hand.

The cost of reduction in the cases of both tin and copper bears a relative proportion to the prices of the metals which, calculating those for the reduction of blende, would make its value very much greater. This will, no doubt, soon be the case; but the proper means to bring it about at once and to give to blende its proper importance would be for the proprietors of mines of that ore to wash and roast it on their own properties. At present they are at the mercy of the zinc manufacturers.

The great advantages which would accrue from the establishment of such reduction works at the blende mines are not limited solely to the emancipation of the blende raisers from the dictation of the zinc manufacturers. The reduction of blende differs in several particulars from that of calamine, the more generally used ore. It must be roasted first in a reverberatory furnace with large surface, laid down in a thin layer and constantly stirred for ten or twelve hours. This necessity, though of no consequence to those who have constructed works specially for the purpose, entails a certain amount of extra trouble and cost, in cases where the reduction of this ore forms the exception, not the rule. When roasted, it may be disposed of easily, as it is then perfectly adapted to the final process of reduction in any of the furnaces used for calamine ores. Should this further process be also undertaken at the mines, there would then be a still greater profit, and the metal, for which there is always a ready market, be sold at once at the prices of the day.

The extended utilization of blende is a matter of great importance to British mining interests. The supplies of calamine from our own mines have hitherto been very limited. It has not been discovered in large quantities. Upper Silesia and Poland and Belgium have furnished the greatest quantities. Spain also promises to do so largely in the future. The consumption of zinc for many purposes is becoming very important in this country. We have been forced to bring it from abroad to meet the demand. Blende exists in very considerable amounts in many districts of Great Britain. It would doubtless be discovered in many others were a sufficient inducement held out to make its search worth while. This would be afforded by the large profits made on blende by the combination of reduction with extraction. The mines already in working would be further opened out. A great and valuable branch of industry would thus be developed, and our zinc workers made independent of foreign supplies.—*London Mining World.*

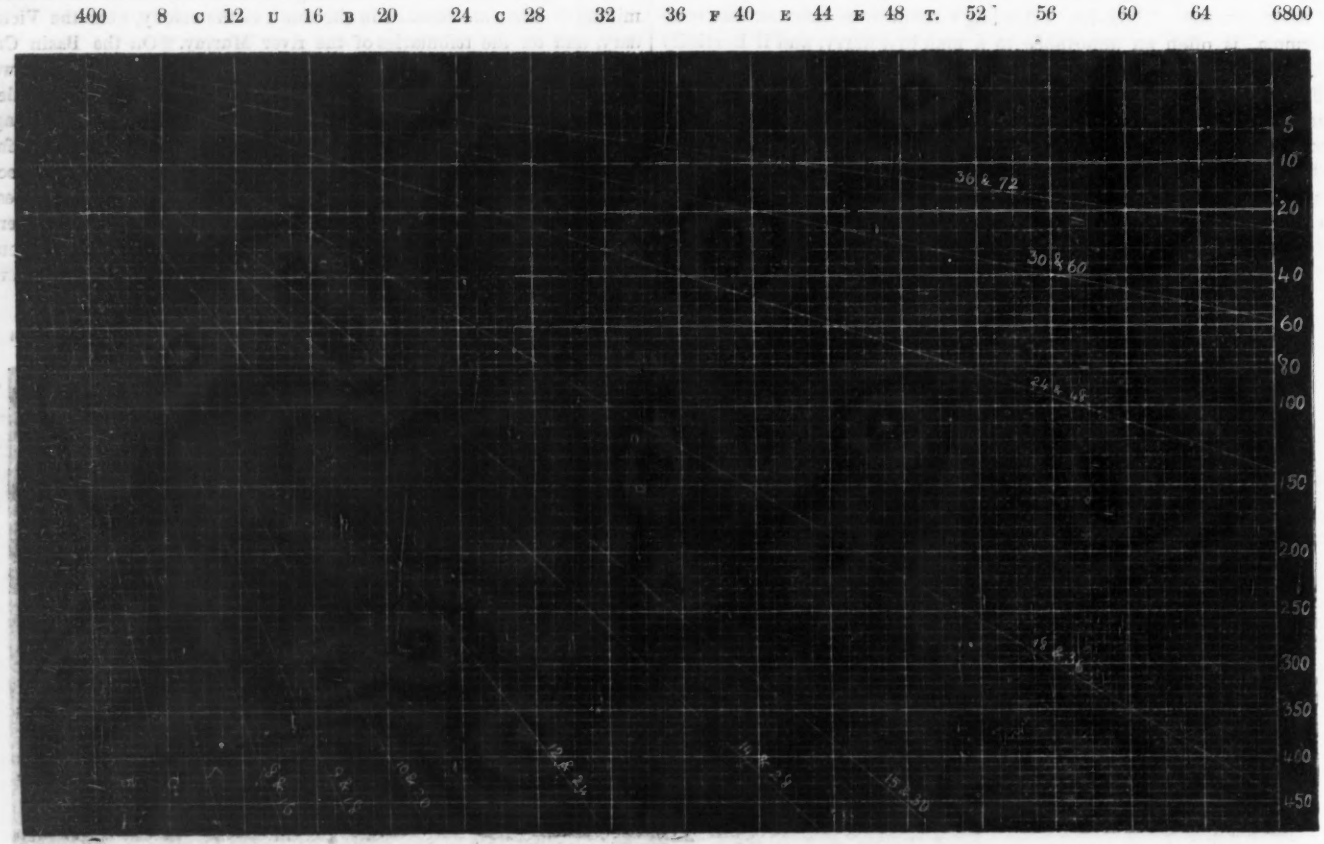
The Joliet Iron and Steel Works.

Continued from Page 276.

THE NEW STEEL RAIL MILL.

This building stands 600 ft. west of the converting works, ample space between them being left for a second Bessemer plant, and an open hearth or other steel making plant. The rail mill is 445 ft. long by 105 ft. wide, and 25 ft. high, with two transepts of 85 ft. span, the one being 40 ft. and the other 20 ft. long, also a shed-wing 125 by 40 ft. This building consists of 60 stone piers, 5 ft. wide by 30 inches thick, and 20 ft. apart centers, surmounted by arches with brick voussoirs of 15 ft. span, filled in with windows and wooden doors. Over each side pier is a compound truss consisting of timber top chord and iron bottom chord. These are connected by 12 by 2 inch timber perlins upon which rest the sheet iron covering, and iron ventilators.

The heating end of the mill is large enough to contain 6 Siemens' gas furnaces of the largest class. The two furnaces erected are double, being 26 by 16 ft. over all, each bed being 16 by 6½ ft. Each furnace takes 16 three-rail ingots at a time. Chimney and gas flues from the producers are already built for all the furnaces, and a sheet iron brick-lined chimney 5½ ft. diam. by 85 ft. high is erected for 3



SCALE OF CUBIC FEET USED.

furnaces. Each furnace is stayed with wrought iron buck-staves and trusses of the strongest description, and provided with double fire-brick regenerators, air and gas valves and dampers, and hydraulic charging apparatus, by which the ingots, hot from the converting works, are charged without rehandling, and by which they are drawn to be bloomed. The gas producers occupy a stone building 96½ by 44 ft., with roof and ventilators entirely of iron, situated near the rail mill, and convenient for the reception of coal. It is large enough for 20 producers, and at present contains 12, with their gas-stacks, dampers, cooling tubes, charging-hoppers, coal railways and chutes, and ash discharge. The producers are in nests of 4 each, each nest being 18 by 20 ft. over all, by 9 ft. high, and having the most approved shapes and appliances.

The engines, standing in the rail mill transepts, are 118 ft. apart centers; the two trains stand between them on continuous shoes 98 ft. long. The rail train consists of 3 stands of 3-high 23 inch rolls and a stand of pinions, made complete, with guides, guards, and appurtenances by MOORE, of Philadelphia.

The rail train engine, by CORLISS, was specially designed for these works, and is vertical and condensing, having a 40 inch cylinder and 5 ft. stroke, with a 58 ton 30 ft. fly-wheel, and a 20 inch shaft with journals 17 by 36 inches.

The Blooming train, to reduce 14 inch ingots into three 7 inch rail-blooms each, was built by MOORE, of Philadelphia, and consists of one stand of 30 inch, three high rolls 5 feet long, with pinions and fixtures complete; also Fritz's power feeding tables, by the aid of which three men roll an ingot weighing a ton in four minutes. The Blooming engine, by CORLISS, is vertical and condensing, having

a 32 inch cylinder and 5 feet stroke, with a 40 ton, 25 feet fly-wheel, and a 17 inch shaft, with journals 14 by 30 inches.

The boilers occupy a separate stone building, 85 by 48½ feet, with roof and ventilators entirely of iron. It is situated close to the rail-mill, and convenient to the coal supply. There are eight boilers and fixtures almost exactly like those in the converting works, and there is room for two more. An English pressure pump, with two plungers, 3¼ inch each, and a 14 inch steam cylinder, 30 inch stroke; also a 12 inch accumulator, also a boiler feed pump, are placed in the rail engine transept. The former drives the charging machinery and the Blooming tables.

The steam, injection, feed, blow-off, overflow and hydraulic pipes and valves (water being taken from the main and also from an artesian well) are necessarily numerous. They are conveniently situated in a 4 by 4½ feet stone tunnel, leading to the main water-supply tunnel before mentioned. They are mostly of wrought iron, with copper expansion joints. The exhaust steam from all the non-condensing engines is led into this tunnel. The engine and train foundations are masses of dimension stone of great size and thickness, laid in cement on the bed-rock in the most durable manner. A tunnel passes underneath the entire train, from engine to engine, to get at the foundation-bolts, and the drainage system is all above this.

The rail-finishing apparatus consists of a 16 by 12 inch saw engine and saws and carriage, by MOORE, of Philadelphia, straightening and curving plates; two hot-beds on cast-iron stands, with rollers, the total hot-bed area being 108 by 30 feet; a cold bed, 108 by 30 feet; two steam straightening presses, by MOORE; two punching machines of the same make: four rail drilling machines, by BEMENT, of Philadelphia; an engine (built in our shops), with 16 by 12 inch cylinder, for driving the punches and drills: rollers for carrying the rail to the saws, and power-driving gear. The saws are 80 feet from the center of the rail-train, thus allowing the rolling of 60 feet rails and long merchant steel and iron.

There is room on the rail-train shoes and power in the rail-engine for two more stands of rolls, to run together with the rail-train, for rolling either tops and bottoms for iron rails, or iron rails, or large merchant iron and steel of any description. These rolls can be changed while the rail-mill is running, thus saving the cost of stopping to change for small orders.

In the rear of the Blooming train stands a 3 ton steam hammer, by SELLERS, of Philadelphia, with 25 ton block, crane and fixtures. Rolls and couplings are to be changed by a travelling crane running the length of both trains.

The iron rail-mill, started in July, 1870, is a stone building 230 by 80 feet, and 20 feet high, with roof and ventilator entirely of iron. It contains three stands of 21 inch, three-high rolls for rails and tops and bottoms, driven by a 36 inch by 3 feet horizontal engine, with a 28 ton, 20 foot fly-wheel; also finishing apparatus, consisting of saws, hot-bed, presses, punches, shears, &c.; also eight heating furnaces, six having overhead boilers, and an artesian well.

The puddle mill is a stone building, 190 by 75 feet, by 20 feet high, with iron roof and ventilator, and a temporary wooden extension 75 by 40 feet. It contains a stand of 16 inch and a stand of 21 inch rolls, and a squeezer, driven by a 26 inch by 4 feet horizontal engine with a 22 ton, 20 feet fly-wheel; also nine double-puddling furnaces and one double-heating furnace. Between these two mills stands a stone boiler-house 50 by 35 feet, containing six boilers 50 inch by 26 feet, with two 14 inch flues; also an old rail and piling shed and old rail shears. Near the rail-mill is a stone store-house 60 by 20 feet. Sand and coal bins and sheds, and the necessary scales, railways and fixtures, are arranged conveniently around the buildings.

The shops are situated between the two rail mills, and convenient to the converting works. The machine shop is of stone, 120 by 75 ft., and 20 ft. high, with slate roof. It is well lighted on all sides, the boiler and tank house being a detached stone building 50 by 18 ft. The boiler is like those in the converting works. The machine shop contains an 18 by 26 inch vertical engine, 2 Sturtevant No. 6 blowers and a fan for foundry and smith shop (these are in the basement); a Moore roll lathe 54 inches by 34 feet; a Sellers planer 6 by 6 feet by 30 feet; a Sellers planer 30 by 36 inches by 15 feet; a Hewes & Phillips drilling and boring machine to take a piece 10 by 10 ft.; a Sellers 60 in. slotting machine; a Bement 14 in. shaping machine; a 26 in. by 19 ft. roll lathe; a 32 in. by 19 ft. screw cutting lathe; a 21 in. by 11 ft. screw cutting lathe; an 18 in. by 14 ft. screw cutting lathe; a 12 in. by 5 ft. Sellers lathe; a Sellers 2 in. bolt cutter; a 54 in. Sellers drill press; a 20 in. drill press; a 14 ton and a 10 ton Bement crane; also shafting, pulleys, galleries, grindstone, vises, benches, and small tools.

The foundry is a buttressed stone building 100 by 60 ft. and 24 ft. high, with two tiers of windows to give the greatest amount of light, as well as strong walls. It has a wing 68 by 24 ft. for cupolas and core room and oven, and a wing 30 by 18 ft. for a second core oven. The roof is covered with slate. The foundry contains two 5 ton cupolas 12 ft. high; a hydraulic cupola hoist; 2 core ovens 14 by 10 ft. by 12 ft. high, and a small core oven, with the necessary cars; a 25 ton and a 10 ton Bement crane; 2 iron casting tanks 12 and 8 ft. diameter by 10 ft. deep, and the necessary ladles, flasks and fixtures.

The smith shop is a stone building 70 by 60 ft. by 18 ft. high, with a slate roof. It contains a 1000 lb. Sellers steam hammer, and six double fires. The boiler shop is a wooden extension of the smith shop, 75 by 60 ft., containing a complete set of boiler making machines and tools. The pattern and carpenter shop is a two story stone building 70 by 38 ft., with slate roof. It contains an engine 12 by 16 inches; a Daniells' planer; a circular saw bench; a scroll saw; a 12 in. lathe; a 15 in. lathe with head for large turning, and the other necessary tools. All these shops are driven and warmed by the machine shop boiler, by pipes running in stone tunnels below the general level.

A system of railroads, wide gauge, for bringing in supplies and delivering products, connects the work with the Chicago and Alton Railroad, and also with the Chicago, Rock Island and Pacific Railroad. A narrow gauge (30 inch) system is arranged for internal transportation. Two 18,000 lb. Baldwin locomotives with 9 to 12 in. cylinders, and 30 in. wheels, work the narrow gauge system.

The company also owns two blast furnaces at Bridgeport (South Chicago) 56 by 13 feet, blown by two independent vertical engines, with 60 inch air cylinders, 32 inch steam cylinders, and 5 feet stroke. The capacity of the establishment is as follows: Joliet blast furnaces, (on rich ores) 1400 tons per week; Chicago furnaces, 350 tons; total 1750 tons pig iron. Bessemer plant, 700 tons of ingots per week. Rail mill, 1000 tons of rails in new mill, and 600 tons in old mill, or 1600 tons per week. Puddle mill, 250 tons muck bar. The coke works, as at present built, can produce 175 tons coke per week, and can be extended indefinitely, the washing house having a capacity of 150 tons of washed slack per day. The fire brick works can turn out 3,000,000 bricks a year.

In designing the various parts of these works, the leading idea has been to save expense in repairs rather than in first cost. Solidity, and perfection of workmanship have been sought in the machinery; the American system of Bessemer plant has of course been adopted, for no other can be profitable in this country; Siemens' reheating furnaces are adopted in the steel mill for the sake of the saving they make in fuel, and in every respect scientific economy has been the ruling principle. Two rail ingots will be cast, and the trains are arranged for the production of the long bars which are coming more and more into use. The rail train is, in its general features, patterned after that at Harrisburg, but is divided into three stands of short rolls instead of two long rolls, the change being made for the sake of increased strength. The power of the mill is far in excess of that demanded by the production of steel, and a small additional expense for furnaces and rolls will permit the mill to run by day on iron work, the rolling of steel being confined to the night.

Many considerations, aside from the mere mechanical execution of this latest example of American furnace and mill construction, make the Joliet Iron and Steel works an interesting study. The Mississippi Valley has reached a turning point in its history. Its past is mostly an agricultural one. Its future is certain to contain a manufacturing element of enormous importance. This latest step in making the change is so comprehensive and extended, that the future of the Joliet works can exert a very considerable influence upon the general progress of industry in their neighborhood. That that future will be as successful as it is now hopeful, we think is as certain as human speculations can be.

Improvements in the Processes of the Manufacture of Pig-Iron.

By E. N. K. TALCOTT, C. E.*

From the first manufacture of pig-iron to the present time, the general form of the blast furnace has remained the same, consisting of a vertical chamber or shaft, circular in form, but widening from the bottom upwards and from the top downwards. The shape most generally adopted in this country consists, first of a crucible at the bottom, the sides of which are perpendicular for from 6 to 8 feet; thence the furnace widens out at an angle (called the angle of the bosh) of from 60° to 70° until the required width is reached. This widest point is known as the bosh. Thence a slight reduction of size is carried to the flues which take off the waste gases, from whence to the tunnel head or mouth the size decreases more rapidly until the required diameter is reached. The sizes and proportions of different furnaces are so varied that it is impossible to establish any positive rules for them. The furnaces in the Lehigh valley are as follows:

Crucible	from	5	to	10	feet	in diameter.
Bosh	"	10	"	20	"	"
At the flues	"	8	"	14	"	"
Tunnel head	"	5	"	12	"	"
Total height	"	40	"	73	"	"

Various improvements upon the general outline have been adopted, as carrying the lining perpendicular from the bosh partly up to the flues, or dispensing with all the angles, and making the interior a combination of curved lines, but the same general form is retained. The tendency at the present is to increase both the height of the furnace and the size of the bosh. In England, high furnaces with large boshes have been largely adopted, and are giving some remarkable results. In the valley of the Lehigh, the average product of furnaces 55 feet high and 18 feet boshes is 225 tons of No. 1 pig metal per week, with a consumption of about two tons of coal to one ton of pig-iron. The Norton furnaces, near Stockton-on-Tees, England, which are 85 feet in height and 25 feet boshes, produce 530 tons of iron weekly, using about one ton of coke to one ton of iron. The Ferry Hill furnaces, England, are 103.5 feet high, and 27.5 feet boshes, and produce weekly 600 tons of iron with an average consumption of 15¼ cwt. of coke to one ton of iron. The smaller furnaces in England use from 1 ton 17 cwt. to 2 tons of coke to 1 ton of iron. In addition to the increase in production and decrease in consumption of coal which seems to be the result of these large furnaces, the quality of iron seems to have been improved thereby. The iron used in the manufacture of Bessemer steel is principally made in these large furnaces. It would seem to be well worth the while of the iron-masters of this country to study

*This paper was read before the Society of Civil Engineers some time ago, which is the reason why some inventions, now well known, are described in it as novel.

carefully the results of these furnaces, with a view to an increase in the size of ours. Indeed, some advance has already been made in that direction, one of the furnaces at Glendon, Penn., in the Lehigh Valley, being 73 feet high and 18 feet boshes, and one at Stanhope, New Jersey, yet unfinished, is to be 85 feet high and 22 feet boshes. But the materials used here differ so much from those in England that experiments in this direction must necessarily be conducted with the utmost caution, to avoid disaster.

In its present form the hot-blast oven is of cast-iron, and consists of a series of bed pipes, cast with sockets upon them, in which (in some ovens with both legs resting on the same, and in others on different bed pipes) stand upright pipes of the shape of an inverted ∩ connected with the bed pipe by means of a rust cement joint. These ∩ pipes are exposed to the fire, the bed pipes being protected by a casing of fire brick, and the air, entering the bed pipes, circulates through the uprights and is heated during its passage to a temperature varying from 600° to 1000° F., according to the amount of heating surface employed. The ovens are almost universally heated by the waste gases of the furnace, and in most of them the burning gas is brought into direct contact with the pipes, being generally introduced from below by flues leading up between the bed pipes, although, in the improved form of the Thomas Hot Blast, the fire is introduced from above, impinging directly upon the tops of the pipes. The action of the fire upon these pipes, however, at the extreme heat maintained in the ovens, causes them to burn out, and necessitates frequent renewals, which are both troublesome and expensive. MR. JOHN PLAYER, formerly of the Norton Furnaces, England, but now a resident of Philadelphia, claims to have obviated this difficulty to a great extent, by employing a large combustion chamber underneath the oven, with deep and very narrow flues up into the pipe chamber, through which the resultant heat of the combustion of the gas, and but very little of the fire, comes in contact with the pipes, while the same or greater heat is obtained as under the old plan. So far as this is in use in this country it gives tolerable satisfaction, although I have been unable to learn that the excessive temperature of 1200° F. which he claims can be produced, has ever been reached.

An entirely new style of oven has lately been patented by Mr. THOMAS WHITWELL, of the Thornby Iron Works, Stockton, England, consisting of a cast-iron air-tight casing, 22 feet diameter, and 20 feet high, lined with 18 inches of fire-brick, and the interior divided by fire-brick walls into compartments of different sizes, largest at the hot end. The gas enters the oven at the hot end, where it is lighted, and passing through the compartments, burning as it goes, escapes at the cold end into the smoke-stack, the fire-brick absorbing and retaining the greater part of the heat generated by the combustion. After the brick has mostly become red hot the gas is shut off and the blast admitted at the cold end of the oven, passing through the oven in the reverse direction from the gas, and by its passage over the brick becoming heated to a red heat, and in this condition passing into the furnace. These stoves are built in pairs, being used alternately for the admission of gas and air. It is claimed that one of these stoves will supply sufficient heat to raise 8,000 cubic feet of air per minute to a red heat for 3 hours, and that it can be reheated in 1½ hours, while the cost is no greater than the ordinary cast-iron stoves. They possess the advantage of simplicity of construction, slow fouling from dust, facility for cleaning, and durability. At the Consett Iron Works, England, where they are in use, it is stated that zinc is melted at the plug hole of the tuyere, in 2½ seconds, and that the tuyere pipes are red hot in open day, the temperature being estimated to have been as high as 1,500° F. The use of heated air for the blast has been found to result in a decreased consumption of coal, and thus far the hotter the blast the greater this decrease. Hence the point to be attained is to produce the greatest heat in the simplest and most economical manner; in which points this oven seems to excel.

The gases are taken out of the furnace at the level of the tunnel head, or from that down to 10 or 12 feet below, in flues constructed in the lining of the furnace, and are conducted in flues or pipes to the position where it is desired to use them, where they are mixed with atmospheric air and burned. In this way, what was formerly allowed to waste into the air produces all the heat required for both blast and steam.

When it is taken into consideration that for every ton of solid material used in making a ton of pig-iron, 3 tons of air in the shape of blast must be supplied, it will at once be seen that the apparatus for producing this blast is of the utmost importance. The blast engine may be said to be the lungs of the furnace; cripple it and the furnace dies. As the blast is delivered to the furnace at a pressure varying from 3 to 8 lb. per square inch, the machine must be strong and substantial. As the quantity to be delivered is large, it must be proportionally large; and as the power required is great, it must be applied as economically as possible. But comparatively few furnaces being able to use water as their motive power, steam engines are generally used for this purpose. The steam is generated by the waste gases. Generally the boilers are elevated on masonry piers, nearly to a level with the flues of the furnace. Latterly, however, they have been placed on the ground, and the gas drawn down to them by means of a powerful draft, and with great success. This dispenses with a great deal of expensive masonry. The engines are of varied construction, but all involve an ordinary steam cylinder attached in some way to a blowing cylinder, each head of which is made with a number of openings closed by leather flap-valves, one half of which open inwards and the other half outwards, thus forming in effect a bellows. The forms of engines most used are beam engines with the steam and blowing cylinders at opposite ends of the beam. Vertical engines with the cylinders side by side and the piston rods both connected to one cross head, or with the blowing cylinder directly over the steam cylinder, and horizontal engines with two blowing cylinders driven by one steam cylinder through the interposition of gearing, or with one blowing cylinder on a line with the steam cylinder and both pistons on one rod running through both ends of both cylinders. All of these engines involve heavy fly-wheels to insure a steady motion. A new vertical engine has lately been built, with the steam cylinder over the blowing cylinder, and which dispenses entirely with fly-wheels. One of these engines is now at work at Niles, Ohio, blowing a furnace 45 feet high, with 10 feet boshes. All of these styles of engine have their advocates, and all possess some advantages and disadvantages. For reliability, endurance, and satisfactory results, however, the beam engine seems, thus far, the favorite. To give a better idea of the sizes of the engines used for this purpose, some figures in relation to them are given below:

WHERE USED.	Diameter of Steam Cylinder.	Diameter of Blowing Cylinder.	Length of Stroke.	Number and kind of Engines.	Number of Furnaces.
Thomas Iron Works, Hokendauqua, Pa.	66 ins.	108 ins.	10 ft.	2 beam engines	4
	56 "	90 "	9 "	2 beam "	
Allentown Iron Works, Allentown, Pa.	40 "	84 "	7½ "	1 vertical "	4
	48 "	84 "	7½ "	1 beam "	
	40 "	84 "	7½ "	2 beam "	
Carbon Iron Works, Perryville, Pa.	36 "	84 "	7 "	1 vertical "	2
	50 "	84 "	7 "	1 vertical "	
Burden's Iron Works, Troy, N. Y.	40 "	90 "	7 "	2 horizontal "	2
Boonton Iron Works, Boonton, N. J.	40 "	90 "	7 "	1 horizontal "	2
	40 "	84 "	7½ "	1 vertical "	
Port Oram Iron Works, Port Oram, N. J.	40 "	84 "	7½ "	1 vertical "	1

The great majority of furnace stacks are massive constructions of stone masonry of a square base with an arch on each face for tuyeres and casting purposes, surmounted by a brick gas chamber and tunnel head. The stone work is tied together by heavy wrought-iron binders running through it in all directions. Where stone is abundant this is a preferable form, from its cheapness, durability, and heat-retaining qualities. These stacks are not built of solid masonry, but have an outside and inside wall laid in mortar, with the intermediate space filled with loose stone. In regions where good building stone are scarce, other materials have been employed. Of these, brick and boiler iron are the most common. The brick stacks are generally circular in form and encircled by wrought-iron bands at intervals of about 2 feet. These stacks stand well for awhile, but are liable to crack badly with the heat, and burn out. They also waste considerable heat by radiation. The iron stacks consist of a shell of boiler iron supported upon cast-iron columns, and give excellent satisfaction. Their cost is very nearly the same as stone, and they possess an advantage in being quickly erected, and giving ready access to the base of the furnace on its entire circumference. They are not as economical of heat as the stone stacks, but are being adopted to a very considerable extent.

From these data in relation to the manufacture of iron, you may perhaps form some idea of its present condition and importance. When it is remembered that for each ton of pig metal produced per annum, a plant of $20 is required as a permanent investment, besides a working capital of from $5 to $10 per ton, it will be readily seen what a large amount of capital is already invested in this branch of industry in this country, amounting, it is believed, in the year 1868, to nearly fifty millions of dollars. The new and varied uses of iron, and the amount required annually to repair the wear and tear of that already in use, give promise of greater demands in the future. Railroads are multiplying continually, for which must be supplied not only rails, but rolling stock, bridges, depots, and other equipments, into the construction of all of which iron enters largely. Iron buildings are taking the place of stone and brick in all of our large cities; our ships are no longer of oak, but iron vessels crowd out the old wooden ones, until even the rigging is of wire rope; the axles of our wagons are of iron—in fact, so cheap and abundant has this staple become that it is produced for almost every conceivable purpose. With a protective tariff sufficient to insure a reasonable profit upon its manufacture, it is difficult to foretell the production ten years hence. Certainly, as the unoccupied territory fills up, as wealth increases, and civilization advances, this article, which has now become one of the necessaries of life, must continue to be more and more in demand, to supply which, new localities must be developed and new works erected. And as the country grows older, and labor and capital both become more abundant, the expense of production must be reduced, until it will not be at all remarkable to find American iron competing with that of other nations in all the markets of the world.

NOTE.—Some experiments made by the writer at blast furnaces in the Lehigh valley in reference to the loss of heat by radiation through the stack, gave the following results, the thermometer in the open air standing at 20° F.:

On the outside of stone stacks varying from 6 feet to 10 feet in thickness of masonry, from 60° to 90° F.

Brick stacks 30 inch wall, from 120° to 190° F.

No experiments were made with iron stacks.

In the boiler rooms the outside of a brick wall 24 inches thick gave as high as 212° F.

Hot blast oven walls 18 inches thick gave as high as 220° F.

From these facts it will be seen that the saving of radiated heat about a blast furnace is a problem which will bear study with a view to economizing in fuel by the use of the heat so wasted.

LAST month the head of one of the horizontal blowing cylinders at the Harrisburg, Pa., Furnace burst with a deafening report, throwing huge pieces of metal a distance of fifty feet. The accident was caused, it is supposed, by a defective tube, through which water was admitted into the stack.

THE COAL TRADE.

NEW YORK, May 8, 1873.

A good deal of anxiety exists in the trade as to the future of business this season. The operations of the past half year have divided dealers into two strongly marked parties. On the one side is the "combination," with its control of the greater part of the coal production, its intention to make a regular monthly advance in prices up to the close of navigation, and its determination to sustain its action by any course which is necessary. It has sagacious, experienced and powerful men at its head, comprises nearly all the companies which in former times were looked upon as controlling elements in the trade and has added to them a new organization made up of a great number of smaller mining companies formerly scattered but which are now united under one head. We say that nearly all the old leading companies are included in the combination, for though some are nominally apart from it, they act with it and seem to have adopted without reservation its line of operations.

Throughout the whole season this party has had undisputed control so far as prices are concerned. But demand is a thing that even the most powerful combinations cannot always secure. Coal has made its monthly advance of ten cents a ton with unfailing regularity, but the lively business proper to the spring has not yet begun, and dealers are known to be holding back. Production has been reduced in the Schuylkill region to the extent of fifty per cent, partly by decreasing the output and partly by stopping some mines entirely. Coal is accumulating at Port Richmond and already it is reported that the yards there contain 150,000 tons, while 30,000 tons are on board cars and 20,000 tons in boats. Whether these figures are right or wrong, it is pretty certain that they do not seriously misrepresent the condition of the Schuylkill trade. It is well known that Schuylkill coal is not taken as fast as produced, and the "piling up" of coal by the P. and R. Coal Company is a fact.

The explanation of this fact is as might be expected, a two-sided one. The combination says, that the advance in prices is demanded by the necessities of the trade, but that some dealers do not appreciate its strength and are foolishly holding off in the hope that the immense capital invested in its operations will compel its managers to make better terms with buyers. Those managers, however, look upon such a result as impossible, first, because of the above mentioned necessity that prices should be higher; second, because of the unity of action among the great companies, and third, on account of the action of the buyers themselves, a subject to which we will shortly return.

On the other hand we have the explanation of the second party in the trade. This party is of course, made up of the numerous dealers whose business was injured or altogether ruined, by the action of the P. and R. road last autumn, and of the entire body of dealers who want to buy at low rates and are afraid the present standard cannot be maintained. These gentlemen say that Schuylkill coal has to be piled up for the reason that the old distributing channels were swept away by Mr. GOWEN, who attempted to replace them by an insufficient number of new agencies. They point to the fact, which is certainly true, that Lehigh coal is in good demand at the very time that the Schuylkill collieries are shutting down. To this they add the fact that the advances have not been made in obedience to a brisk demand, but in the face of a dull one. Dealers are therefore afraid to buy, having no confidence in the continuation of the high rates. By this party the month of May is looked upon as the Waterloo campaign of the combination.

Hitherto we have given what any one may pick up by a half hour's talk with the gentlemen doing business in Trinity Building. To choose between the parties is a difficult matter. The combination is certainly very strong, it has a certain degree of right on its side and could have put up prices to a reasonable point with impunity. The real question hinges not so much upon its past action as its future course. The opponents of the combination say that coal was high enough last month, and prices should have stopped there, and that the cool determination of half a dozen of men to add to the price month by month, without regard to the circumstances of the market, is a foolish and arbitrary course. The combination on the other hand says that the action of consumers and dealers in holding back, only solidifies its demand. Coal is an article which must be used, and if it is not bought now it must be laid in later. A rush must come toward the end of the season, because the quantity taken now is below the quantity regularly required. With the rush will come a scarcity of vessels. Freights will be high and coal scarce. Prices then will go up into speculative ranges, and the condition of the dealers will be really very bad. To the charge that they are piling up coal, the members of the combination reply that this only shows a disposition to relieve the market, when the rush does come, to the extent of their power. But the piling up of coal cannot go on forever, and if it is not taken soon, production must be cut down. That will lessen the output of the year, and the consequence will be that to the demands of the combination, will be added the uncontrollable influence of a short supply.

We think that the backward condition of the market is somewhat exaggerated. In the first place, the manufacturing industry is undoniably dull in some quarters, the threats of a strike having induced many companies to avoid taking summer business except within limits which made them certain of controlling it. The usual increase of demand was, therefore, hardly to be expected; and though the strikes have not taken place, the manufacturers have not forgotten their caution. Some slackening of the demand was therefore to be expected. On the other hand, circumstances have thrown almost the whole of this short demand upon the shoulders of the Philadelphia and Reading Company—a result which is very likely due, for the most part, to the loss of so many channels of distribution. At the same time, it is this very company which seems to have produced most of the year's increase in output. We have not this week's tables at hand, but reference to our issue of last week shows that the Philadelphia and Reading road and Schuylkill Canal have carried this year about 1,608,000 tons against 1,449,000 last year. This is an increase of 159,000 tons, and there is a further increase of 19.000 of Shamokin coal. Inasmuch as the total increase of anthracite for the year, according to the same table, is 191,534 tons, it is evident that the Schuylkill region has yielded the greater part of it, though its fair proportion would not be over 60,000 tons. Taking these two facts—an increase which is more than nominal, and the exceptional position of the Schuylkill mines in regard to selling facilities—into consideration, the pile of coal at Port Richmond does not appear so remarkable, nor is its presence to be attributed altogether to opposition to the combination.

The conclusion to which all this tends is that the true solution of the dilemma in which all parties are placed, lies in a compromise. If buyers maintain such an attitude that the production of coal must be cut down for some time, and even to the extent of affecting seriously the year's output, the result cannot fail to be further and serious advances in price, of which, however, the mine owners will obtain only a part and the railroad companies will receive a large share. Consumers would of course, have to bear the full brunt of the injury in higher rates. But stoppages are always costly to companies, and though the high rates would affect more than half, or fully half, of the year's product, it is doubtful if the mining companies would not lose more than they gain. On the other hand we have shown that the embarrassment chiefly affects one district, and that is a district which has recently been the scene of immense investment of capital, and which, more than any other, needs the encouragement of a good trade.

We have said that the malcontents look upon May as likely to prove the Waterloo campaign of high prices. Whether their anticipations are right or not, we think the companies would find it wise to avoid not merely the chances of such a campaign, but even the appearance of entering upon one. It will be far better to encourage good feeling and a large consumption, than by any measure whatever, to throw the trade into disorder and compel buyers to cut down their orders to the lowest notch. The combination is a new one, the part it has to play is always looked upon with hatred in America, and it can win respect and support only by giving evidence that its intentions are not arbitrary, and its demands no more than just. If it will omit the intended June advances of prices, it will do much to place itself in right relations to the consuming part of the trade, that part without which the producers could not exist.

Bituminous.

Trade is rather quiet. Vessels are scarce—a circumstance which is partly attributed to the demand for shipments to the West India ports. Even a small increase of the amount of coal shipped could seriously derange the carrying facilities of the home shippers, on account of the long absence from home.

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending May 3, 1873.

	1873.		1872.	
	WEEK.	YEAR.	WEEK.	YEAR.
By Railway	27,964 05	313,175 07	31,140 12	368,674 19
" Canal	238 13	1,386 07	....	355 11
	28,202 18	314,561 14	31,140 12	369,030 10
Decrease 1873	54,468 16			

Anthracite Coal Trade for 1873 and 1873.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending May 3, 1873, compared with the week ending May 4, 1872.

COMPANIES.	1872.		1873.	
	WEEK.	TOTAL.	WEEK.	TOTAL.
*Phila & Reading R. R†	99 966	1,425,394	111,064	1,647,707
*Schuylkill Canal	31 653	161,295	21,329	93,169
*Lehigh Valley R. R.	68,108	1,223,624	70,501	1,203,024
Lehigh & Sus. R. R.	38,967	516,788	41,420	630 162
" " Canal	25,306	76.101	23,726	56 045
Scranton North	11,787	204.068	15,311	218,402
" South	46,859	720,149	55,915	739,287
Penn. Coal Co., rail	31,141	368,675	27,964	313.175
" " " canal	...	356	239	1.386
Del. & Hud. C. Co. Canal	46,361	95,567	48,739	121,136
" " East	14,534	216,966	7.009	128,000
" " West	6,415	111.204	12.378	142,288
" " South	4,457	116,596	5.538	109,304
Shamokin	8,669	144,143	12,498	166,916
Trevorton	....	....	....	....
Lykens Valley Coal Co.	....	....	....	....
Wyoming North	....	....	....	....
Wyoming South	....	....	....	....
P. N. Y. C. & R. R. Co.	12,938	233,810	15,820	240,035
Williamstown Col'y	....	.....	....	....
Big Lick Col	....	.....	....	....
Total	447,181	5,604,066	468 961	5,810,036
1872			447,181	5,604.066
Increase			21,780	205,036
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, 1873 and 1873.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending May 3, 1873, compared with week ending April 27, 1872.

COMPANIES.	1872.		1873.	
	Week.	Year.	Week.	Year.
C. & O. Canal	18,900	118,195	16,298	91,190
B. & O. R. R.	29,086	385,571	29,181	446,943
Penn. S. Line	....	.....	1,468	34,052
H. & B. T. R. R.	....	87,941	.....	153,419
*Harrisburg & D	9,101	181,749	7,990	125,112
*L. V. R. R.	724	12,218	382	11,201
P. & N.Y.C. & R. Co.	7,201	134.858	7,404	112,825
Cumberl'd Branch Canal	6,461	39,303	2,650	17,909
" Railroad	675	3,648	1,916	35,782
Total	72,148	963,483	67,289	1,028,328
	67,289			963,483
Decrease	4,859			
Increase				64,900

Penn. and N. Y. R. R.—Coxton, Pa.

Coal tonnage for week ending May 3, 1873.

	Week. Tons. Cwt.	Total. Tons. Cwt.
Anthracite received:		
From Lehigh Valley R. R.	9,787 02	146.648 07
" Lack. & B. R. R.	961 05	13,2·2 10
" Pleasant Valley R. R.	4,192 05	66,973 12
" Sul. & Erie R. R.	879 04	13,141 05
Total	15 819 16	240,035 14
Same time last year	12,937 15	224,810 04
Increase	2,852 01	16,225 10
Decrease		
Distributed:		
To Lehigh Valley R. R.	2,029 06	19,593 07
To Lack. & B. R. R.	29 17	443 14
To S. Central R. R.	5,050 14	47,429 03
To Ithaca & A. R. R.	2 394 11	36,435 12
To Erie R. W. Pockets for shipm't.	4,408 13	81,312 13
To individuals on line of road	408 08	15,895 00
To points at & above Coxton for use of Co	550 13	11,457 19
To points between Waverley and Elmira	947 14	27,408 06
Total	15,819 16	240,035 14
Bituminous received from BARCLAY R. R.		
Shipped north from Towanda	7,380 01	112.117 10
Shipped south from Towanda	24 03	707 03
Northern Central R. R.	....	.....
Total	7,404 04	112.824 13
Same time last year	7,200 19	134,857 17
Increase	203 05	
Decrease	.....	22,033 04
Distributed:		
To Erie Railway	5,872 17	95,516 11
To So. Central R. R.	1,507 04	16,448 13
To Ithaca Valley R. R.	....	117 09
Lehigh Valley, R. R.	6 03	352 04
To individuals on line of Railroad.	18 00	271 12
To points on line of road for use of Company	....	118 04
Total	7,404 04	112,824 13
Grand totals transported		
Anthracite	15,819 16	240.035 14
Bituminous	7,404 04	112,824 13
Total	23,224 00	352,860 07
Same time last year	20,138 14	358,668 01
Increase	3,085 06	
Decrease	.....	5,807 14

Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna, & Western Railroad for the week ending Saturday, May 3, 1873.

	WEEK. Tons. Cwt.	YEAR. Tons. Cwt.
Shipped North	15,311 08	218,492 09
Shipped South	55,904 13	739,287 09
Total	71,216 11	957,689 18
For the Corresponding time last Year:		
Shipped North	17,787 02	204,007 16
Shipped South	46,858 13	720,149 09
Total	58,648 00	924,157 05
Increase	12,568 01	33,532 13
Decrease	.....	

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, May 3, 1873.

BY RAILROAD.—ANTHRACITE.

PASSING OVER MAIN LINE AND LEB. VAL. BRANCH.

	Tons.	Cwt.
From St. Clair	30,475	02
" Port Carbon	4,724	06
" Pottsville	2,191	09
" Schuylkill Haven	29,450	17
" Pine Grove	6,583	12
" Tamaqua	13,413	00
" Harrisburg	60	15
" Dauphin	6,299	06
Total	93,198	07

FOR SHIPMENT BY CANAL.

Passing Frackville Scales	8,715	16
" Mill Creek "	1,833	10
" Schuylkill Valley Scales	896	15
" Mt. Carbon "	793	14
" Cressona "	8,703	03
" Pine Grove "	.....	
" Tamaqua "	1,518	01
Total	22,430	17

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

Via Catawissa & Williamsport Br.	142	17
" N. C. R. R. passing Locust Gap	2,017	08
" " " Shamokin	3,974	01
" " " Herndon	....	
Total	6,134	06

SHIPPED WEST OR SOUTH FROM PINE GROVE.

Via Schuylkill & Susquehanna R. R.	906	01
" Lebanon & Pine Grove Branch	799	09
Total	1,705	10

CONSUMED ON LATERALS.

From Frackville Scales	433	17
" Mill Creek "	600	13
" Schuylkill Valley Scales	1,278	06
" Mt. Carbon "	667	17
" Cressona "	234	04
" Pine Grove "	104	02
" Tamaqua "	571	10
Total	3,890	09

LEHIGH AND WYOMING COAL.

Received via Silverbrook Junction, Sent East	4,334	00
Cat. & Wpt. Br. Sent West	....	
" " Rupert, Cat. & Wpt. Br.	...	
" " Allentown, E. Penn'a Br.	118	09
" " Alburtis, " "	....	
" " Oreland, G. & N. Br.	1,191	18
" " Willow Street R. R.	491	00
Total	6,135	07

BITUMINOUS.

From Harrisburg	7,990	00
" Connecting R. R., G. & N. Br.		
" Junction R. R.	....	
Total	7,990	00

COAL FOR COMPANY'S USE.

Anthracite	6,959	18
Bituminous	259	01
Total	7,248	19

RECAPITULATION.

	Total for Week.	Corres'p'g week last year.	Increase and Decrease.
Passing over Main Line and Leh. Val. Branch	93,198 07	88,186 15	i 5,011 12
For Shipment by Canal	22,430 17	28,264 03	d 5,833 06
Shipped Westward via Northern Central R. R.	6,134 06	5,851 17	i 282 09
Shipped West or South from Pine Grove	1,705 10	2,191 01	d 485 11
Consumed on Laterals	3,890 09	2,695 11	i 1,194 18
Lehigh and Wyoming Coal	6,135 07	1,040 15	i 5,094 12
Total Anthracite paying freig't	133,494 16	128,230 02	i 5,264 14
Bituminous	7,990 00	9,100 14	d 1,110 14
Total of all kinds paying freig't	141,484 16	137,330 16	i 4,154 00
Coal for Company's use	7,248 19	8 741 02	i 1,496 03
Total Tonnage for Week	148,733 15	146,075 18	i 2,657 17
Previously this year	1928 64 07	1826320 17	i 102,543 10
Total to date	2077598 02	1972396 15	i 105,201 07

SHIPPED BY CANAL.

From Schuylkill Haven	20,376 00	29,709 10	d 9,333 10
" Port Clinton	953 00	1,944 00	d 991 00
Total Tonnage per Week	21,329 00	31,653 10	d 10,324 10
Previously this year	71,840 10	129,631 09	d 57,790 19
Total to date	93,169 10	161,284 19	d 68,115 09

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, May 3, 1873.

	WEEK.	SEASON.
North	62,893 08	199,968 06
South	5 558 07	109,303 16
Total 1873	68 451 15	909,272 02
Corresponding time in 1872 :		
North	55,479 07	833,490 19
South	4,457 11	116,596 02
Total, 1872	59,936 18	950,087 01
Increase North		
Decrease North		
Increase South		
Decrease South		
Increase	8,514 17	.....
Decrease	.....	40,814 19

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

Week ending May 3—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	29534 01	14194 05	4140 11	47868 17	572819 12
Upper Lehigh		2706 06	926 12	3632 18	67415 03
Beaver Meadow	1839 08	1013 06	1858 18	4511 12	60631 06
Hazleton		134 05	7360 13	8094 18	20985 04
Manoa Chunk	2146 01	2853 17	8431 15	13431 13	147403 17
Total	33519 10	20901 19	23118 09	77539 18	869055 02
Prev'ly reported	403042 06	352059 00	36413 18	791515 04	
Total to date	436561 16	372960 19	59532 07	869055 02	
Same time .1872	360229 08	251598 15	44587 12	656475 15	
Increase	76,272 08	121362 04	14944 15	212579 07	
Decrease					

DISTRIBUTION.	WEEK 1873.	WEEK 1872.	YEAR 1873	YEAR 1872.
Forwarded East by Rail to Tidal points	33519 10	29234 19	436561 16	360289 08
Forwarded East by Rail to Local points	6359 16	7896 09	163049 09	116818 08
Forwarded East by Rail use Central Division	1549 08	1435 18	30550 19	25947 19
Forwarded East by Rail use L. & S.	206 13	211 10	4640 07	3187 13
Delivered at and above Manch Chunk	1461 05	702 09	28132 14	18454 01
Delivered at Coalport & Hazard for Canal	23118 09	14728 15	84005 14	58220 06
Delivered to L. V. R. R. at Packerton	201 15	259 16	12220 07	5359 03
Delivered to L. V. R. Rd. at Sugar Notch	3186 07		30177 14	
Delivered to L. & B. R. R. at Plymouth Bridge	7945 14	4000 03	79716 02	68098 17
Total	77,539 18	58469 19	869055 02	656475 15

Report of Coal Transported over the Lehigh Canal

For the week ending May 2, 1873.

REGIONS SHIPPED FROM.	TIDE. tons. ct.	LOCAL. tons, ct.	TL WEEK tons cwt.	TL. DATE. tons, cwt.
Manch Chunk Region	4,301 08	3,749 12	8,051 00	18,408 15
Manch Chunk Region Hazardville				
Beaver Meadow Region	191 13	2,569 19	2,761 12	4,942 13
Mahanoy Region		276 19	276 19	739 06
Hazleton Region	2,369 17	5,830 16	7,960 13	16,546 07
Upper Lehigh Region	98 00	865 09	963 09	2,950 17
Wyoming Region	2,159 13	1,053 01	3,212 14	12,457 01
Wyoming Region, Hazardville				
Total,	9 080 11	14 145 16	23,226 07	56,044 19
Previously reported	29,059 09	3,759 03	32,818 12	
Total to date	38,140 00	17,904 19	56,044 19	56,044 19
Corresponding week last year	7,524 06	17,781 16	25,306 02	76,101 02
Increase	30,615 14	123 03	30,738 17	20,056 03
Decrease				

DISTRIBUTION.	WEEK 1873.	WEEK 1872.	YEAR. 1873.	YEAR. 1872.
Consumed on line of Lehigh Canal	2,454 03	2,806 16	5,087 00	8,096 07
Passed into Morris Canal to Tidal Points		66 17		266 09
Passed into Morris Canal to Local Points	669 17	394 17	2,508 06	1,922 01
Passed into Del. & Rar. Canal to Tidal Points	9,080 11	969 09	22,709 03	27,830 03
Passed into Del & Rar. Canal to Local Points	372 10	6,863 09	947 06	2,369 19
Consumed on line Delaware Div. Canal	2,524 06	2,325 10	2,363 03	4,532 15
Passed through to Bristol	9,224 17	11 816 03	22 440 01	35,08 03
	23,226 07	25,306 02	56,044 16	70,113 02

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 May 2, 1873.

	Tons.	Cwt.	Tons.	Cwt.
East	2,004	16		
West	10,493	04		
			12,498	00
Same time last year			8,669	08
Increase			3,828	12
Decrease			.....	
Total amount shipped to date			166 915	18
Same time last year			144,142	14
Increase			22,773	04
Decrease				

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday May 3, 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	16,268 09	29,181 10	1,468 07	46,948 06
1872	18,900 10	29,085 18	....	47,986 08
Increase		95 12	1,468 07	....
Decrease	2,602 01	.....	....	1,038 00

YEAR.

1873	91,190 09	446,943 07	34,052 01	572,185 17
1872	118,196 01	385,571 04	....	503,766 05
Increase		61,275 19	34,052 01	68,419 12
Decrease	26,908 08	....	....	....

Cumberland Branch R. R.

WEEK.

	To C. & O. Canal. Tons. Cwt.	To R. & O. R. R. Co. Tons. Cwt.	Total. Tons. Cwt.
1873	2,650 02	1,915 14	4,565 16
1872	6,460 11	675 03	7,135 14
Increase	—	1,240 11	.....
Decrease	3,810 09	.....	2,569 18

YEAR.

1873	17,908 17	35,732 06	53,641 03
1872	39,302 16	3,648 02	42,950 18
Increase		32,084 04	10,690 05
Decrease	21,393 19		

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending May 3, 1873, with totals to date, compared with same time last year.

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL Tons. Cwt.
Total Wyoming	18,949 00	302,905 09
" Hazleton	48,751 11	744,043 06
" Upper Lehigh	53 08	1,782 06
" Beaver Meadow	14,673 14	249,432 07
" Mahanoy	10,542 19	156,271 05
" Mauch Chunk	27 03	1,766 14
Total	92,997 15	1,456,201 07
Same time last year	93,286 01	1,452,193 12
Increase	....	4,007 15
Decrease	288 06	
Forwarded East from Mauch Chunk by rail	70,509,13	1,203,609 11
Same time last year	68,108 01	1,223,023 13
Increase	2,292 12	
Decrease		19,414 02

DISTRIBUTED AS FOLLOWS.

Forwarded East from Mauch Chunk by rail	69,493 02	1,180,171 19
do East for use L. V. R. R.	1,007 11	23,437 12
Delivered at and above Mauch Chunk for use of L. V. R. R.	1,776 05	29,565 07
To P. & N. Y. R. R.	9,787 02	146,648 07
To Northern Central R. R.	721 17	4,573 01
To D. H. & W. R. R.	38 05	14,873 11
To L. & S. R. R. at Packerton for rail	281 08	5,636 03
Delivered at M'h Chunk	21 12	1,525 04
Delivered on line of road above Mauch Chunk	165 10	7,219 04
To L. & S. R. R., at Penn Hav., for railroad		1,541 10
Do. for canal	7,960 13	16,546 07
To Lehigh Canal Manch Chunk	1,709 00	3,649 12
To Catawissa Railroad	5 00	40 00
To L. & B. R. R. at Lack. Junc.	30 10	20,813 10
Total	92,997 15	1,456,201 07

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, May 3, 1873.

	WEEK.	SEASON.
By Delaware and Hudson Canal	48,739	121,136
By Railroad, East	7,009	128,000
" West	12,378	142 288
" South	5,558	109,304
Total 1873	73,684	500,728
Corresponding time in 1872 :		
By Delaware and Hudson Canal	46,861	125 111
By Railroad, East	14 534	216,966
" West	6,415	111 204
" South	4,457	116,596
Total	71,767	569,877
Decrease	69,149	

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Saturday, Mal 3, 1873.

	Tons.	Cwt.
From Schuylkill Haven	20,376	00
" Port Clinton	953	00
Total for week	21,329	00
Previously this year	71,840	10
Total	93,169	10
To same time last year	153,181	09

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

SCHUYLKILL.	AT NEW YORK. May 1. R. A.	W. A	AT PHILADELPHIA. May 1. R. A.	W. A.
Lump	$— —	$5 45	— —	4 10
Steamer	— —	5 45	— —	4 10
Broken	5 70	5 45	4 35	4 10
Egg	5 85	5 60	4 50	4 25
Stove	6 05	5 75	4 70	4 40
Chestnut	5 20	5 95	3 85	3 60
Pea	— —	— —	— —	— —
LEHIGH.				
Freight to New York 50 cents.				
Lump, (on board)	— —	5 35	— —	— —
Broken	— —	5 30	— —	— —
Egg	— —	5 30	— —	— —
Stove	— —	5 60	— —	— —
Chestnut	— —	4 35	— —	— —
Pea	— —	— —		
SPECIAL COALS.*				
Honey Brook, Le'h W.A.	4 70@5 60		— —	— —
Spring Mountain " "	— —@— —		— —	— —
Sugar Loaf " "	— —@— —		— —	— —
Room Run	4 70@5 60		— —	— —
Hill & Harris.. " "	4 70@5 60		— —	— —
Shamokin " "	4 70@5 60		— —	— —
Lykens Valley. " "	4 85@6 10		— —	— —
Broad Top " "	6 60@— 10		5 35	— —

Company Coals.

May, 1873.

	L.	Str.	Gra.	Eg.	Sto.	Chest
*Scranton at E. Port	4 35	4 35	4 55	4 75	5 00	4 35
Pittston at Weehawken	4 80	4 80	4 80	5 00	5 50	4 70
*Lackawana at Weehawken	4 70	4 70	4 90	5 15	5 60	4 70
Wilk'b're at Hoboken	4 55	4 75	4 90	5 10	5 45	4 55
Old Co. Lehigh at Pt. John'n	5 60	—	5 35	5 35	5 50	4 70
New York Coal Exchange	5 35	—	5 20	5 20	5 35	4 65

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

Prices at Baltimore—May, 1873.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 75@6 00
Pittston and Plymouth, do	5 50@5 75
Shamokin Red or White Ash, do	5 50@5 75
*Lykens Valley Red Ash, do	....@5 50
By retail, all kinds per ton of 2,240 lbs	7 50@8 00
*George's Creek and Cumberland f. o. b. at Locust Point for cargoes	....@5 00
Fairmont and Clarksburg 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.

May, 1873.

George's Creek and Cumberland f. o. b. for shipping $4 60@4 75

Prices at Havre de Grace, Md.

May, 1873.

Wilkesbarre and other White Ash for Cargoes..... $	@....
Lykens Valley	@....
Shamokin Red or White Ash.....	....

Bituminous Coals (Cumberland).

Georgetown, F.o.b.....	$4 60
Baltimore "	5 00
New York "	7 25
South Amboy	6 75

Prices of Foreign Coals.

May, 1873.

Duty 75 c. per ton.

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

Liverpool Gas Caking	— —@— —
" " Cannel	17 00@— —
" House "	22 00@23 00
" Orrel.	19 00@— —

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened.....	$20 00@22 00
"Cannel, "	23 00@25 00

Per ton 2,000 lbs. delivered.

Prices of Gas Coals.

May, 1873.

PROVINCIAL.

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

	Coarse	Slack.
Block House.....	$2 50	$1 00
Gowrie.....	2 50	0 00

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

	Coarse.	Culm of Coal.
Pictou.....nett	$2 50	1 50
Sydney	2 50	1 00
Lingan.....	2 00	* 00
Caledonia.....	2 00	* 00

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 50 @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, Penn..... "	6 50 @7 00
AT PHILADELPHIA.	
Westmoreland ..... "	6 50 @7 00

Freights.—May, 1873.

Cumberland.			Anthracite.			
TO EASTERN PORTS.	From Georgetown.	From Baltimore	From Philadel'a.	From Elis. Port, Por't Johnston, and Hoboken.	From Newburgh.	From Rondout...
Amesbury	3 75	—		—	—	—
Bangor	3 25	3 50		2 10	—	—
Bath.....	3 25	3 00		2 25	—	—
Boston	3 00	3 00		2 10	2 25	2 40
Bridgeport	2 60	3 00		1 00	1 20	1 20
Bristol	—	—		1 40	1 60	—
Conasset Nar'ows	3 00	—		—	—	—
Derby.....	3 25	—		1 25	—	—
Dighton	2 75	—		1 45	—	—
East Cambridge.	2 75	2 75		2 10	2 25	—
Fall River.....	2 70	2 75		1 40	1 60	1 65
Hackensack	—	3 00		—	—	—
Hartford.....	3 50	3 25		1 50	—	1 75
Hoboken	2 05	—		50	—	65
Jersey City.....	2 05	—		50	—	65
Lynn.....	—	—		—	—	2 55
Middletown	—	—		1 25	—	—
Mystic	—	—		1 20	—	—
New Bedford.....	2 75	2 75		1 40	—	—
Newburyport ...	3 25	3 50		2 30	—	2 55
New Haven	2 60	2 75		1 00	1 20	1 20
New London.....	2 70	2 75		1 25	1 40	1 45
Newport.	—	2 00		1 40	1 60	1 65
New York	2 15	2 15		50	—	65
Norwalk	2 75	2 75		1 00	1 20	—
Norwich...	2 75	2 75		1 35	1 50	1 55
Pawtucket.....	3 00	3 00		1 50	—	—*
Portland	3 20	3 00		2 00	—	—
Portsmouth, N.H	3 50	3 25		2 20	—	—
Providence.....	2 75	2 95		1 40	1 60	1 70
Rockport	—	—		—	—	—
Saco	—	—		—	—	—
Sag Harbor.....	—	—		1 25	—	—
Salem	—	3 25		2 10	—	2 40
Stamford	—	—		1 00	1 20	1 20
Stonington	—	—		1 25	—	—
Taunton.....	—	—		1 90	—	—
Warren.....	—	—		1 40	—	—
TO RIVER PORTS						
Albany	—					
Catskill.....	—					
Cocksackie.....	—					
Coeyman's.....	—					
Cold Spring.....	—					
Fishkill	—					
Haverstraw.....	—					
Hudson	3 00					
New York vessels	2 00					
Nyack.....	—					
Poughkeepsie...	2 30					
Rhinebeck	—					
Rondout.....	—					
Saugerties	—					
Sing Sing	—					
Stuyvesant.....	—					
Tarrytown.....	—					
Troy	—					
West Point.....	—					
Yonkers	—					

* And Towing.

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

Foreign and Provincial Freight

May, 1873.

Foreign.

Newcastle and Ports on Tyne, per keel of 21 1-5 tons £

Liverpool, 5 per cent primage

TO NEW YORK.

Provincial.

Sydney.....	$3 50
Lingan.....	3 50
Cow Bay.....	3 75
Port Caledonia.....	3 60
Little Glace Bay.....	3 50

TO BOSTON.

Sydney	3 00
Lingan	3 00
Cow Bay	3 00
Port Caledonia	3 00
Little Glace Bay	2 90

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.....	06
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,.....	1 06
Shipping expenses.....	25
Wharfage.....	00
Total.....	$2 23

TO SOUTH AMBOY.

L. V. R. R...	72
B. & D. R. R... .. } .. .. }	1
Cam. & Am. R. R. } .. .. }	
Shipping Expenses, ...	35
Total	$2 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 35

San Francisco Stock Market.

BY TELEGRAPH.

NEW YORK, May 8, 1873.

We have advices from the San Francisco Stock Board, dated May 1st and 6th. The only exception to a general advance of the list is a slight decline in Meadow Valley. Gould & Curry has nearly doubled since our last, being now quoted at $19 per share. Savage still continues its upward movement, having advanced $35 during the operations of the week. An assessment of $10 was levied on Savage, April 5th, delinquent the 19th inst., day of sale, May 27th. Eureka, G. V. has declared a dividend of $2 per share, payable May 7, Belcher has also declared a dividend of $8 per share, payable on the 10th inst.

	April 25.	April 29.
Savage..... —	78	116
Crown Point..... —	118	127
Yellow Jacket..... —	70	73
Kentuck, "New Issue"..... —	9¼	13
Chollar Potosi..... —	50	63
Gould & Curry "New Issue' ..... —	10⅛	19
Belcher "New Issue"..... —	89	88
Imperial..... —	6	6⅛
Raymond & Ely..... —	57	59⅛
Meadow Valley..... —	14⅛	14⅛
Eureka G. V..... —	22	—
Ophir..... —	—	—
Hale and Norcross..... —	—	—

THE ENGINEERING AND MINING JOURNAL.

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

CONTENTS FOR THIS WEEK.

THE VIENNA EXHIBITION has opened, but it opened as is always the case upon a very incomplete preparation. The condition of the "show" is however improving rapidly. The United States is, of course, the hindmost in preparation, and on the opening day our space contained little beside the double set of Commissioners appointed. Europeans are, however, gentle critics of America, and receive whatever we send them in the kindest spirit. Were we ever to make an exhibition worthy of our reputation as inventors and mechanicians, there would certainly be something that would repay a journey across the ocean. Let us trust that this will be the case in 1876.

EXCELLENT arrangements have been made for the social comfort of those members who attend the meeting of the Institute in Philadelphia. Among others, an excursion to Pottsville has been arranged. But we need not descant upon the attractions of a city and neighborhood so well known as Philadelphia and its surrounding country. At present it offers the especial advantage of being the only place in the country which is thoroughly alive to the importance of our coming Centennial anniversary. Looking upon the immense exodus of Americans to Europe to attend the Vienna Exposition, and remembering the vast amount of money which will be spent in Austria, as a consequence, and the knowledge which will be so generally disseminated of those magnificent Austrian Alps, whose broad valleys are thought by not a few to be the finest sight in Europe, we cannot understand the apathy which possesses so many upon the subject of our own solitary celebration. We don't expect foreign despots to turn pale when the ring of the hammers is heard on the Centennial building, but we do expect to see the people of Europe take that as a call to come over and visit a great and varied country. We expect to see 1876 mark the beginning of an era of intercommunication between the intelligent people of both continents. Heretofore the visiting has been altogether on one side, but we are much mistaken if, after the Centennial, travelers do not bring more money into the country than our own citizens take out of it. At all events, Philadelphia will certainly reap the fruits of its sagacity and good sense in appreciating the proper value of the occasion.

THE foreign journals published the following list of papers which were presented for reading before the British Iron and Steel Institute, at its meeting in London, April 29;

"On the Manufacture of Iron and Steel by a direct process, by Mr. C. WILLIAM SIEMENS, F. R. S., London. On the Combustion of Powdered Fuel in Revolving Furnaces, and its application to Heating Purposes, by Mr. T. R. CRAMPTON, Westminster. On a method of preventing Shock in Reversing Rolling Mills, by Mr. JEREMIAH HEAD, Newport Rolling Mills, Middlesborough. On a New Wire Rope Tramway System, coupled with the transmission of power by Wire Ropes, by Mr. H. M. MORRISON, Longsight, Manchester. On Greener, and Ellis's Patent Oxide Dry Bottoms for Mill Furnaces, by Mr. THOMAS GREENER, Darlington. On a recent Boiler Explosion at Linthorpe Ironworks, Middlesborough, by Mr. JEREMIAH HEAD, Middlesborough."

To one familiar with the character of the papers read before our own Institute of Mining Engineers, it can but be a striking fact, that of the six papers mentioned above one half are obviously descriptions of patents, and perhaps two of the other papers are of the same kind. We do not wish to be understood as speaking in a critical way of this circumstance. Dr. SIEMENS' process is a patented one, and yet we read, as many others will read, the above announcement of a paper by him on that process with pleasure, for it is one of the new discoveries in the manufacture of iron. The paper on Powdered Fuel is by the inventor of the furnace in which it is to be used. The oxide dry bottoms which Mr. GREENER was to describe, is a patent, and the remarkable thing about this patent right is that it covers just what forge-men have been using ever since wet puddling was known. Messrs. GREENER and ELLIS propose to replace the sand bottom of the ordinary re-heating furnace, with the oxide bottom of the puddling furnace. If we cannot say much for the ingenuity displayed in making this transposal, we certainly are willing to endorse all that can be said as to the ingenuity displayed in obtaining a patent for "this novel and ingenious application of a mechanical or other principle." This dry bottom business has been exploited in England in a way that is not altogether creditable. It will probably be brought over here, and we publish in another place some strictures upon it.

IN the May number of the *American Journal of Science*, a letter from Professor HENRY WURTZ to Prof. DANA is quoted, to show that the former promulgated in 1866 the theory that the heat of metamorphism is due to motion in the altered strata. The paper of Prof. WURTZ on the Genesis of Gold, read at the Buffalo meeting of the American Association, was subsequently published (in the winter of 1867-8) in this Journal, then known as THE AMERICAN JOURNAL OF MINING, and the following paragraph occurs in our number of Jan. 25, 1868 (Vol. V. p. 50):

"There is one related point to which I shall devote a few words; as due weight may not have been attached thereto by geologists, even supposing that it has occurred to any in precisely the same light. This is, that the tremendous dynamic agencies, whose effects of upheaval, subsidence, disruption and displacement, we find so widely manifest, while doubtless themselves engendered of the pent-up heat-energy of the interior, must have given birth to, or have been in part transmuted into, heat-motion. Hence I deduce conclusions of great moment, but one or two of which can now be dwelt upon. It follows, for instance, that in our theoretical views of metamorphism, we are by no means of necessity limited, for our essential chemical excitant, merely to that portion of the hypothecated residual cosmical heat which might be supposed to have been retained by the emerging oceanic floor. Neither elevation nor subsidence (both necessarily accompanied by enormous compression) could occur without rise of temperature; though the degree of this rise would, of course, vary very much in various parts of the mass. The era of possible metamorphic changes dependent upon the percolation of superheated waters is thus indefinitely prolonged *even to the present time:* and explanation, both in mode and measure, is thus presented for our thermal springs and many like phenomena."

The credit of this theory, which certainly indicates a true cause (though not in our opinion *the* exclusive, universal cause) of the heat of metamorphism, must be given to Prof. WURTZ, though MALLET and others have developed and sustained it. MALLET, in particular, stretches it to cover volcanic heat, a conclusion which we cannot adopt.

In the same series of articles by Prof. WURTZ appears (Vol. V. p. 18) the following paragraph, which is specially interesting in view of the recent discovery of gold in the sea by SONNSTADT.

"It is possible that a very important share of the primeval oceanic gold may still be held in solution. [Here follow some calculations, showing that all the gold now in human hands is less than the 162,000,000,000,000th part of the ocean by weight]. So far as ordinary chemical analysis has yet indicated, the present ocean may contain more gold than the present total wealth of mankind in this metal.* * * In this connection, I would recall the celebrated discovery of silver in the ocean water by MALAGUTI, since confirmed by many others; and would urge that gold be also sought for, with renewed precautions. It may be that if we had for the latter tests as delicate and characteristic as for the former, it would have been already detected."

We reproduce these passages, in justice to one of the most acute investigator and original thinkers among American chemists.

Thoma's Method for the Manufacture of Iron.

WE publish this week the first part of an article by Mr. A. THOMA, on his method of manufacturing iron and steel. The principal objects aimed at in this method are saving of fuel and the production of an absolutely pure article. In accomplishing by this process the first, the location of works is less dependent on the immediate vicinity of coal-beds than heretofore, and by the asserted practicability of using even very impure iron ores without impairing the quality of the product, a means is promised of utilizing the immense deposits of ore of this class, which up to the present have been, to a great degree, locked up from the commerce of the world.

Mr. THOMA's long experience in the iron business, and his standing among the metallurgists of the age, attested by the frequent occurrence of his name in the text-books, and journals of the science, during more than a quarter of a century, entitle his opinions to respectful attention; and it is to be hoped that the test of practice may soon be applied to the propositions he advances. Mr. THOMA and Mr. BISHOFF, of Magdesprung, were the first, many years ago, who used gaseous fuel in metallurgical establishments.

The Bullion Product of the United States.

ACCORDING to the forthcoming report of the U. S. Commissioner of Mining Statistics, the bullion product for 1872 compared with that of previous years, was as follows :

	1869.	1870.	1871.	1872.
Arizona	1,000,000	800,000	800,000	625,000
California	22,500,000	25,000,000	20,000,000	19,049,098
Colorado	*4,000,000	3,675,000	4,663,000	4,661,465
Idaho	7,000,000	6,000,000	5,000,000	2,695,870
Montana	9,000,000	9,100,000	8,050,000	6,065,339
Nevada	14,000,000	16,000,000	22,500,000	25,548,801
New Mexico	500,000	500,000	500,000	500,000
Oregon and Washington	3,000,000	3,000,000	2,500,000	2,000,000
Wyoming	.....	100,000	100,000	100,000
Utah	.....	1,300,000	2,300,000	2,445,284
Other Sources	†500,000	525,000	250,000	250,000
Total	61,500,000	66,000,000	66,663,000	63,943,857

* Including Wyoming. † Including Utah.

The principal items in this estimate for 1872 have been discussed in the extracts from the Commissioner's report published in our columns during the last few weeks. The decline of more than $2,000,000 in production will not surprise those who are aware how disastrous has been the indirect effect of the prosperity of the more accessible districts upon the mining industry of Idaho, Montana and Oregon. The placer miners of these regions have emigrated in large numbers, attracted by the prospect of steady work in the quartz mines of Nevada and Utah, or have turned their attention to stock-raising, a business which the completion of the Pacific railroads and the rapid increase of the settlements along the railroad belt have rendered exceptionally profitable. The desultory industry which during a few months of each year produced from thousands of gulches and bars a large aggregate of gold has been suspended, partly by the causes just named, and partly, no doubt, on account of the exhaustion of much of the ground formerly profitably worked without capital or machinery. But the treasures of these Territories are not exhausted. On the contrary, they have hardly been discovered. When the completion of the Northern Pacific and of various projected branches shall have made Eastern Oregon, Idaho and Montana as accessible to trade and travel as are Colorado, Utah and Nevada, it will be quickly made to appear that the mineral resources of our northern belt are as vast and as varied as those of any other part of the country.

The product of 1872 was about equally divided between gold and silver mines, if the bullion of the Comstock is reckoned in the latter class. The amonnt derived from systematic and permanent operations (quartz and hydraulic mines) is larger than ever ; and this circumstance, so encouraging in itself, explains the impression entertained by many who ignore the former extent and present decay of small placer-mining operations, that the total yield of the country was greater. The transition from precarious surface mining to organized permanent and extensive work is going steadily forward. Every year witnesses a substantial gain ; and though the aggregate production may fluctuate, there is no real retrogression, but a constant advance, in this most important industry.

The Dixon Bridge.

THE fall of a bridge, at Dixon, Illinois, by which a large nnmber of persons were killed and wounded, is an occurrence which ought to awaken the authorities and the people to the necessity of ascertaining the true strength of the immense number of bridges which are scattered over the country. America being the land of great rivers, is peculiarly the land of great bridges also. Construction of this kind has necessarily been made a specialty by our engineers, who have developed a practice which is as different from that of other countries as our railroading is different from that in other lands. In many respects this practice is a triumph of skill and suitability to the conditions. In this country the first requisite is to carry economy to the utmost limit, a fact which compelled the rejection, once for all, of that system of box girders which in England was not forbidden by the cost of iron and labor. Our bridges have so little metal in them that they are mere webs of iron bars, and have a wonderful gossamer appearance. The danger is always that this trusting to the strength of the material will be carried too far. When a good engineer is employed, as is nearly always the case in railroad construction, there is little likelihood that economy will be more considered than safety ; or rather, it is pretty certain that true economy will be sought by raising a sonnd structure. Whether built from special designs or made in one of those great bridge factories, which are such a noticeable feature in modern manufacturing industry, the model is pretty sure to be a good and safe one.

But a different state of affairs exists in the construction of town and county bridges. Inexperienced commissioners there decide upon the structure, and their responsibility ceases when they have provided a bridge, built after a pattern which is already in extended use. It is these very bridges, too, which are most likely to be overloaded on some unusual occasion. The work demanded of such a structure is, in ordinary times, the safe passage of a few loaded teams ; but any occasion like that religious ceremonial at Dixon, is apt to throw upon them a crowd of human beings, and an unusual demand for strength. These considerations indicate that there ought to be an inspection of all bridges over a certain span. Most States have a state engineer or inspector of railways, or some similar official, whose duty it should be to examine the plans of all bridges to be constructed in the State. The fee need not be great enough to form an objectionable tax upon the people and the chances of security would be much increased.

The circumstances under which the Dixon bridge fell, prove the necessity of some provision of this kind. There are but three general causes for the failure of a work like this. A faulty model, faulty construction, or lack of that constant attention without which no bridge can be safe, must have been the cause, and probably it is the first of these—a bad design—which must bear the responsibility for this cruel disaster. The bridge was one of the Truesdell pattern, the principal feature of which is a chord placed in the neutral axis. Some hundreds of these bridges have been built, and they are found even on railroads, though we believe county and town commissioners are its most numerous patrons. Stories of improper influences used to obtain the contract have been published, the truth of which we are in no position to know. The bridge is reported to have been tested when built, two or three years ago, with a load of 2000 pounds to the running foot, and it is estimated to have broken with a load of 400 pounds to the foot, upon the side where the people were crowded. This seems to indicate that want of proper attention also has had something to do with its fall. Whatever the cause, however, it is certain that the State governments are in duty bound to provide a proper official inspection of bridges.

Nova Scotia Mining.

FROM the report of Mr. DANIEL MACDONALD, Commissioner of Public Works and Mines for the Province of Nova Scotia, we learn that the coal production largely increased in 1872. For 1871 the production was 595,418 tons, and for 1872, 785,914 tons, an increase of nearly 32 per cent. Led by this result and the favorable conditions of mining in this conntry, which have obtained since the rise in the cost of English coal, some enthusiasts predict a doubling of the yield in Nova Scotia during the present year. But the Inspector of Mines, Mr. HENRY S. POOLE, F. G. S., thinks that the maximum possible output of the present mines, as now established, is 1.100,000 tons, and that this will not be reached on account of the scarcity of labor. Wages have risen from 20 to 25 per cent, and a steady miner can now earn $80 a month. The rise of prices abroad has opened new markets to provincial coal, and has proved that the mines of Nova Scotia are not so dependent upon United States markets as was supposed. Still, the New England States are the heaviest users of the coal, and these mines are, indeed, the natural supply of those States.

We have spoken, in a former issue, of the gold mining of the province. The present report adds nothing to that information except the fact that gold mining has taken on a serious change. Working by the owners has been very generally given up for working by tributers. The dangers of the tribnte system are well known to be, what may be generally summed up in the expression, "reckless treatment of the mine." Timbering is neglected, and stripping out the rich ore takes the place of jndicions work. Still, tributing proves more profitable to the owners, and with proper inspection, the change may be a good one for the district. The production of gold has lessened on account of a falling off in the number of miners. The work in the mines presents nothing worth noting, except, perhaps, in one point : the tailings from the Palmerston Mill receive an after treatment, which consists in passing them, wet, through a barrel sieve of one-eighth inch mesh. The fine stuff runs ovor three tables 8 feet long, 2 feet wide, and covered with amalgamated plates and riffles. Small jets of water keep it in motion. By this method 41 ounces of gold were extracted from 675 tons of tailings, and 70 pounds of mercury was saved. These results are encouraging enough to warrant an increase in the length of the plates, from which closer work is expected.

The statistics of the mining industry in the Province are as follows :

Number of mines.	Minerals.	Quantities.	Value.
25	Coal,	tons, 880,950	$1,409,520
30	Gold (17,713 tons quartz)	oz. 15,079	278,961
2	Iron,	tons, (?) 6,000	
1	Barytes,	" 260	2,080
1	Manganese,	" 40	1,400
	Plaster,	" 99,470	89,523
	Fire clay,	" 527	

Method for the Manufacture of Cast Iron, Wrought Iron, and Steel.

BY ALOIS THOMA.

Twenty, or twenty-two years ago, Mr. FAIRBAIRN wrote in the *Journal of th Franklin Institute*, in regard to the magnetic iron ore deposits in the United States :

"In time other methods of reduction may be discovered, in which the occurrence of stone coal will have less weight. With the present method, however, an important iron industry at a great distance from the coal deposits of Pennsylvania is impossible, no matter in what abundance magnetic iron ores may occur in the Southern States, and however good their quality."

When I read this, the first iron works nsing altogether gaseous fuel, and constructed by me, had been for several years in successful operation. I saw in the use of gases as fuel, and in my process, the method alluded to by Mr. FAIRBAIRN, as to be discovered ; because in using it, not only can every kind of fuel, such as wood, peat, and lignites be successfully used, but the saving in fuel accomplished by it is surprisingly large. Besides this, the employment of gaseous fuel renders the direct manufacture of wrought iron from suitable ores easy, and cast-steel can be produced at a very low cost, while the blast furnace process is entirely avoided.

Since that time I have devoted my energies to the perfection of my method, for doing which I had the best opportunities in building and running works using gas fuel. My process is now fully determined in all its details ; all the necessary

furnaces and other apparatus have been tested, and I am thus convinced, that by the introduction of this method in the United States, extraordinary advantages will be obtained. Furthermore, it is rendered possible by this means, to produce at home a full supply of certain kinds of cast and wrought iron, of which millions of pounds are now imported. Of cast-steel rails even a large export is rendered possible by means of the introduction of my process.

In all these processes I use almost exclusively gas as fuel, or gas furnaces, and am enabled thereby to use, with equal results, fuel of every kind, even those from which it is not possible by the ordinary methods to obtain a high heat. We are not, therefore, dependent entirely upon the coal deposits, but can do equally well upon a large scale with peat, wood or lignites, which may be found in the vicinity of the ores.

Each of the gas furnaces which I use in the production of iron or steel, consists of two distinct and separate parts.

1st. The *generator*, in which, by the imperfect combustion of the fuel, carbonic oxide gas, hydrocarbons and hydrogen, mixed with the nitrogen of the atmosphere, are evolved.

2d. The *furnace*, in which these gases are burned by the introduction of hot air into the parts where the flame and heat are required.

The construction of the gas generator is regulated by the nature of the material to be used; that of the furnace by the nature of the work to be accomplished, and if it should be desirable to change the kind of fuel, alterations in the gas generator are easily and quickly made to suit.

The present form or construction of the gas furnace is the result of a thirty years' experience in the business. I claim, in general, the application of gas fuel in metallurgy, and also the so-called generators with blast (that is, those in which the gas is generated under blast, and not with natural draft) as my invention. When, in 1840, I first proposed their use and furnished detailed plans for the same, (thereby showing that I had been for a long time engaged upon the subject) gas furnaces were unknown.

In the year 1830 I expressed to Treviranus, at that time Master of Machinery at Colonofska in Upper Silesia, the intention of using gas as a fuel upon the principle of the blow-pipe, as only in that way could we reach entire satisfaction and be freed from smoke. Since that time I have been constantly engaged upon the subject of improving this method of generating heat.

BISCHOFF, at Mägdesprung, was experimenting upon the same subject at the same time, but in another manner, inasmuch as he used suction draft generators, which I did not consider so applicable for the smelting of iron and steel, because they did not work with as much regularity, and were not near as free from dust as the blast generator. Each of us was at the time entirely unconscious of the experiments of the other, and we only became acquainted after each had succeeded in his experiments, BISCHOFF being the first to meet with success.

We had no accident to thank for our invention, but each accomplished his improvements by means of a thorough investigation of the principles of combustion, and it is truthfully acknowledged in the German edition of Muspratt's Theoretical, Practical, and Analytical Chemistry, Vol. 3., p. 284 (article iron) where it is stated:

A—gas puddling furnaces with isolated generators.—Generators belonging under this head are all, more or less, modifications of those built by BISCHOFF, of Mägdesprung, or THOMA, with or without blast.

Our furnaces were, from the beginning, Regenerators, though the old invention has received a new name, in that we used the escaping flame for heating the blast, thus returning to the furnace this source of heat. We do not heat the gases very much, nor is this necessary, because in our arrangement they do not become cooled before using, nor would a high degree of heat have any appreciable influence upon the heat to be obtained in the furnace; we have only to take care that the gases are sufficiently free of steam, and that the blast is of a proper temperature to ignite. The conversion of distilled tar into permanent gases is also accomplished in a simple manner.

In the year 1842, I succeeded in building the first thoroughly successful gas-furnace. Soon other experiments followed, and in 1845, I commenced the introduction of gas-furnaces in the Ural, on the boundary of Europe and Asia, and the extensive Iron Works of Liswenski Savod *were in fact the first which were entirely worked with gas.* Although much has, in the meantime, been written and many experiments have since been made, still no permanent or extended works with gas-furnaces have been established, except those at Liswenski Savod. The products of these works, which previously were of an ordinary quality, became after the introduction of gas-furnaces noted for their peculiarly good character, and the consumption of wood was reduced from 42,500 cords to 16,600 per year.

Wherever I have established the use of gas fuel, the results have proved its great advantages in the two above mentioned points—superiority of the article produced, and economy of fuel—further it proved also that fewer skilled workmen are needed, that the capital required is less, and therefore it may often be profitable to establish works in places where they would be required for a limited period only.

Oxide Dry Bottoms.

Two inventors in England have lately made a breeze over the employment of cinder bottoms in the reheating furnaces. We have not mentioned the subject before, for the simple reason that we were utterly unable to discover what there was patentable in this proceeding; for we could find nothing in the proposed bottom different from that used in all puddling furnaces. In fact, we thought the papers read before the scientific societies showed signs of an attempt to cover the impudence of patenting such a claim, by laying extraordinary stress upon such trivialities as granulating the bottom to a certain fineness before charging. A correspondent of *Engineering* now comes forward with the following letter in which he attacks the new lining, patent, principle and all. He says:

SIR—The interest that all ironmakers take in anything pertaining to their craft, must be my excuse for seeking to occupy a portion of your valuable space with a few remarks on the last "meteor" that has burst over the Cleveland District, viz., "Oxide Dry Bottoms."

The paper read at the Cleveland Institute fails to establish any difference in the distinction claimed as existing between "oxide dry" and "cinder bottoms," beyond removing the liquid cinder from the charge, which I hold to be highly impolitic.

The bed of both furnaces is composed of dry oxide; whether it be in lumps, or pulverized, or is collected in its liquid state in a pan, the composition of the mass on which the charge reposes is substantially the same.

The matter has been treated as though some special virtue attached to the ore being used in a granulated form; but this only facilitates the forming of a sloping surface, a condition not indispensable in furnaces, and, I believe, a positive evil in oxide bottoms, as it carries off from the vicinity of the work an important aid to the heating power of the furnace.

Cinder left in a liquid condition around the charges of cinder bottom is said to oxidize that portion of the charge submerged, deteriorate the iron, and by long exposure to heat, impoverish the fettling.

1. The average waste is not more below than above the cinder; this I have ascertained from heats varying from 10 cwt. to 20 tons.

2. The iron is not in the least affected by the presence of cinder; save the inappreciable oxidation, its quality is not impaired. I can speak for iron that has been twelve hours sunk in a bath of liquid cinder, and a furnace at its highest temperature.

3. As the cinder is drawn off within a few minutes of its creation, it is mere moonshine to say it is impoverished.

I therefore deny the existence of what has been held up as evils in the cinder bottom, and repudiate the assumption that they furnish evidence of special virtue in "dry bottoms."

The chief object of this new scheme is the utilization of the inevitable cinder ever flowing from the various stages reaching to the bars or plates, a penalty that science and ingenuity has as yet failed us to obviate.

Now as oxide or cinder bottoms are in very common use for the preliminary or roughing operations, and the resulting cinder used as fettling, it is only as a substitute for the reheating furnaces of finishing mills that they have any special value.

It cannot be denied that sand bottoms are undesirable. But so is oxidation; and they are retained on the principle, "What cannot be cured must be endured." The question is, will the proposed expedient perform the work with equal facility, giving the cinder hitherto lost as the profit of the change?

Ten or twelve hundredweight of cinder per shift is not a powerful attraction, when it involves the giving up of past experience, and rests its claims on disputable and dangerous grounds. The reputed yield of cinder is simply monstrous; it shows an excess due to some disaster which does not credit the reputed experience of some of the speakers in "cinder bottoms." Two hundred weight of cinder per ton of iron heated is a fair yield, and should not be exceeded, and it need not vary, whether your heats be large or small.

"Sand bottoms" have the great merit of heating iron with a uniformity that renders the manipulation of masses simple, and certain qualities that will constitute a formidable opposition to change. And though the banishment of sand from the manufacture of iron would be agreeably hailed by the trade, I am certain its exile will not be imposed by the agency of oxide damp or dry. The fact that it is the practice now to raise the piles from "dry oxide bottoms" with bricks is startling evidence that the days of sand bottoms are not even numbered.

As there is nothing new that is true in "oxide dry bottoms," why are not cinder bottoms worked dry? The answer to this may account for the superabundance of fettling got out of these furnaces.

Why do furnacemen working "cinder bottoms" lose their temper when they lose their cinder, even though over the fore-plate, where no further harm can follow? Because the action of the furnace is restrained, its temperature is checked, and which can only be restored at the cost of additional fuel, and a further excess of oxidation, or, as some may call it, a larger supply of good fettling. It is because a dry furnace is slow and sluggish, and the 30 per cent. excess of cinder reported as saved is a fair estimate of the additional waste I should expect from reverting to the use of dry bottoms.

There is a reciprocal action between the liquid cinder and the incandescent gases that promotes economy in fuel and oxidation that is not taken into account, and is best known to those who have had to deal with large furnaces of refractory fire-stone and most difficult to glaze. Draw off the cinder and you neutralize that reciprocal action to the cost of your material. I fail to realize where the great profit is to ensue if sand is substituted by oxide. Two cwt. of oxide saved on one ton of iron heated, is a mild incentive to change, especially when such change may be purchased by risks that will bring more of the charge from the tapping hole, and less from the door. And the merit that is due to substituting the scrap ball of the puddler with the oxide of a mill charge is of much the same value as paying your tailor's bill with your rent; it is a residue of heated iron, get it how you will.

It is a scheme in which the sources of profit are somewhat delusive, and the substance may be sacrificed to the shadow. If successful, it does not seem to offer a gain of more than about 2s. per ton, but I am inclined to regard the disadvantage of "oxide dry bottoms" as involving a positive loss that the saving in oxide cannot cover.

Some doubt was expressed at the meeting as to whether the "patent" would hold; I have no doubt about it. The only thing that cannot hold under the existing law is an "inventor."

Every species of applied experience, whether new or old, if it has the virtue of accident in not being patented before, will, with the help of money, find support. The faith in the "patent laws" is as fervid as it was wont to be in the "philosopher's stone," and not less deceptive. A royal commission into the claims of inventors would shiver reputations and set new faces on old pedestals. But I think the claims to "oxide dry bottoms" will not be disputed; but if they should be it will, I think, be on the grounds that they do not differ in any essential point from cinder bottoms, except in the treatment of the cinder, which I think is quite optional but not likely to be followed. I am, Sir, yours obediently,

CYCLOPS.

The Oil Trade of Pennsylvania.

THE following table shows the *daily* production of the Oil Region in *barrels*, as reported for the Titusville *Herald*:

	1869.	1870.	1871.	1872.
January	10,192	12,634	15,477	16,268
February	9,967	11,917	14,391	17,012
March	9,891	12,385	13,457	15,506
April	11,067	12,974	13,308	16,308
May	10,153	14,165	13,987	18,345
June	11,334	14,817	14,806	17,749
July	11,697	15,969	17,261	18,513
August	12,157	17,777	18,161	18,816
September	12,645	19,489	17,048	16,561
October	13 071	20,159	17.092	14,300
November	13,317	18,012	17,672	16,068
December	12,844	15,214	17,724	

Amount of oil exported from New York and other ports in *gallons*:

In 1868	99,281,750	In 1871	156,514,735
In 1869	102,748,604	In 1872	151,823,007
In 1870	140,602,305		

MINING SUMMARY.

Colorado.

COLORADO ORE RETURNS.

Below we give the bullion and ore product of Clear Creek County during January, February and March, of 1873. While the totals are considerably above those of the same season of 1872, it must be remembered that Mr. STEWART was not running till the middle of January, the gold placers of Idaho have not yet been touched during the winter, the works at Masonville have been troubled by a small supply of water, JUDD & CROSBY'S mill has been undergoing repairs during the whole quarter, and several of our largest mines, viz.: the Terrible, Pelican, Snowdrift, and Silver Plume have been doing considerable dead work, preparatory to the summer's labor, taking out, meanwhile, only ore enough to pay expenses. The general summary is a credit to the county, and a warrant of a splendid raise during the balance of the year.

BULLION.				COIN.
J. O. STEWART,				$46,529 67
Masonville,				2,000 00
ORE.	POUNDS.	OUNCES.	Av. val. per ton.	
Bought by First National Bank	214,056	14,075·22	131½ ozs.	18,297 78
" G. W. Hall & Co.,	315,780	67,723·03	429 "	88,039 93
" Leon Eggers,	65,295	17,788·80	535 "	23,125 44
" Wm. Bement,	315,000	48,141·91	305¾ "	62,584 48
" Jacob Snider,	20,366	5,349·96	525½ "	6,954 94
" Boston & Colo. Smelting Works	571,460	32,557·22	114 "	42,324 38
" Swansea, Colorado Works,	109,205	3,644·17 S. 47·96 G.	68 "	5,728 75
" Whale Mill Co.,	40,000	2,500.00	125 "	3,250 00
Shipped by Terrible Silver Mining Co.,	40,000	14,000·09 S. 7·99 G.	700 "	18,365 40
Totals	1,691,082	205,780.31	243½	$317,200 77

The amount credited to the First National Bank consists principally of Terrible 2d class, with small lots of low grade ores from Sherman, Republican, and Brown Mountains. It is shipped to Chicago. Ninety per cent. of G. W. HALL'S shipments are from Leavenworth Mountain, and contain all of the ore mined from the Colorado Central lode. Every pound has gone to Germany. Mr. EGGERS has bought only high grades, and has also shipped exclusively to Germany. Mr. BEMENT'S totals include considerable high grades from Leavenworth, large consignments from the Pelican, and a number of smaller lots from nearly every working mine around Georgetown. His assays per ton therefore represent very closely the general average value of the mines. He ships to Black Hawk, the East, and Europe. Mr. SNIDER has bought only from the mines in the vicinity of Silver Plume. The B. & C. Smelting Works have purchased *directly*, mostly from the mines around Idaho. The Terrible shipments include solely their first class ore, one lot of which, weighing over five tons, contained an ounce and a half of gold per ton.

Mr. PEARCE, of Empire, has bought from all localities in the county, and everything that has been produced from the gold lodes of the Empire. The Whale Mill Co. have also done the same, and considerable of their matte is from Gilpin County ores. We have excluded, however, in our figures, all ores not mined from Clear Creek. Both these works have been prevented from continuously running, by the difficulties in obtaining pyritous ores, owing to the stoppage of so many of the gold mines of Empire and Gilpin County during the winter months.

Only two works in the county are producing bullion and these owe their existence almost solely to the energy and perseverance of Mr. STEWART. It is an undoubted misfortune to the country that there are no more, for the vitality, the genuine and lasting prosperity of the district, depends *almost entirely* upon its *low grade ores*, and these alone can be treated at home. About two-thirds of the raise of the county has been carried away, representing a loss to us of many thousand dollars. At present the difficulties in the way of a profitable treatment here are not few. No one process will suit all the ores, and we cannot expect enough capital will come in to erect zinc, lead, and leaching works, until it is satisfactorily shown that the mines will furnish a full supply. To demonstrate to outsiders that the country is not lacking in these resources, namely, ores carrying a high per cent. of zinc and lead and rich in silver, (a fact which any one who has mined here knows of a certainty), concentrating and separating works must be erected on a small scale at first, affording a market for every 30 ounce ore and separating the base metals from the precious. There is an unlimited sale for both products. The Denver Smelting Works are being forced to ship lead ores from Utah, instead of taking those which are as abundant in this county as boulders in the creek. Already there are parties in town trying to find clean galena for Wynandotte, Chicago and St. Louis. The works are wanted to-day, and by energetic action on the part of a few, could be running in six months. With them a large number of mines now profitless, either on account of a low grade in silver, or the presence of a ruinous percentage of zinc, could be successfully re-opened with benefit to their owners and the country at large.

BOULDER COUNTY.—The product of this county for January, February, and March has been as follows:

	COIN.
Caribou Silver Mill,	$ 44,332 28
Bought by B. & C. Smelting Works,	10,378 57
All other sources (estimated),	100,000 00
	$154,710 85

The average value of ores from the Caribou district, bought by the B. & C. Smelting Works, up to April 1st, was 148 ounces per ton. Outside of Grand Island District (Caribou), the only producing mine of any great prominence has been the Red Cloud. No work as yet has been done in gulch mining. A lot of about 10½ tons from the No Name lode assayed 169 ounces per ton.

GILPIN COUNTY.—The product of the mines for the first quarter of the year has been as follows:

	COIN.
Bullion,	$210,000 00
Matte from Gilpin Co. ores, shipped by B. & C. Smelting Co.,	173,215 62
Ores treated elsewhere, valued at	4,000 00
	$387,215 62

The Boston and Colorado Smelting Works have shipped matte having a coin value of $221,918. This was the product of ores from Gilpin, Clear Creek, and Boulder County.—*Mining Review.*

Nevada.

From the Gold Hill *News* of April 26:

CROWN POINT.—Daily yield 450 tons from the 1200 and 1300-foot levels. The incline is down 170 feet below the 1400-foot level. The bottom is in hard blasting rock, with very little water coming in. The south drift, 1400-foot level, is in 140 feet, the rock barren, but easily worked with a pick. The cross-cut east from the fifth floor above the 1300-foot level, 100 feet north of the Belcher line, is again in ore. The stopes in all the levels above the 1400 are looking finely. The new pump will be in running order next week. The San Francisco *Alta*, in an able article relative to the unparalleled ore body of the Crown Point and Belcher mines, says: "It has been followed through four levels, and two more are about to be opened. The quantity of ore which has been laid open will last four years at the present rate of working, and there is no doubt whatever of its indefinite continuance. The peculiarity of this ore body is that while all those found hitherto in the Comstock have been perpendicular to the foot wall, and ending with it, that in the Crown Point runs with the stratifications and improves in size and richness as it goes downward. The great and continued improvements in the self-acting machinery nearly obviate the inconvenience of deep working since the expense of a few hundred feet, more or less, is barely appreciable. The United States Consul General at Mexico, reports the Guatimoctrin silver mine, which produced $997,000 profits for the year 1870, at a value of $5,000,000. The Crown Point earned $2,100,000 in three months to April 1, and paid $1,100,000 to stockholders. This month of April it will earn nearly as much as did that Mexican mine for a year.

BELCHER.—Daily yield about 550 tons from the 1000, 1100, 1200 and 1300-foot levels. The main incline is down 116 feet below the 1200-foot level, with the bottom in hard, dry rock. The timbering of the main south drift at the 1300-foot level is progressing well, and as soon as completed, drifting south will be resumed and pushed ahead as fast as possible toward the main incline. At the 1200-foot level the north drift from the incline is in 244 feet, and the south drift to connect with it is in 404 feet, leaving about 85 feet to run in order to complete the connection. Some unusually fine ore is coming from the breasts and stopes of the 1300-foot level, by way of the Yellow Jacket shaft, and the other ore producing sections of the mine are looking and yielding finely as usual. The bullion receipts for the present month will exceed that of last, and with the large surplus left in the treasury after paying the last dividend, an increased dividend may be looked for. The machinery and everything works well.

MINT.—The east drift for this ledge, 75 feet below the surface, is being actively driven ahead. Some very fine ore has been run into about 25 feet from the main shaft. The vein is about two feet in width. A quantity of the ore shown us this morning looks very rich in sulphurets, and so closely resembles Crown Point ore as hardly to be distinguished from it. The apparent importance of this discovery can hardly be estimated, situated as it is, directly east of the Savage mine, some three or four thousand feet, and running into the hill on the opposite side of the ravine, showing that a rich vein of ore exists east of, and in close proximity to, the Comstock, yet independent of it. The ore vein mentioned, however, is evidently a spur of the main ledge, and the drift is in about ten feet beyond it, with every indication of soon striking the main ledge, as there are several feeders in the face of the drift which apparently lead to it. There is also a noticeable increase of water coming in, which is another favorable indication. The new hoisting works operate smoothly and well.

IMPERIAL.—The powerful new pumping machinery was started last Thursday, and is a great success, moving with less labor than any other on the lead. On trial yesterday, the water in the sump was lowered five feet in three minutes, the pump working slow on the shortest stroke. The water is out of the sump in the main shaft, and to-day the men are taking the mud from the bottom. Work is being pushed energetically in and about this mine. The company are now making a comparative test of wood and coal, carefully weighing and recording everything.

WOODVILLE.—Daily yield about 20 tons of very superior quality, keeping the Ramsdell and Ione mills steadily running. The Ione started up yesterday, and when some other available mill can be procured, it will be set to work. The stopes on the lower level are yielding well. The drift north, first station, has run into very rich ore during the past week, assaying over $400 dollars to the ton—more than half silver. The bullion promise of this mine is very flattering at the present time, and the present rise in the stock is based upon a very healthy financial foundation.

GOULD & CURRY.—The new pumps in the incline are completed and working well, draining the water so that sinking can be proceeded with immediately. The promising development of quartz at the 1500-foot level with drift mentioned in our last, shows about the same. No farther improvement. The main south drift at the 1600-foot level, to connect with the Savage south drift, is actively driving ahead, making good progress. Prospecting at various points going ahead as usual.

MARKET REVIEW.

NEW YORK, May 8, 1873.

IRON—Scotch Pig is without noticeable change. There have been no further arrivals of consequence, and most of the lots that were pressed on the market have been disposed of. On the whole, though business is dull and somewhat unsatisfactory, yet there is perhaps a steadier tone. We note sales of about 300 tons Glengarnock from ship at a private price, and 250 do. Coltness $59@62. The Lehigh Company's prices for No. 1 American Pig are firm at $50, but considerable lots of Nos. 1, and 2 Iron are being offered by outside parties at lower figures than than they can be bought from the works; we note a sale of 200 tons No. 1 Allentown (an outside lot) at $48, cash. New English Rails are dull. New American are without business. Old Rails are quiet, and we hear of no sales. Scrap is moving slowly; 200 tons No. 1 Wrought from yard, and a small lot from ship, both on private terms. Refined Bar from store continues rather quiet, and prices are in buyers' favor.

Import of Iron into New York, from Jan. 1 to April 30, 1873—

	Bar.	Pig.	Sheet, &c.
From Foreign Ports	tons.4,615	tons.22,345	bdls.88,334
Coastwise	21	.....	1,356
Total	tons.4,636	tons.22,345	bdls.89 690
Same time, 1872	5,488	18 209	113,362

LEAD—Foreign Pig is in moderate demand and firm at 6¼@6¼ cents gold for Ordinary; 200 tons Spanish and 50 do. English sold at these figures. Refined descriptions, suitable for corroders' use, may be quoted $7.25@$7.50 per 100 lb. gold. Domestic is firm at 6½@5¼ cents. Bar 9½ cents, Sheet and Pipe 10¼.

Import of Lead into New York, from Jan. 1 to April 30, 1873—

From Foreign Ports	pigs.146,441
Coastwise Ports	14,390
Total	pigs.160,831
Same time, 1872	166,825

Withdrawals from bond for consumption 2d, 3d, and 5th May—

Spain	pigs.3,230

COPPER—At the recent meeting of Manufacturers held here, no change was made in prices, and we retain previous quotations. For Ingot, there is more inquiry, and, with an increased business, the market has more tone than before; sales have been made of 80,000 lb. Lake for present delivery at 33@33½ cents; 100,000 lb. Tenenessee, 32; 100,000 lb. Lake for June, 31½; and 600,000 lb. for June to December delivery, 32. English is quiet, but the stock is not large, and 30@30½ cents 30 days is asked.

SPELTER—There is a little more inquiry for Foreign, but altogether for small lots; in this way Silesian is selling at 7¾@8 cents gold as to brand. The European markets remain very firm.

Import of Spelter into New York, Jan. 1 to April 30—

1873	plates 78,464
1872	plates 132,692

STEEL—The situation, so long reported, of light stocks and good demand, continues unchanged.

TIN—The market for Pig remains in the same dull and depressed condition; Straits is held at 32½@32¾ cents cash and time; English, 31¾, 30 days; and Banca, 37½@38 gold, without business. Straits is off in London to £140, and English L. & F. £145. Plates are also very dull; stocks are moderate, but the long absence of demand is sensibly felt, and goods are offering below the English parity; we have only to notice the sale of 500 bxs. Charcoal Tin at $12 gold for I. C.

Import of Tin into New York, from Jan 1, to April 30—

	1873.	1372.
PIGS	No. 23,288	33.093
PLATES	bxs.378,992	345,127

Withdrawals from bond for consumption 2d, 3d and 5th May—

Tin Plates from England	bxs.1,214

The following is from Messrs. WHITE & HASKELL'S Metal Circular of 5th inst.:—

The importations of Pig for March were—

	Slabs.	Tons.
Straits	5,730	205
Billiton	1,200	34
English, L. & F.	.....	68

From the East Indies, 12,703 slabs or 500 tons Straits, are on the way and due in all May, June and July.

Stock in importers and speculators hands:—

	Slabs.	Tons.
Straits	6,967	280
Billiton	2,100	65
Total, New York and Boston	9,067	345
Against April 30, 1872	5 000	235
" April 30, 1871	6,400	296
" April 30, 1870	855	34
" April 30, 1869	13,800	554

ZINC—Sheet continues steady at previous quotations. Manganese black oxide, 3½; Manganese gray peroxide, 5½.

Messrs. BIGELOW & JOHNSTON review the market for the month ending April 30th, 1873, as follows:

NEW RAILS.

IRON—Foreign, $70@72 gold; American, $80@85 currency; Imports at New York this month, 10,157 tons; previously since Jnnsry 1, 17.831 tons; total to date, 27,988 tons; same time, 1872, 43,798 tons; same time, 1871, 30,615 tons.

STEEL—Foreign, $110@112 gold; American, $120@125 currency; Import at New York this month, 9,569 tons; previously since January 1, 16,146 tons; total to date, 25,715 tons.

OLD RAILS.

Double heads, $54@55 currency; T or Flange, $52@53 currency; U or Bridge, nominal. Import at New York this month, 1.109 tons; previously since January 1, 3,389 tons; total to date, 4,498 tons; same time, 1872, 17,128 tons; same time, 1871, 11,057 tons.

SCRAP IRON.

No. 1 Wrought, $50@52½ currency.

PIG IRON.

American Forge, $38½@42 currency; No. 1 Foundry, $50 currency; No. 2 Foundry, $44@46 currency; Scotch No. 1 Foundry, $48@58 currency. Import of Foreign this month, 5,150 tons; previously since January 1st, 12,991 tons; total to date, 18,141 tons; same time, 1872, 18.601 tons; same time 1871, 20,687 tons.

NEW RAILS—Nothing of importance has transpired during the month, and prices are nominally unchanged. In *Steel* very little has been done.

OLD RAILS—The transactions during April have been of the most trifling character, and it is not likely that any improvement will occur until there is some increase in the demand for New Rails.

SCRAP IRON—Dull.

PIG IRON—In *American* there is some business at about the figures quoted for No. 1, though here and there parcels are offered for cash at some reduction. For No. 2 the demand is light, and prices are irregular. *Scotch* Pig has been very weak, caused chiefly by the forced sale of lots brought out by steamers on ships' account. The stock is light, and at the close there is less pressure to sell.

Mr. EDWARD SAMUEL, under date of Philadelphia, May 1st, 1873, says:

AMERICAN PIG IRON.—The past month has been without any movement in the market, worth noticing. The continued tightness in the money market has had the effect of softening prices, and there have been small sales of good Irons at lowest quotations. The demand for all grades is exceedingly light, with no disposition on the part of the purchasers to buy for future deliveries—at the same time there is very little Iron pressing on the market for sale, and it is fair to presume that if trade in manufactured Iron becomes brisk, prices will be maintained. There is, however, an accumulation of stocks in the makers' hands, which sooner or later must come on the market, the effect of which may be to lower prices, at an earlier day than at present anticipated. Quotations for good makes are as follows: $47@$48 for No. 1, $42@43 for No. 2, $36@38 for No. 3 Forge, at Furnace.

SCOTCH PIG.—The local market has been quiet, with no transactions of magnitude. Eglinton is held at $53@$54.

In the English Market, prices have reduced about 20s. per ton in comparison with last month's figures. Under date of April 16 h, the Liverpool quotations were F. O. B. in the Clyde as follows:—

GARTSHERRIE	140s.
COLTNESS	142s. 6d.
SUMMERLEE	136s.
LANGLOAN	140s.
CALDER	145s.
CARNBROE	125s.
GLENGARNOCK	130s.
DALMELLINGTON	120s.
EGLINTON	120s.

F. O. B. Liverpool abont 8s. per ton more, all round.

Exports to the U. S. for month of March	9,698 tons.	
" for 3 m's, ending Mch. 31,	28,808	"
Stock Pig Iron in store, Glasgow, Dec. 25, '72,	106,919	"
" " " Ap'l 10, '73,	79,766	"
Decrease	27,153 tons.	

Rails have sympathized with the general market, and are, for the season, unusually dull. Orders have been placed at from $82 to $85 Mill, but the principal work on hand is re-rolling, most of the new enterprises being out of the market in consequence of the difficulty in negotiating bonds. English Rails are quoted at £11 10s.@£13 for heavy sections f. o. b. Wales, and nominally at $72 gold, New York.

MERCHANT BARS.—Although it was stated at the meeting of Eastern Iron Association that some mills have orders ahead for four to six months at high prices—it is certainly the fact that this is not generally the case, indeed the contrary is much nearer the truth, and the disposition on the part of most makers to take orders at concessions merely proves this. There is some talk of trouble ahead with the puddlers, and a confidence of higher prices in the near future in consequence of the high price and limited production of English Bars and the labor troubles here, which are expected to curtail our production. At 4 cts. there is certainly no money in making. Quotations are 4@4.3 cts. base Mill price and 4.3@4.5 cts. store price for Best Refined.

OLD RAILS are dull, and quotations nominal, the only sales occurring having been made at about $57@$58 currency for D. H's. Abroad they are held firmly at £9@£9 2s 6d, C. F. & I., Philadelphia.

WROUGHT SCRAP was in fair demand early in the month, and considerable lots changed hands at from $55@$56 currency; but at present the market is quiet, without any inquiry from buyers, and prices have receded to about $50 for fair lots, inferior selections being difficult to place, whilst extra good selections find ready sale at much better figures than quotations.

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. All members and Associates who pay their dues ($10,) for each current year, strictly in advance, will have sent to their address, regularly and weekly, the ENGINEERING AND MINING JOURNAL, which is the organ of the Institute, and will contain the proceedings and transactions, and all important papers read before the Institute and all notices of meetings. Back numbers cannot, as a general rule, be sent.

Those members and associates who have not paid their dues for the current year, are requested to do so at once. Money may be sent in postal orders, checks or bank bills, to the Secretary, THOMAS M. DROWN, 1123 Girard street, Philadelphia, Pa.

II. It is expected that the more important papers, read before the Institute, and the debates thereon, will be published in annual or occasional volumes to which those Members and Associates will be entitled who have paid their dues.

III. All authors of papers are requested to notify the Secretary in advance of the meetings, giving the subject and length of their papers. Attention is also called, in this connection, to Rules 12 and 13.

IV. The ninth rule has been amended, so that there will be hereafter three meetings a year, in February, May and October.

V. The annual meeting for 1873 will take place in Philadelphia, May 20. Communications in reference to it can be addressed to the secretary.

Members will rendezvous at the Bingham House, southeast corner of Eleventh and Market streets.

The meetings of the Institute will be held at the Board of Trade Room, Mercantile Library Building, Tenth street, below Market.

A meeting of the Council will be held at the office of the Secretary, on May 20th, at noon.

THOMAS M. DROWN, Secretary.
1123 Girard street, Philadelphia, Pa.

MISCELLANEOUS.

WM. A. SWEET, Pres't. GEO. W. HARWOOD, Treas. FRED. B. CHAPMAN, Sec'y.

SWEET'S MANUFACTURING CO.,

SYRACUSE, N. Y.,

MANIPULATORS OF:

Bessemer Steel,
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Sweet's Cast Steel Crow Bars,
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Sweet's Excelsior Steel Tire,
Swede's Spring Steel,
Cast Spring Steel,
English Spring Steel,
Sleigh Shoe Steel,
Cutter Shoe Steel,
Frog Point Steel.

Nov 19:1y

SUPERIOR RAIL MILL.—CAPACITY: 1,000 TONS PER WEEK.

Harbaugh, Mathias and Owens,

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RAILROAD IRON,

Office, corner Fifth Avenue and Smithfield Street, Pittsburgh.

Our central location enables us to draw from both sides of the Allegheny Mountains Metals and Ores best adapted for making a No. 1 Rail, and together with our Improved Machinery, are a sufficient guarantee of our ability to produce Rails of a quality unsurpassed for durability and strength, by any foreign or domestic manufacture.

New Patterns, of any desirable weight, made to order on Short Notice.

We respectfully solicit orders for New Rails, or Re-rolling. June 25.1y

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OF THE

Kingdoms of Prussia and Saxony.

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REPRESENTATIVE FOR THE UNITED STATES:

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It is hereby announced, that until further notice the above named works, being already overstocked, cannot receive any further consignments.

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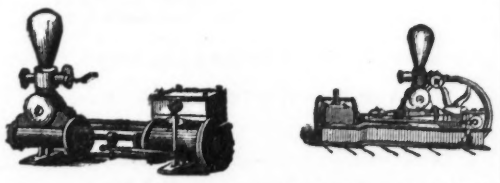
manufacturers of Steam Pumps for all purposes, both Direct-acting and Balance-Wheel.



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Feb. 25:6m

MISCELLANEOUS.

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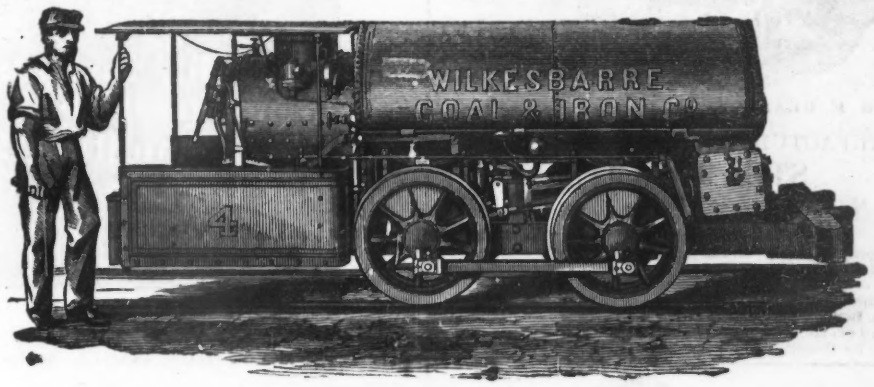
JOHN JEWETT & SONS, AGENTS, 182 FRONT STREET, NEW YORK.

OXIDE OF ZINC, SPELTER, SHEET ZINC.

Jun28:1y SPIEGELEISEN CINDER FOR BLAST FURNACES.



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Feb:7-1y:eow Baldwin Locomotive Works, Philadelphia.

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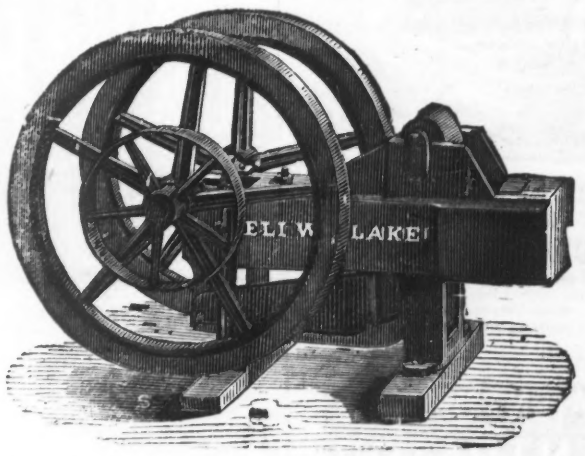

The office of this Machine is to break Ores and Minerals of every kind into small fragments, preparatory to their further comminution by other machinery. Also to break stone for McAdam roads, and Ballasting Railroads.

This machine has now been in use, enduring the severest tests, for the last ten years, during which time it has been introduced into almost every country on the globe, and is everywhere received with great and increasing favor as a labor-saving machine of the first order.

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☞ The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well contested suits in both countries, all persons are hereby cautioned not to violate them; and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent faces or jaws actuated by a revolving shaft and fly-wheel, are made and used in violation of our patent.

☞ Those who visit New York City can be shown this machine in operation by inquiring of B. R. WESTERN 37 Park Row who will give information, prices, &c., and receive orders.

Mch. 14-1y. **Address BLAKE CRUSHER COMPANY, New Haven, Conn.**

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DR. C. F. CHANDLER.

Nov. 21:1y Dean of the Faculty.

TO COAL OPERATORS.

Proposals for the Sale or Lease of Coal Lands in Luzerne County.

PHILADELPHIA, April 15, 1873.

The undersigned hereby gives notice that he is prepared to receive proposals until June 1st, 1873, for the sale or lease of four tracts of land in the warrentee names of John Brady, Wm. Gray, Nathan Beach and Thomas Paschall, situate in Foster township, Luzerne Co., adjoining the lands of the Buck Mountain Coal Co., Sharp, Weisse & Co. and the Highland Coal Co., containing about 1400 acres. The right is reserved to reject any and all bids not satisfactory to the owners.

FRANKLIN FELL, Trustee,

April 22:5t. 120 South Front Street

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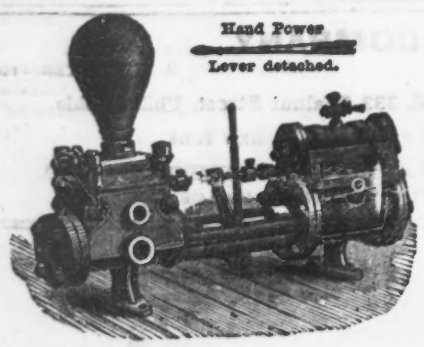

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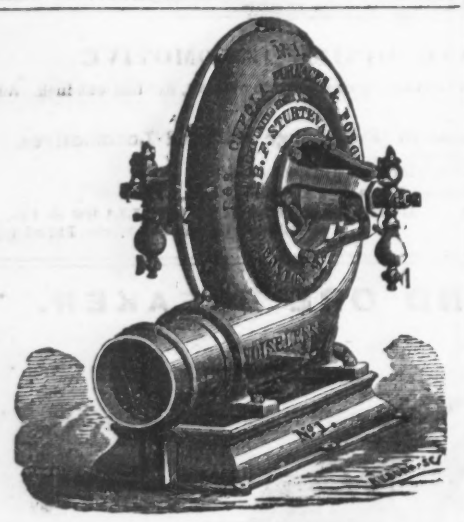

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A comparison is challenged between the results obtained by the approved methods of water concentration and the complete system of dry-ore concentration in the amount of ore saved, quantity concentrated, economy of working, and comfort of the operators and workmen

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MISCELLANECUS.

The Bessemer Steel Works,
of John A. Griswold & Co.
Troy, N. Y., May 3, 1872.

B. F. Sturtevant, Boston, Mass.,

Dear Sir, We have changed your No. 8 for your No. 9. Pressure Blower. The time in melting is about the same with either Blower. We are melting 225,000 lbs. (112½ tons,) Pig Iron daily, (20 hours running time.) It works well.

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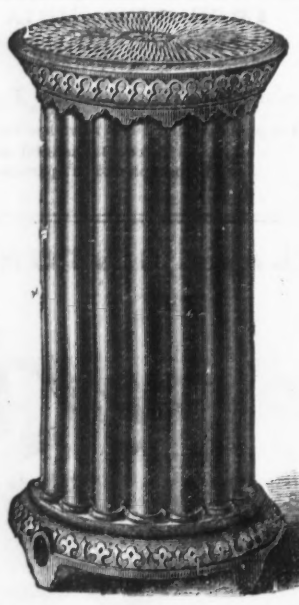

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Patent Ore and Coal Crushing and Washing Machines.
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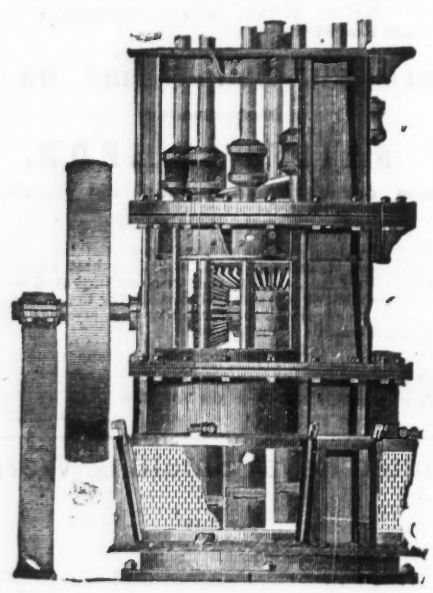
MINING MACHINERY, ETC.



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Bar Iron, Braziers' Rods, Wire Rods, Rivet and Machinery Iron, Iron and Steel Wire of all Kinds, Copperas, &c., &c.
RAILROAD IRON, COOPER WROUGHT IRON BEAMS AND GIRDERS,
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MISCELLANEOUS.

STEAM PUMPS.

COAL SHIPPERS.

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Advertisements admitted on this page at the rate of 40 cents per line. Engravings may head advertisements at the same rate per line, by measurement, as the letter press