

# THE ENGINEERING AND MINING JOURNAL.

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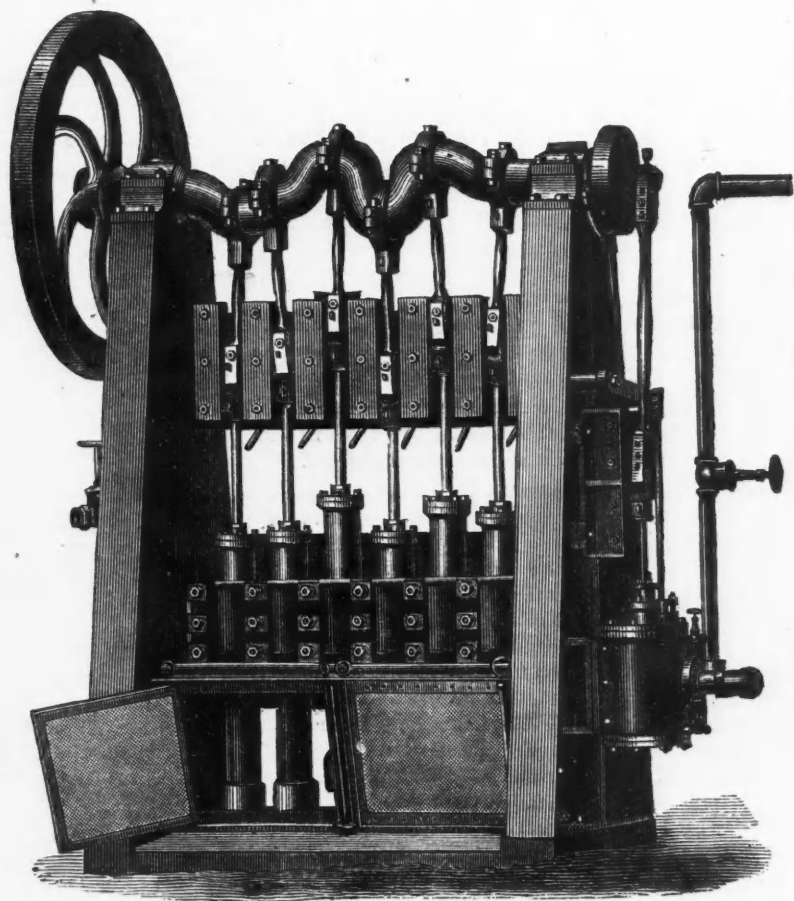
PRICE 10 CENTS PER COPY.

## Stamp Mills of Lake Superior.\*

By JOHN F. BLANDY.

EVERY new mining district has had its own peculiar experiences in inventing and experimenting upon new methods for the various operations of mining, and more particularly in the processes of crushing and dressing ores. As a matter of course during this period many old things have been re-invented, patented, and cast aside, there to remain until at a future day other geniuses shall bring them forth again as new.

In this respect the Copper Region of Michigan has not been behind other mining centers, and probably in no other part of the country has more money been expended in devising new machines and improvements upon old ones for



THE ATMOSPHERIC STAMP MILL.

the crushing of the rock. The appliances for washing the sand have not been so varied, simply for the reason that, having but one mineral, or rather metal, of high specific gravity to separate from rock material which varies but little in its character in any one mine, it requires much less care than is necessary in most mining centers of the world.

At the beginning of operations in that district most of the work was in the control of Cornish miners, who introduced the simplest of Cornish mills, namely, wooden stem pestles, with wooden shafts and cams. These were well suited to the small mines, and particularly to the limited means of transporting more expensive machinery. As these facilities improved, they were enabled to change to iron, and to vary their patterns of rods, shafts, cams and mortars. The most approved pattern, finally obtained, is the square or round stem, with collar adjustable by means of keys. In its present form it is a bar of cold rolled shafting, an eye in the top, an adjustable collar with key-plate and keys, the head and a shoe of chilled iron. The stem is fitted into the head by a slight taper. The

\* Read before the American Institute of Mining Engineers at the February meeting, 1874.

battery has heretofore been of wood, lined with chilled cast plates, and bed-plate of the same, but within the past year the California pattern has been introduced. The screens are of sheet steel, drilled with 16 holes to the inch.

During this period of trial and gradual improvement in the pestle stamps in the years 1855-6, the Ball Steam Stamps were introduced, and after years of labor and expense have been made the most efficient and powerful machines ever yet used for the purpose. It is ostensibly the Nasmyth steam hammer, and yet the many devices for the motion of the slide valves, the continuous and uniform running, the turning of the stems, the mortar, grates, and regulation of feed make it a very different machine from the ordinary steam hammer.

The movement of the valves and revolving of the stamp is taken from a separate engine, which is usually run by the escape steam from the stamp cylinder. This engine is at the same time used to drive the washing machines, and also the lathes and other tools in the repair shop.

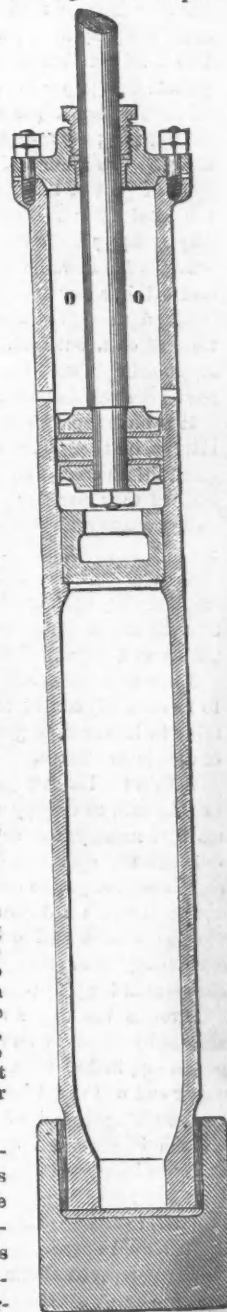
I cannot bring out the various points in the machine in any better way than by quoting from the circular of the proprietor of the patent, who says:

"Some of the points in which they excel all other machines for crushing ores, are as follows: 1. It is complete in itself, and independent of the other machinery in the mill. 2. It is a direct-acting steam stamp, the piston rod being connected direct with the stamp shaft, and all moving parts working in a vertical line, which prevents wearing of the parts. 3. The stamp shaft is both raised and forced down by the direct action and expansion force of the steam, which allows running at a high speed, without any shock or injurious effect upon the machine. The average speed of the stamps now in use being 90 strokes per minute, of 24 inches lift, or more than double the speed of other stamps. 4. All connecting parts are made with elastic connections or cushions, which destroy the effect of concussion or crystallization of the stamp shaft or other parts, which is a common occurrence with other stamps. 5. All the boxes or wearing parts are bushed, and the mortar is lined throughout with boiler plate or hard iron, which protects the machine from wear, and can be replaced with but little loss of time or expense. 6. The mortar at all times has a large quantity of rock in it, which prevents the stamp shoe or head from coming in contact with the die, which does away with the noise and prevents the abrading of the copper, common to other stamps, which are obliged to crush directly upon the die. 7. The space occupied upon the floor by one stamp, which crushes 100 to 120 tons of rock per day, is but 15½ by 12½ feet. 8. It is the most durable stamp in existence. 9. In workmanship and material it cannot be excelled. 10. It does its work cheaper and better than any other stamp."

The last three propositions are, of course, open to argument, particularly the last one, and upon it depends the whole question. As to its durability, there can be no question of that, provided the workmanship and material are what they should be. The fact that there is but little beside the stamp shoe and mortar that is subject to severe wear, is evidence that they must be durable. I am not able to say what amount of rock has been crushed by one stamp without a renewal of the cylinder or mortar.

The latest printed statement I have of the expense of running the Pewabic Mining Co.'s mill, is for the year 1869. The report for that year says: "The amount of rock stamped this year, with two heads of stamps, was 43,199 tons—700 tons more than in 1868; and the reduction in mining cost from \$1 21 in 1868 to 90 4-100 cents in 1869, is equivalent to a saving of \$13,219 20. (The extraordinary repairs, amounting to 9-100 cents, is not included in the

\* This is a matter of much importance, as the scale or leaf copper is difficult to catch on the lifting machines.



90 4-100.) The average amount of rock stamped during the first three years, when the mill was new (say from 1860 to 1863) with four heads, was 37,862 tons per year, and the cost 94.7 cents gold per ton, including repairs. Last year two heads stamped 43,200 tons, at a cost of 97.3 cents, currency, per ton of rock. Had it been possible for the mine to supply rock for four heads, the cost of stamping would not have been far from 60 cents per ton." The actual running time for the two heads is given as 250 9-24 days, or 172 4-5 tons per day for the two heads.

Number of tons of rock stamped per cord of wood.....	10
Average monthly wages of men and boys.....	\$40 42
Cost of fuel per ton of rock stamped.....	40c.

Lower figures are now claimed for the mill at the Copper Falls mine, but I have not been able to get any detailed statement of expense. The cost of fuel is still considered very high, and may yet be reduced. This seems to be principally due to the fact that there is great loss of pressure in the steam passing from the boiler to the cylinder, as it requires 90 lb. in the boiler to show 70<sup>o</sup> lb. effective pressure in the cylinder. It is proper to state that at the Copper Falls mill the rock passes through a 9x15 inch Blake Rock Breaker before going to the stamps, whereas, at the Pewabic mill, it was broken by hand. This cost is not, however, included in the above figures.

For comparison, we have the following figures of costs of the Quincy Co.'s mill, for the year 1868. This is the most improved pestle mill of the district, containing 64 heads, and is well known for the efficiency of its management. The total number of tons stamped in the year was 36,557 tons; running expenses, \$1.031 per ton; repairs, \$0.249 per ton; total, \$1 28; average number of tons stamped per cord of wood, 8.69 tons; highest average for any one month, 11.15 tons per cord; average wages not given, probably about the same as above. The reports of this mill are very complete.

The report of the Central Co.'s mill for the year 1872 gives 98 34-100 cents per ton total cost; average number of tons per cord of wood, 10 13-100; average wages, \$47 72. This mine is working almost altogether upon a fissure vein, whereas the Pewabic and Quincy mines are working upon the same belt of rock, and within a few hundred feet of each other.

The figures given above do not show sufficient difference to establish the questions of cost, but I am satisfied that the improvements made since then in the steam stamps, would prove much more favorable to them in the comparison. I have been unable to obtain statements of a later date.

It is but proper to state that there are those who still contend for the pestle stamps, on the ground of first cost, less extraordinary repairs, and further, that small mines cannot afford to erect mills of a minimum capacity of 100 to 120 tons of rock per day—the power of one head of the steam stamp. This the patentee has endeavored to remedy, by the construction of a smaller pattern, namely, one of 1100 lb. weight, with a duty of 40 tons per day.

Such a mill has not yet been tried, and it therefore remains to be proven whether they can run at so small a cost on a reduced scale. It is further claimed that the steam stamps require a higher order of mechanics to run them, together with a well appointed machine shop.

These arguments are well taken, and therefore the character of the mine needs to be carefully considered before deciding upon the kind to be adopted. If the mine is, however, of great capacity, the question can be quickly decided in favor of the steam stamps.

Within the last few years, still another machine has been introduced, which may be said to occupy an intermediate position between the pestle and steam stamps, namely, the so-called "Atmospheric Stamp." This has been brought into effective operation only within the past year, and consequently the accurate results cannot yet be obtained. The peculiar feature of this machine, and the one from which it derives its name, is the air cylinder, which takes the place of the stamp head, and to which the shoe is attached. This is represented in the accompanying engraving: the cylinder being attached directly to the chilled shoe—total length 54 inches.

Through the upper cylinder-head passes the piston rod R, which receives motion by means of an ordinary connecting rod from the main crank axle. The piston—4½ inches diam.—is fitted with double reverse cup-leather packings. The upper end of the cylinder is bored to receive the piston, to a depth of 14 inches. The working barrel of the cylinder is pierced with two sets of small holes, for the ingress and egress of air, discharging the air behind the piston after it has once been used as an elastic cushion. This elastic cushion, besides increasing the force of the blow removes the jar from the machine, prevents the noise, incident to all such implements, and, by hastening the descent of the head, allows an increased speed.

The perspective engraving sufficiently illustrates the connection of the heads with the crank shaft by means of the piston and connecting rods. The crank axle runs in plummet blocks carried upon the tops of the side frames, and can be driven either by a band wheel or by an upright steam engine, fastened directly upon the frame of the battery. When more than one battery is used in a mill, this latter method is not advisable.

The cylinder stamp heads pass through a deep guide plate, which forms part of the battery frame. Water is introduced upon the upper side of this guide plate, and allowed to run down around the cylinders, thus affording a lubricator, and preventing the sand splashed up from the mortars from cutting the bushings of the guides.

The removal of the shock, and the peculiar construction of the cylinder, enable

a high speed to be obtained, and further it may be remarked, no damage can be done by a reversing of the engine, a frequent source of accident with the pestle mills. It is claimed that they can be run as high as 200 blows per minute per head, but, so far, experience has shown that they should not be run more than about 130 blows per minute.

Sufficient time has not elapsed to give positive results as to effect and cost of running this mill. So far, the best work has been to pulverize about 30 tons per battery per 24 hours, or 5 tons per head, of rock taken from a No. 9 Blake's Breaker. It has been rather expensive in repairs, but the weak points—none of great importance—are being discovered, and no doubt upon the construction of new mills, these can be easily remedied. In general, the mill at the Phoenix mine, the only one which has, to my knowledge, been erected in this country, is giving good satisfaction, and is watched with great interest by those in charge, so that its merits will be fairly brought out. The size of a battery is 62 inches between side frames, and 110 inches from crank axle to floor. Total weight, 8½ tons.

The following, taken from the London *Mining Journal*, gives the results of an experiment made with a battery of six heads in Cornwall.

"The tin ore (from the Providence mines) was reduced to the size of road metal, and, consequently, did not require so much stamping to reduce it as ore of the size usually supplied to the batteries in Cornwall. It was generally considered, however, by the mine agents present, that whereas the stamps at Providence mine reduced 1 ton of ore per head in 24 hours, the same stamp would reduce 1½ to 1¾ ton per head in the same time, provided the ore be reduced to the size used in the experiment. On the other hand there were no smalls stamped (and these form a large proportion of all the hard stuff in the County of Cornwall); this was not taken into account in the comparison, and tells in favor of the Atmospheric Stamps. The experiment lasted 68 minutes, and the quantity of ore stamped was 38 cwts., making in round numbers 40 tons in 24 hours, or at the rate of 6½ tons per head. Making the necessary allowance for size of stuff, the quantity reduced per head was at the rate of five times as fast as at the Providence Mines; and making an allowance for usual stoppages of 3 hours in the 24 hours, and for hindrances, the rate may be safely taken at 4½ tons in 24 hours per head of Atmospheric Stamps against 1 ton stamped in the same time by one ordinary stamp-head under favorable circumstances. At the termination of the experiment every rubbing part of the machine was cool, and in perfect order, although each head had been making from 140 to 150 blows per minute. It is certain from the trial of these stamps, that six heads of the Atmospheric Battery will stamp as much ore as 27 heads of Cornish Stamps. The weight for performing the same amount of work will be as 9 to 25, and the area occupied as 1 to 4."

Still another style of mill has been introduced, and the first one was started this month at the Peisherick mine. This is only peculiar in its arrangements. The plan has been called forth by the scarcity of water at the location.

The rock from the Blake Breakers (two sizes) is screened; the coarser stuff passing thence through rollers. The fine stuff from both breakers and rollers is discharged on to a jig. All the coarse stuff from the jig passes into the hopper of a stamp battery. In this way a very small amount of the rock reaches the stamps, and a very moderate amount of water can be made to handle a proportionately large quantity of rock, and may prove very economical.

### The "Direct Process" in Iron Manufacture.

#### CONCLUSION OF DISCUSSION.

DR. STERRY HUNT expressed his pleasure at the results obtained by Mr. BLAIR, whose works near Pittsburgh he had an opportunity of visiting in November last. He felt a great interest in the question of iron sponge, from the fact that he had been the friend of ADRIAN CHENOT, who had, in 1855, works in operation on a considerable scale at Clichy-la-Garenne, near Paris, and had assisted him in some of his experiments just before his sudden and accidental death at the end of that year. CHENOT died with many of his plans unrealized, leaving behind him no one fitted to carry on his work. Dr. HUNT testified that, notwithstanding the difficulties encountered, CHENOT did succeed, at least with the readily reducible and porous Spanish ores, in obtaining a complete reduction, as the regular daily manufacture from the sponge of cast steel, which he had personally overlooked and followed, sufficiently showed. The apparatus of CHENOT was essentially that of Mr. BLAIR, but there were practical difficulties in the way of heating the column which have been overcome by the latter by means of his simple and ingenious initial heater, in which the gas wasted from the top of CHENOT's furnace performs the work of heating the ore in the upper part of the cylinder, while by the happy device of using a mixture of charcoal in powder, instead of lump, the whole difficulty of preserving the reduced ore from the influence of the air below is resolved. By these additions to the furnace of CHENOT, BLAIR has continued and perfected his work.

But the ready production of iron sponge was but one part of the problem; its utilization was still more difficult. The conversion of the sponge into cast-steel by cementation with oil, and fusion in a crucible, as practised at Clichy by CHENOT, was, at best, but a slow and troublesome method; and the attempt to weld the sponge into blooms, as tried at Clichy and afterwards practised at Baracaldo, in Spain, was an expedient not easy of execution, and applicable only to very pure ores. The work of CHENOT, of GÜRLT, and of others, in making iron sponge, was in vain; the time had not yet come for its economic utilization, nor was it until the brothers MARTIN, with the aid of the Siemens gas-furnace, succeeded in producing steel on a large scale in the open hearth from the fusion of soft iron with cast iron, that the true use of the sponge as a substitute for puddled iron was found.

This new process again turned the attention of inventors to the production of iron sponge, and three or four years since a reduction-furnace, erected for the

purpose at Westport, on Lake Champlain, succeeded in producing sponge which at the Bay State Works, at South Boston, gave in the Siemens-Martin process a soft steel, with excellent results. The reduction furnace which the speaker had examined seemed, however, but indifferently fitted for its work, and was soon abandoned. The simple, cheap and efficient apparatus of CHENOT has, in the hands of Mr. BLAIR, received such improvements as made it, in the speaker's opinion, admirably fitted for the purpose of reducing iron ores to sponge. He regretted exceedingly that the beautiful and ingenious reduction furnace constructed by Mr. EDWARD COPE at Trenton, which many of the members of the Institute had an opportunity of inspecting in October last, was not already in operation, so that we might be enabled to judge of its practical efficiency. For the rest, the speaker entertained no doubt that the economic production of iron sponge, and its utilization in the open hearth, in accordance with the Siemens-Martin plan, was destined to be one of the great metallurgical problems of the future.

One of the most important advantages of this process is the fact pointed out by Mr. BLAIR, that the mechanical impurities of the reduced ore are readily and completely eliminated by the process of dissolving it in a bath of molten metal. The iron is reduced to the metallic state without the reduction of phosphorus and silicon, and the compounds of these are not attacked by the metallic bath, which takes up the reduced iron as mercury takes up the precious metal in the process of amalgamation.

ILLUSTRATED CATALOGUE OF BRASS-WORK AND SUPPLIES, FOR PLUMBERS, ENGINE-BUILDERS, STEAM AND GAS-FITTERS. A. CARR, 43 Cortlandt street, New York.

This is a substantial volume of nearly 200 pages, containing detail illustrations of the Selden direct acting pump, the positive circulation steam radiator, and other specialties manufactured by Mr. CARR; and, in addition, steam-whistles, valves, oil-cups, and other brass work for engines; fittings for house pipes, sewer pipes, and a great number of similar details. It is so full as to be extremely useful to engineers and plumbers as a book of reference, and a careful index adds to its value. Mr. CARR is a trustworthy and experienced engine and pump builder, and knows what to put in a catalogue of this sort.

**The Variability of Iron Ores and Fluxes.**

A CIRCULAR TO FURNACE PROPRIETORS BY J. BLODGETT BRITTON, CHEMIST, PHILADELPHIA.

(CONTINUED FROM PAGE 387.)

COKE.—This is destined to be the leading fuel in the metallurgy of iron and steel. A sample, composed of forty-nine different pieces, from the neighborhood of Connellsville, Pa., gave upon analysis the following result:

Moisture.....	.490	Phosphoric acid (phosph's .013).....	.029
Ash.....	11.332	Carbon by difference.....	87.456
Sulphur.....	.693		
Ash from same:			100.000
Silica.....	47.90	Sulphur.....	trace
Alumina.....	47.76	Phosphoric acid (phosph's .09).....	.21
Sesquioxide of iron.....	1.43	Potash and soda.....	.49
Lime.....	1.48	Undetermined matter and loss.....	.20
Magnesia.....	.53		
			100.00

Some analyses of the ash of anthracite showed very nearly the same composition. Connellsville coke is hard, has a good metallic ring when struck, bears much handling without breaking, and does not materially deteriorate by keeping. It is given as a standard whereby the value of other coles may be ascertained. The majority of coles produced are not so good as the Connellsville. Many contain more than fifteen per cent. of ash, and from one to two per cent. of sulphur, though there are some with less than three per cent. of ash and one tenth of one per cent. of sulphur. A coke will always lose more or less sulphur by keeping—the substance volatilizes.

SLAGS OR CINDERS.—Make an average sample by selecting some of several tappings.

The following may be taken as about the composition of a slag that ought to be produced with fair foundry iron (anthracite):

Silica.....	39.80	Phosphorus (.008).....	trace
Alumina.....	15.76	Manganese.....	trace
Magnesia*.....	5.06	Protoxide of iron (pure iron .95).....	1.23
Lime.....	37.29	Loss.....	.45
Sulphur.....	.41		
			100.00

Slags produced by furnaces using charcoal contain more or less potash, due to the ash of the fuel. † When a properly constructed and well-appointed furnace works badly, the cause is due usually to an improper admixture of the raw material used. Whether or not this is the case may be readily ascertained by a reliable chemical analysis of the slag, which will show what substances are wanting, and what are in excess. Such an analysis should never be neglected.

Phosphorus in appreciable quantity is not usually found in normal slags of blast furnaces. The substance has such an affinity for iron that nearly all that is native in the ore will afterwards be found in the pig. But such is not the case with sulphur. A large portion of that substance may be expelled by roasting the ore. Another portion becomes volatilized in the furnace; and still a larger portion may be fluxed out by judiciously using limestone rich in lime. †

\* The relative proportions of magnesia, lime, alumina, and manganese may vary considerably, because these substances measurably replace each other.

† As a flux, good normal furnace slag, with a little limestone or oyster shells, may be used sometimes with great advantage.

much faith should not be placed in the notion that sulphur and phosphorus always largely neutralize each other, for iron may be both red and cold short from excess of the two. It takes about .50 of phosphorus, that is, one half of one per cent., to make an ordinary commercial bar of iron perceptibly cold-short; but less than a third of this quantity of sulphur may give the red-short quality in a marked degree.

PIG IRONS.—These are more variable in their composition than is generally supposed. A difference may exist between the bottom and top of a pig. Castings from the same raw material will some times materially differ, owing to the mode of mixing the ores, charging, and the temperature of the furnace. A high temperature is favorable to the formation of graphitic carbon in the iron; at a very low temperature grey iron cannot ordinarily be made. As the per cent. of graphite changes, so will that of the silicon change more or less, though this law does not hold when the iron is made white by using chill-moulds. The difference may be material, although not readily discoverable to the eye; therefore, to secure a proper sample for analysis, pieces should be broken from several pigs of the lot. If the iron be grey and soft, the better plan is to bore or drill it, catching the fine particles on clean white paper; and then mix the several parcels in equal proportions together, being very careful in the process to protect from all dust or dirt and moisture. A couple of ounces of the mixture will be sufficient.

Some pig iron made at the Glamorgan Furnace, at Lewistown, Pa., with equal portions of hematite and fossil ores, anthracite being the fuel, was found to be of the following composition:

Pure iron.....	93.49	Phosphorus.....	.30
Graphitic carbon.....	3.43	Sulphur.....	trace
Silicon.....	2.15	Combined carbon and loss.....	.56
Calcium.....	.07		
			100.00

The metal was coarse-grained and soft, classed as strictly grey No. 1 Foundry, and brought at Pittsburgh the highest price then ruling. It may be taken as a good type of its class.

A pig-iron of the following composition was found well adapted for making Bessemer steel:

Graphitic carbon.....	3.98	Sulphur.....	trace
Combined carbon.....	.38	Phosphorus.....	.06
Silicon.....	2.45	Pure iron.....	91.72
Manganese.....	1.25	Undetected matter and loss.....	.09
Calcium.....	.07		
			100.00

Grey pig-irons of ordinary fair grade contain upon an average 6.50 of foreign matter, composed chiefly of carbon, silicon, manganese, and calcium, with more or less sulphur and phosphorus. White irons and spiegel's are more variable, and contain from 2.50 to 20 per cent. of foreign matter. An excess of sulphur always tends to make pig-iron white. The spiegel's are rich in manganese and combined carbon. The average loss of iron in slag will scarcely exceed, or perhaps reach, 3.50 of the pig-metal produced; hence in the general working there is always a gain upon the raw material, and more pig is obtained than there is pure iron in the ore; though this fact is not usually made apparent by an analysis of the ore only, because of the common practice above mentioned of furnace men selecting for chemical investigation better material than is in the general working put into the furnace, a practice which has done, and is doing, a great deal of serious mischief.

The three following rules are given for guidance in blast furnace management:

FIRST.—Allow no material to be put into the furnace the composition of which you are ignorant of.

SECOND.—Ascertain the composition of all stock at your command.

THIRD.—Ascertain from time to time the composition of each grade of pig-metal the furnace produces.

The importance of a proper adherence to these rules must be obvious. A neglect of them may cause, as it has caused but too frequently, the chilling or unsatisfactory working of the furnace or the continued use of a poor limestone, or of an ore or fuel bad because of associated injurious matter, when other stock, every way suitable to be used as a mixture or alone, is at command, and may be quite near by and neglected. A knowledge of the constituents of pig-metal will indicate what raw material should be used, and the manner of its use, and also inform as to what purposes the metal is best adapted, and therefore, to whom it may be most advantageously sold. Science is now far in advance of practice in the metallurgy of iron; and no more costly mistake can be made by the iron-master than to refuse or neglect to call to his aid the manifold benefits that chemistry affords. A few hundred dollars judiciously expended yearly in reliable chemical analysis, may save from ruin, and cannot but add thousands to the profits of any modern high-class furnace.

J. BLODGETT BRITTON,  
IRON-MASTERS' LABORATORY, No. 339 Walnut Street, Philadelphia.

**The World's Production of Iron.**

THE official report of the Vienna Exhibition gives the annual production of iron in the producing countries as follows: England (1871), 134,664,227 cwts.; Zollverein, German Bund (1871), 32,296,042; France (1871), 23,620,000; Belgium (1871), 11,406,480; Austria-Hungary (1871), 8,492,122; Russia (1871), 7,208,141; Sweden and Norway (1871), 6,138,347; Italy, (1872), 1,474,180; Spain (1866), 1,474,180; Switzerland (1872), 150,000; total for Europe, 227,793,099. North America (1872), 46,900,000; South America, 1,000,000; Japan (1871), 187,000; other countries of Asia approximated 800,000; Africa, 500,000; Australia, 200,000; total for the world 276,500,000 cwts. It appears from this statement that England produces about one-half of the whole amount, North America about one-fifth, France about one-twelfth, and Belgium one-twentyfourth.

# THE ENGINEERING AND MINING JOURNAL.

NEW YORK, SATURDAY, JUNE 27, 1874.

ROSSITER W. RAYMOND, Ph. D.,  
JOHN A. CHURCH, E. M., } Editors.  
RICHARD P. ROTHWELL, C. E., M. E.,  
Editor of the Coal and Iron Department.

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### Officers of the American Institute of Mining Engineers.

The list of officers published last week included only the names of those elected at the St. Louis meeting. For the convenience of members we now print the following complete list of old and new officers:

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Treasurer, THEODORE D. RAND.  
Secretary, THOMAS M. DROWN.

AN error was made by the reporter in taking down Prof. EGLESTON's remarks on coking at the St. Louis meeting. Instead of working a coal containing 12 per cent. of sulphur down to 0.5 per cent., the dressing works at St. Aubin, France, take a refuse coal containing 12 per cent. of ash and iron pyrites in large quantities, and return a dressed coal containing only 3 per cent. of ash and 0.5 per cent. sulphur. The coal is in lumps from the size of a hickory nut down to fine grains.

AN ACCIDENT which lately took place in the Amador Mine, of California, is worthy of attention, as it was distinctively new in its method, and therefore may serve as a guide for the prevention of similar occurrences in other mines. The Sutter Creek *Independent* says, that "as the night-shift men were coming to the surface after 6 o'clock, in what is well known as the north shaft of the Amador Consolidated Mining Company, the cage, containing five men, reached within 5 feet of the surface, when it was suddenly and unexpectedly dashed to the bottom, falling 1,640 feet, the entire cable of No. 18 steel-wire falling on top of all. The cause of this distressing event was the giving way of the braces holding the reel within the grasp of the clutch, when, causing the wheel to slip away, it became at once like a wheel on a spindle, and was in a few seconds revolving with such speed that no power at hand could check it. The cage itself weighs over 1,000 pounds, and the five men nearly as much more, one of them weighing over 200 pounds. To this must be added the constant paying out of the immense cable, weighing many tons, and 1,900 feet in length." The cage had safety catches, but these are designed to operate only when the rope breaks, or slacks, which did not occur in this case. The cage rushed down the shaft with all the conditions of its descent as usual, except that it was beyond control. It is

worthy of note that all the men had the top or back of the head crushed; all, but one, lost an arm, or a leg, torn out. Both these results of the fall were probably due to the violent throw which would come when the cage suddenly stopped. The fall of the rope upon the sufferers does not seem to have had any effect.

THE time limiting the possession of unimproved mining claims has been extended, as we announced last week, to January 1, 1875, but the imminent approach of the 10th of June, while Congress was still debating over the question of extension, aroused a good deal of anxiety in Eastern owners of Western mines. Men utterly unknown in mining circles suddenly appeared in the field and wanted to know if they could retain the property they held. It had been in their possession for ten or fifteen years, but had never received an hour's attention nor a dollar's expense for its preservation. Probably a much greater number of owners did not stir at the prospect of losing their claims, but we were surprised to see how many men really appeared to prefer doing what the law required, rather than abandon property which had, perhaps, been bought in the hope of realizing enormous wealth. The fact that so many of these obscure owners were moved to show themselves and take an interest in the property the country had committed to their charge is to us a proof, if proof were needed, that the forfeiture clause was well thought of. Some of these gentlemen thought the action of government rather extraordinary, but, in our view, not only is it right considering that the government gives up this property free, on condition that it is worked, but it is also necessary. Working miners are often impeded by titles which really have nothing to uphold them but the difficulty of disputing them, and it is time the government looked at this question from the miners' standpoint. We hope there will be no further extension of the time; not that we care to dispossess the present owners. If they will come forward and take their part in the struggles of the West, well and good. But the evils of the present system are so great that the government will, sooner or later, be compelled to stop them, and for this reason we trust the day of forfeiture may not be again postponed. In this connection we will advert to a recent decision of the Interior Department not before printed by us. It was called out by the decision (by Judge DRUMMOND) that work done on a tunnel was not work on the vein, and is as follows: "Where a tunnel is run for the development of a particular vein or lode, it is considered by this office as work done on the lode or vein. The law requires that certain expenditures shall be made on a vein or lode before patent can issue therefor. This expenditure may be made from the surface, or in running a tunnel for the purpose of developing the same."

### Anthracite Iron Statistics.

By the kindness of one of the largest manufacturers of iron in this country, we are able to publish the annexed table of statistics representing, in great detail, the cost of making anthracite pig iron during a period of eighteen and a half years. The case we present is a very characteristic one. The company owns its ore mines, purchasing only about 5 per cent. of its ores; and its transportation is very short, both for ore and coal. Considering these facts it is plain that whatever fluctuations may take place in the cost of making this company's iron, must be due solely to changes in the rate of wages. It is true that the coal is purchased, but the fluctuations in the cost of coal, when transportation is short, are also mostly due to the oscillations of the laborers' pay.

The great discrepancy noticeable in the estimates of the cost of pig iron, which appear so frequently both in books and in ephemeral literature, is due in large part to the attempt to compare the work of furnaces which are established under very different conditions. We therefore repeat that the case presented in this table is that of a company which 1. Mines its own ores. 2. Works low grade ores (average of 5 years, 41.6 per cent.). 3. Has short transportation (average, say, 30-35 miles) for fuel and ores. 4. Smelts with anthracite coal. 5. Uses large furnaces "with all the modern improvements," a very hot blast, (900° F.) and high pressure. 6. Has produced on a long average 33 per cent. of No. 1 X, 28 per cent. No. 2 X, 31 per cent. No. 2 and 8 per cent. No. 3; or, if we count these as Nos. 1, 2, 3 and 4, the general average would be 2.07.

It should be mentioned that the cost of the ore includes not only the mining expenses, but also a royalty of 25 cents a ton for brown hematite, and 50 cents a ton for magnetite. The item of labor includes also repairs and the cost of blowing in and out, to which are due the very great fluctuations in this item. The "running time" includes the total number of weeks run by all the furnaces in each half year. As the furnaces are not all of one size, the average which can be calculated from the running time and the total make would not be correct for any one of the stacks. But it would not vary to any important extent, and as the performance of the separate furnaces is not given, no other mode of representing the running time than to credit it all to one furnace was possible. The "average quality" is calculated by the ordinary mode to a uniform figure, as it would be of no advantage to represent the exact amount of each number made in detail. As given in the table, the general average number permits a direct comparison with the calculations of foreign metallurgists, who reduce the quality to an average number for the sake of direct comparison.

The long period which this record covers is valuable not only for the close averaging which it permits, but also because it includes the most eventful years in the history of the iron trade in this country. The lowest cost of pig metal was \$13.02 in 1862, and the highest was \$36.07 in 1864. The short time in which the cost swayed from one of these remarkable extremes to the other is evidence of the severe fluctuations through which the iron trade has been forced to pass.

Six months, ending	Cost per ton.			Amount used per ton pig.			Cost per ton pig.				Total cost per ton pig.	Tons pig made in six months.	Running time. Weeks. days.	Quality. Average No.
	Coal. \$	Ore. \$	Limestone. \$	Coal. tons. lb.	Ore. tons. lb.	Limestone. tons. lb.	Coal. \$	Ore. \$	Limestone. \$	Labor and Repairs. \$				
December, 1855....	3.10	3.59	0.63	2 968	2 1252	1 1357	7.55	9.50	0.98	2.54	20.57	6445	39 5	1.61
June, 1856....	2.95	3.75	.57	2 835	2 1353	1 834	7.00	9.61	.78	3.08	20.47	10608	52 5	1.67
December, "....	2.89	3.65	.54	2 560	2 892	1 976	6.50	8.75	.78	5.94	21.97	6838	40	1.77
June, 1857....	2.84	3.69	.52	2 465	2 858	1 630	6.27	8.34	.67	4.08	19.37	10534	51 5	1.53
December, "....	2.80	3.30	.52	2 336	2 804	1 537	6.02	7.72	.65	4.23	18.61	7564	39 5	1.66
June, 1858....	2.54	2.88	.43	2 11	2 813	1 544	5.09	6.68	.54	3.49	15.80	7732	32 4	1.93
December, "....	2.43	2.81	.37	1 2175	2 566	1 699	4.80	6.33	.48	2.55	14.16	12256	52 2	1.79
June, 1859....	2.42	2.62	.34	2 161	2 701	1 733	2.02	6.06	.46	2.85	14.39	11767	49 2	1.86
December, "....	2.39	2.61	.34	2 176	2 870	1 500	4.97	6.23	.41	4.29	15.91	10429	52	1.86
June, 1860....	2.44	2.60	.35	1 2056	2 885	1 778	4.68	6.23	.47	4.13	15.50	11155	46	1.96
December, "....	2.45	2.86	.36	1 1949	2 633	1 655	4.58	4.58	.46	2.46	14.02	13699	52 1	1.98
June, 1861....	2.37	2.70	.34	1 2218	2 685	1 854	4.72	4.72	.47	2.58	14.00	13219	51 5	2.05
December, "....	2.36	2.62	.33	2 85	2 627	1 789	4.82	4.82	.44	2.34	13.58	13777	52 2	2.06
June, 1862....	2.37	2.39	.34	2 56	2 531	1 824	4.79	4.79	.47	2.45	13.05	12784	52	2.01
December, "....	2.70	2.63	.32	2 323	2 363	1 567	5.80	5.80	.41	2.11	14.01	17902	77 5	1.61
June, 1863....	3.80	2.60	.45	2 224	2 676	1 737	7.99	6.00	.60	4.45	19.03	16968	72 1	2.08
December, "....	4.92	3.03	.49	2 579	2 909	1 978	11.11	7.29	.71	4.94	24.05	18724	78 5	2.07
June, 1864....	5.66	3.59	.55	2 435	2 871	1 1112	12.42	8.59	.82	4.65	26.48	23317	102	2.25
December, "....	7.03	4.79	.73	2 777	2 949	1 1427	16.51	11.60	1.16	6.80	36.07	21162	95 4	1.99
June, 1865....	6.13	4.68	.80	2 907	2 1166	1 1416	14.75	11.78	1.30	6.64	34.48	14320	68	2.25
December, "....	5.69	4.72	.69	2 443	2 75	1 1128	12.06	10.87	1.04	5.73	29.70	17189	72	1.96
June, 1866....	4.85	4.34	.76	2 262	2 758	1 1078	10.27	10.11	1.13	5.67	27.18	23496	101 1	2.08
December, "....	4.44	4.94	.74	2 605	2 523	1 1116	10.07	11.02	1.11	5.16	27.36	23556	96 5	1.69
June, 1867....	4.00	4.90	.72	2 903	2 687	1 1065	9.61	11.30	1.07	5.98	27.97	22153	96 4	1.94
December, "....	3.54	4.56	.75	2 890	2 642	1 1207	8.57	10.43	1.16	4.99	25.14	24987	104	1.74
June, 1868....	3.41	4.60	.76	2 466	2 875	1 1140	7.53	11.00	1.14	6.54	26.21	26214	100 6	2.21
December, "....	4.14	4.53	.78	2 436	2 787	1 1011	9.00	10.34	1.17	6.52	27.33	27448	124 5	2.15
June, 1869....	4.16	4.66	.79	2 132	2 554	1 1366	8.57	10.47	1.27	5.24	25.56	28808	130	2.04
December, "....	4.95	4.98	.82	2 80	2 375	1 1345	10.07	10.79	1.30	6.11	28.27	33352	155	1.90
June, 1870....	3.98	4.89	.81	1 2001	2 489	1 1059	7.53	10.85	1.20	5.05	24.62	33357	156	2.15
December, "....	3.78	4.72	.81	2 32	2 579	1 1067	7.61	10.66	1.20	4.93	24.11	33507	156	2.19
June, 1871....	4.23	4.86	.79	2 61	2 814	1 1161	8.59	11.48	1.20	8.06	29.33	16313	86 3	2.69
December, "....	3.77	4.98	.73	1 2032	2 493	1 916	7.18	11.06	1.03	3.84	23.12	36301	156	2.23
June, 1872....	3.69	5.24	.74	1 1921	2 252	1 944	6.84	11.59	1.05	4.60	24.08	36311	156	2.27
December, "....	3.75	6.22	.75	2 116	2 749	1 1361	7.69	14.51	1.20	5.79	29.20	32167	156	2.28
June, 1873....	3.85	5.95	.75	1 2039	2 471	1 1410	7.36	13.15	1.20	7.40	29.11	32676	156	2.30
December, "....	3.85	6.03	.73	2 60	2 796	1 1412	7.82	14.21	1.20	6.50	29.72	26420	131	2.30
Average, 1869-73..	4.00	5.23	0.77	1 2191	2 557	1 1202	7.92	11.87	1.18	5.75	26.74			
Total.....												735455	3292 5	2.07

It will be noticed that the cost diminishes steadily from the beginning down to the war. This was partly due to an increasing economy in the use of coal, ore and limestone, which indicates improvement in making up the charges; and partly to the abandonment of the system formerly in vogue of blowing out frequently. The two furnaces with which the establishment began blew out twice in the first 30 months, giving average runs of 35 weeks, but then we find runs of 97 weeks, 183 weeks, 196 weeks and the like. This accounts for the low amount charged to labor in the years 1860-63. In fact, the average in this period, \$2.37, indicates very closely the cost of furnace labor without repairs, in former times.

From 1863 to the end of the period included in the table, much greater fluctuations in the "labor" item will be noticed. This is partly due to the numerous alterations in the rate of wages, and partly to the fact that several furnaces were built and blown in. During this part of the time covered by the table, the average charge for labor seems to have been about \$5.50, except when several furnaces stopped together, when it rose in one case to \$8.06. The true charge for furnace work without repairs would, probably, not exceed \$5.00; the average in 1869 and 70, when there was no blowing out and only one furnace blown in, being \$5.33.

One of the most important columns in this table is that which contains the amount of materials used to make a ton of pig. At first only New Jersey ores were used, and the amount was 51.18 cwt., requiring 32.11 cwt. of limestone. Brown hematite was added in the second half year. Since 1868, the charge has not varied much from 70 per cent., or 31.48 cwt., hematite, and 30 per cent. or 13.49 cwt. magnetite. The amount of limestone in the same five years has averaged 30.76 cwt. This is a decrease of 7.56 cwt. of ore and flux, which, if we assume the chemical phenomena to have remained unchanged, corresponds to a saving of very close upon 9 per cent. of the fuel.

The fuel column is perhaps the most instructive of all. From an expenditure of 48.64 cwt. of coal in 1855, the amount used sank to an average of 39.56 cwt. in the 5 years, 1869-73. This saving of 9.08 cwt., or 18.66 per cent., must be accounted for in several ways. 1st. Better ores. 2nd. Increased make of lower grades of iron. 3d. Higher temperature of blast. The first of these, as above shown, has occasioned a saving of 9 per cent. The quality of iron has fallen from No. 1.61 in 1855 to an average of 2.23 in 1869-73, a difference of 0.62. Assuming the same heat equivalent that BELL calculated for Cleveland pig, or 1200 heat units per number, the fall in quality, therefore, corresponds to a diminution in the heat requirement of 744 units. In 1855 the amount of coal per ton of pig was 2.432 tons, which at 90 per cent. is 2.189 tons of pure carbon. By the French scale this gives  $2189 \times 8080 = 17,687$  heat units required per ton of pig in that year. The saving by lowering the average grade of the product, therefore, amounts to 4.21 per cent. In estimating the saving under the third head—from increased heat of blast, we cannot be so accurate, since we are not informed as to the exact amount of blast per ton of pig in 1855. Assuming that it was 20 tons, that the temperature was 600 F. (321° C), and its specific heat was 0.239, we find that the heat due to this source was in 1855  $20 \times 321 \times 0.239 = 1534.4$  units. The temperature of the blast has been increased since that time, and for

several years has been 900° F. (487° C.). We have therefore for heat from blast in 1869-73,  $20 \times 487.7 \times 0.239 = 2331.1$ . The difference is 796.7 heat units, or 4.5 per cent. of the total quantity formerly used. The total economy in these three directions is, therefore, 17.71 per cent., or 0.90 per cent. less than the total from all sources as ascertained above. The difference is doubtless due to a higher carbonic acid ratio of the escaping gases in latter times.

At another time we shall try to deduce some other conclusions from these interesting data, though no conclusions that we can draw can compare in interest with the figures themselves. Before leaving the subject we desire to reiterate that the great lesson of this table is contained in the light it throws upon the labor question, as it has affected the business of this country during the last fifteen years. It is not impossible to estimate approximately the amount which the rise in wages during the war really added to the cost of iron in this establishment. The royalty per ton of iron amounted to 78 cents, leaving \$4.45 as the average cost of mining the ore in 1869-73. Fully \$3 of this would be paid for wages, or \$6.75 per ton of pig. In 1855 the same charge could not have been more than \$4.37, leaving an advance due to labor of \$2.38. The advance in limestone, 20 cents, and in labor \$3.21 were of course wholly due to the rise in wages, and the 37 cents advance in the cost of coal must be put down to the same cause. The total of these advances is \$6.16, while the difference between the cost of pig metal in 1855 and the average cost in 1869-73 is \$6.17, as the table shows. If the cost in 1855 was compared with that in 1864-5, when pig metal cost the most, the results would undoubtedly be the same. These figures show that the rise in wages increased the cost of making iron in the five years, 1869-73, to the extent of 30 per cent. on the cost in 1855; and that at the time of greatest cost in the latter half of 1864, the increase due to this cause was probably 75 per cent.

#### The Red Bank Mining Region of Pennsylvania.

This promising field of supply for the rapidly growing coal market of the North and Northeast is deservedly attracting much attention at present, and as the region is entirely new, it cannot fail to interest our readers to note briefly its capabilities and prospects.

The Bennett's Branch of the Alleghany Valley Railroad, or, as we had better call it, the "Low Grade" freight line of the Pennsylvania Railroad, which has within a few months opened up this coal field is, probably, without exception the best built new road in this country. The location, made with great judgment, has succeeded in obtaining a line with a maximum gradient of 16 feet in the mile, and no curvature exceeding six degrees. Where heavy curves occur the grade is reduced in order to compensate them. The line is all heavily ballasted with broken stone, and the culverts, bridge abutments, piers, etc., are models of well built masonry. In short, the road reflects the greatest credit on the professional skill and judgment of the engineer in charge, Mr. JOHN A. WILSON. The coal field crossed by this line is the northern limit of the great bituminous fields of Pennsylvania. This limit is quite irregular, running up to the north in finger points till the gradual rise of the measures leaves but the lower veins cap-

ping the highest hills. These deposits have been opened in several places, as at the Cameron Mines, St. Mary's, and other places, but the little cover on the coal has greatly injured its appearance, making it rusty, if not actually injuring its value as a fuel. On the Red Bank, coal is being mined at several points, Reynoldsville, in Jefferson County, Fairmount in Clarion, and Red Bank in Armstrong County. The measures here, though not more than 250 feet in thickness, yet contain four and, in some places, five workable beds, aggregating 20 to 30 feet of coal. The following sections will show the order in which they occur; they are furnished by JOHN A. WILSON, Esq., engineer of the B. B. R. R., and Captain BRINKER, Superintendent of the Fairmount mines, and supplemented from our own examinations.

	Section at Fairmount.	Section at Red Bank Mines.
Cover rock to surface.....	40'	125'
Coal, Summit or Upper Freeport vein.....	4'	4'
Sandstones and shales.....	30'	40'
Coal, Lower Freeport vein.....	7'	3½ to 4'
Sandstones and shales.....	56'	25'
Cannel coal.....	absent at Fairmount	10'
Soft coal.....		2'
Measures.....		20' to 30'
Coal, Catfish vein.....	4'	3' 6" to 4'
Measures.....	30'	20' to 30'
Spathic iron ore.....	1' to 1' 6"	1' to 1' 6"
Limestone.....	6'	6'
Measures.....	60' to 70'	not measured.
Coal, "B" Vein.....	5' to 5' 3"	5' to 5' 3"

At Fairmount, all of these beds are above water level, while at the Red Bank mines, which lie to the dip of Fairmount and on higher ground, the three upper beds only are so situated.

The quality of the coal in each case is good, the upper bed is stated to give good results as a gas coal, and is now being tested in a large number of gas works, and all are undoubtedly good steam and house coals. Generally, they contain but a small amount of sulphur, not enough to interfere with their use as steam generators, or for coking purposes.

The beds now opened and being worked at the Red Bank mines are the Upper and Lower Freeport and the Cannel vein; at Fairmount, only the Lower Freeport of 7 feet is worked. These other beds have been proved and opened on each property, so that their number and thickness, as given above, is based on reliable information. At the Red Bank mines, the Upper bed is faulty, and of variable thickness, where regular and in good condition, being about four feet; but where opened irregular and somewhat expensive to work. The second bed not yet worked to any great extent, is regular, and from 3½ to 4 feet in thickness; the coal in each of the beds comes out in large blocks, is hard and will stand transportation. Near the outcrop it is somewhat rusty, but when well under cover is bright and clean, there being no shale partings in the seams. At Fairmount the bed worked is very regular, 7' to 7' 3" thick of solid clean coal; it has been worked at quite a number of points and its regularity is said to be fully established.

The Cannel coal lies in a very peculiar deposit, the extent and limits of which are quite well known. It is not at all continuous, like the other coal beds, but runs regular, so far as known, for about 2½ miles in length, and it has an average width of, possibly, half a mile. The exact shape of this remarkable deposit is not known accurately, but, as far as proven, it appears to be pear-shaped. The Company is now working in at the small end of the pear, and has driven out side-entries at intervals along the main gangway, and these have found the bed regular, its greatest thickness being near the center of the basin; it diminishes gradually on each side from this, and at a certain distance from the center the bottom rock comes up quite regularly, but rapidly, till it cuts off the entire bed. There is no appearance of squeeze or fault, but it seems simply to be the natural limit of the Cannel basin. The rocks below this bed appear to maintain their regularity, as do those above it. It is to all appearances a purely local deposit, careful explorations, boring, etc., having failed to find any trace of it elsewhere than within the limits above referred to.

This Cannel coal burns with a very brilliant flame, indicating a high illuminating power, and it lasts long in the fire, due, undoubtedly, to the large percentage of ash it contains. Some of it flies somewhat in the fire, while other pieces burn as evenly and satisfactorily as the English cannel; it makes no clinker in burning, but leaves an abundant soft white pulverulent ash, which, while the most serious drawback to this fuel, is said to make an excellent polisher, to take the place of fine tripoli.

That the coals and cannel of this region will be largely introduced in the northern and northeastern markets for steam, gas, and domestic purposes, is quite certain; but there is a market scarcely less important awaiting it at home, in the iron works which will in all probability spring up in the vicinity of the coal mines.

The carbonate ore found in very contact with limestone of excellent quality, and within a few feet of workable beds of good coking coals, makes this one of the most desirable locations in the country for the manufacture of iron. The distance from Erie, a port from which much of this coal will be shipped, is but 160 miles; and the coal cars, which otherwise would go back empty, could afford to carry back the Lake Superior and Canadian ores at very low rates of freight. These would make a very desirable mixture with the native ores.

The Red Bank Coal Company, has erected substantial and somewhat extensive improvements, and is opening up the mines with the view of attaining a large output at an early day, under the energetic management of Mr. JAMES H. MAYO. The

Company owns 1,240 acres of coal lands, the surface of which forms a rich and highly cultivated agricultural district, reminding one strongly of the charming rolling hills of Berkshire County, Mass.

The Fairmount Mining Company owns some 1,400 acres of land, and is now shipping over 200 tons per day, with very economical improvements.

The following are the officers of the Red Bank Mining Company:

- JOHN A. WILSON, of Philadelphia, President.
- CHESTER SNOW, of Harwich, Mass., Director.
- JONA. HIGGINS, of Orleans, Director.
- CHAS. B. LANE, of Boston, Director.
- JAMES D. PERKINS, of New York, Director.
- ROBT. C. ADAMS, of Montreal, Director.
- HON. JOSEPH K. BAKER, of Dennisport, Treasurer.

In another number we will give the cost of mining coal in this region.

CORRESPONDENCE.

The Possibility of Making Spiegel-Iron from Ores Containing Phosphorus.

TO THE EDITOR—SIR: In a recent conversation with Prof. B. SILLIMAN, I detailed to him an instance where a very good quality of spiegel-iron was said to have been made from ores containing a considerable quantity of phosphorus, and at the same time told him the circumstances under which I thought such a thing possible. As Prof. SILLIMAN has considered the matter of sufficient importance to refer to it in a recent meeting of the Institute, I hope I may be pardoned for trespassing on your space by repeating the incident.

My attention was directed by Mr. W. J. LAND, a chemist of high attainments, living in Atlanta, Ga., to a specimen of spiegel-iron which he had analyzed some time before. The person who brought the specimen said that it was made at a small charcoal furnace in that State.

By visiting the furnace, I learned from the superintendent and founder that upon one occasion, when using a manganeiferous ore, an iron had been made, very hard, very white, which behaved in a most remarkable manner in the pig bed while hot, but of the composition of which they were entirely ignorant. The whole lot had been shipped off with the white iron, and I was unable to obtain a specimen either of the metal or the slag made at the time. I obtained, however, a specimen of the ore which was used at the time this peculiar iron was made. It was evidently highly manganeiferous, and gave on analysis 0.335 per cent. of phosphorus, and only 20 per cent. of metallic iron.

Mr. LAND's analysis of the spiegel-iron sample was:

Metallic Iron.....	86.252
" Manganese.....	7.218
Silicon.....	0.622
Phosphorus.....	0.057
Sulphur.....	0.062
Carbon.....	4.300
Undetermined.....	1.489

100.

There was pretty good evidence to my mind that the spiegel was made there, and from the ore which I have mentioned, yet all authorities I could get hold of were unanimously of the opinion that phosphoric acid contained in iron ore would be reduced in the blast furnace and enter the metal.

I knew from practical experiments on a large scale that the presence of manganese in the charge was not the only condition requisite to keep the P<sub>2</sub>O<sub>5</sub> from being reduced. It then struck me that the phosphate of manganese was extremely hard to reduce, and by reference I found that even the highest temperatures will not reduce it. Here is, then, the apparent solution of the question: *If the phosphoric acid is in combination with manganese in the ore it will not be reduced, as it will be when combined with iron.*

The only authority which I have been able to discover to support my notion on the subject, is PERCY'S Metallurgy of Iron and Steel, pp. 532. The one analysis given is by FRESSENIUS, of the spiegel-iron made by the Müsen and Cologne-Mining Company from the spathic ores of Stahlberg.

Iron.....	82.860
Manganese.....	10.707
Phosphorus.....	0.059
Silicon.....	0.997
Sulphur.....	0.014
Carbon.....	4.323

PETER has given the following average composition of the spathic ores smelted by the Müsen Company:

S-squioxide of iron.....	2.75
Protoxide of iron.....	52.12
" manganese.....	0.83
Phosphoric acid.....	0.54

A manganese ore was of course added to the charge.

This authority confirms me in my opinion that good spiegel-iron can be made from ores containing considerable phosphorus when other conditions are favorable. KERR says nothing definite on the subject. WILLARD P. WARD.

The Prevention of Clinker in Grates.

TO THE EDITOR: Sir—In Mr. BLAIR's article on the "Direct Process," he alludes to the difficulty he has found with the present form of gas-producer, on account of the forming of clinker. I would like, through you, to offer at least a partial remedy for this. I think the principal cause of the clinker formation lies in the method of setting the grate. There should be a ledge left in the wall immediately at the top of the grate, say of 1½ inches. It might answer still better if the walls flared upward from the inner corner of the ledge. This ledge allows the air passing up between the outer grate-bar and the wall to expand at the wall side, which would not be the case if the wall were straight.

I cannot give you a good philosophical reason why this should prevent the forming of clinkers, but can only state that with the ordinary grate it does so, and I know no reason why, with the step grate of the gas-producer, it should not result the same.

Philadelphia, June 17th, 1874.

JOHN F. BLANDY.

COAL TRADE REVIEW.

Import Duty on Coal.

Anthracite free. Bituminous, per ton of 28 bushels, 80 lb. to the bushel, 75c., gold. All slack, or culm, such as will pass through a half-inch screen, per ton of 28 bushels, 80 lb. per bushel, 40c., gold. Not otherwise provided for, per ton, 40c. gold.

NEW YORK, June 27, 1874.

The Production of Anthracite Coal for the week ending June 20, 1874, was as follows:

Table with columns: Region, Ton of 2240 lb., Week Tons, Year\* Tons. Rows include Wyoming Region, Lehigh Region, Schuylkill Region, and Sullivan Region.

Total of all the regions 439,165 tons, 8,637,767 tons.

The Production of Bituminous Coal for the week ending June 20th, was as follows:

Table with columns: Region, Ton of 2000 lb., Week Tons, Year Tons. Rows include Cumberland and Pennsylvania R.R., Shamokil Branch R.R., Barclay R.R., and Huntington & Broad Top R.R.

The Production of Bituminous Coal on the line of the Pennsylvania Railway and branches, as per report for the week ending June 20:

Table with columns: Region, Ton of 2000 lb., Week Tons, Year Tons. Rows include Snow Shoe, Tyrone and Clearfield, Allegheny Region, West Penn. R.R., Southwest Penn. R.R., Gas Coal, Penn. R.R., and Pittsburgh Coal, Penn. R.R.

The Production of Coke on the line of the Pennsylvania Railway and branches, as per report for the week ending May 30:

Table with columns: Region, Ton of 2000 lb., Week Tons, Year Tons. Rows include Tyrone and Clearfield, All-gheny Region, West Penn. R.R., Southwest Penn. R.R., Gas Coal, Penn. R.R., and Pittsburgh Coal, Penn. R.R.

The Shipments of Bituminous Coal by the South and North Alabama Railroad to April 1st, were:

Table with columns: Location, Tons. Rows include Warrior field and Cahaba.

The shipments for May from the Warrior field amounted to 2167 tons. There was nothing done from the Cahaba field, on account of repairing and getting ready for better business.

Chesapeake and Ohio Railroad.

Kanawha Region.

Coal received from mines for week ending June 6, 1874:

Table with columns: Coal type, Week Tons, Year Tons. Rows include Cannel Coal, Splint, and Bituminous Coal.

Pictou Region, Nova Scotia

Table with columns: Destination, Week Tons, Year Tons. Rows include United States, West Indies, Canada, and Other provinces.

Table with columns: Destination, Week Tons, Year Tons. Rows include United States, West Indies, Canada, and Other provinces.

Our table of production gives for the week 439,165 tons, as against 445,164 tons for the previous week, and 441,933 tons for the corresponding week last year.

The figures of last year we take from the Pottsville Miners' Journal.

The receipts at Port Richmond were 60,000 tons; shipments, 56,000 tons; and balance on hand 130,000 tons.

The receipts at Greenwich, Philadelphia, were: bituminous 3611 tons, and gas coals 5916 tons; shipments: bituminous 3665 tons, and gas coals 6931 tons; balance on hand: bituminous 2447 tons, and gas coals 281 tons.

The receipts of anthracite coal at Coal Port for the week were 9,316 tons, and shipments 8,093 tons; at South Amboy the receipts were 13,832, and shipments 13,533.

The production of Cumberland coal from January 1st to June 20th, inclusive, was 953,373 tons of 2240 lb., as compared with 1,022,037 tons for the corresponding period last year.

The Delaware and Hudson Canal Company has in stock, at Rondout, 46,000 tons; at Honesdale, 415,000 tons, and at Weehawken 17,000 tons.

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

Table with columns: Coal type, Lump, Steamer, Grate, Egg, Stove, Chestnut. Rows include Wyoming Coals, Lehigh Coals, and Schuylkill Coals at Port Richmond.

\* f. o. b. in New York Harbor. † These prices are for registered contracts. Buyers not having contracts will be charged 15 cents per ton more than above prices.

Table with columns: Freight from, Per ton. Rows include Hoboken and Weehawken to New York, Elizabethport & Fort Johnston to New York, South Amboy to New York, Newburg to New York, Port Richmond, Philadelphia to N. Y. alongside, Rondout to New York by boat or barges of the D. & H. Canal Co.

Retail Prices.

Table with columns: Coal type, Grate and Egg, Stove, Chestnut. Rows include Pittston coal, Delaware & Hudson, Scranton, Wilkes-Barre, Lehigh & Locust Mountain, and Schuylkill Red Ash.

Anthracite.—There is certainly a much better feeling in this trade than a week ago, and, if anything, a little better business. The latter may be accounted for by a desire to procure the benefit of June prices, and the knowledge of a 50 per cent. reduction of the out-put, which, if business should not improve, will likely rule for August and so.

The signing of the financial bill by the President and the adjournment of Congress have done much toward improving business. There is certainly a much better inquiry for coal, and all branches of business appear relieved.

It is understood that the troubles with the Boston dealers have been amicably settled by Messrs. QUINTARD and MOULTON, who paid that city a visit last week. Freights rule even lower than last week, \$1 40 to Boston being a common quotation.

informing shippers that no coal will be received at Port Richmond for a term of two weeks from July 2d. With the present demand for coal, the stock of last Saturday (130,000 tons) would still leave a considerable balance at the expiration of that time.

At the Scranton sale of the 24th inst. the following prices were obtained:

Table with columns: Coal type, Price. Rows include Steamer, Broken, Egg, Stove, Chestnut.

If we add 15 per cent. per ton for commission to these prices we see that steamer, egg and chestnut each sold at 1 cent less than programme prices, broken at full rates, and stove at 5 cents above the programme.

The Philadelphia and Reading Coal and Iron Co. having invited the Presidents and Treasurers of the Eastern manufacturing companies to visit their mines in Pennsylvania, the party left here at 8 30 A. M., Tuesday, going to Port Richmond, Philadelphia, where they were to take one of the iron colliers of the company and steam down the river, getting a view of the water front of the city; thence to Reading, where they were to visit the car shops and iron works of the company; thence to Mt. Carbon, stopping at the Mt. Carbon hotel, which is owned by the company.

Table with columns: Month, Price. Rows include March, April, May, June, July, August, September, October, November, Average, 1874, Season contracts, Scranton sale, June 24.

Table with columns: Coal type, Price. Rows include Wilkes-Barre, Lackawanna, and Schuylkill; Lehigh Coal Exchange; Wilkes-Barre, Lackawanna, and Schuylkill; Lehigh Coal Exchange; Wilkes-Barre, Lackawanna, and Schuylkill; Lehigh Coal Exchange; Wilkes-Barre, Lackawanna, and Schuylkill; Lehigh Coal Exchange.

Bituminous.—Trade is very quiet, although there is a better feeling and more inquiries. It has been reported that certain of the Cumberland mines will stop producing. Upon making close investigation, we were unable to learn that any are going to stop; although, as mentioned in our last, the production is not being driven, but is rather being retarded wherever it is possible.

There is no improvement in Provincial gas coals; the arrivals are light, and are all being delivered on the spring contracts. The low freights ruling in this business deliver these coals here at a nominal cost of \$5 50 for Caledonia, and \$6 for Block House.

A cargo of 473 tons of Pictou coal (from the Vale Colliery) at this port sold at \$6 40 per ton, delivered at an adjacent point on the North River.

ARRIVAL OF PROVINCIAL COAL FOR THE WEEK.

Table with columns: From, Tons. Rows include From Port Caledonia, From Pictou, Previous, Total to date since January 1.

Cargo Prices of Bituminous Coal.

Table with columns: Shipping Ports, At the New York, Alongside in New York, Per ton of 2240 lb. Lists various coal sources like Westmoreland and Penn. at Greenwich, Phila., etc.

FOREIGN GAS COALS.

Table listing foreign gas coals with columns: Sterling, Am. cur'cy. Includes Newcastle at Newcastle-on-Tyne, Liverpool House, Orrel at Liverpool, etc.

STEAM AND HOUSE COALS.

Table listing steam and house coals with columns: Per ton of 2000 lb. Includes Liverpool House Orrel, Liverpool House Cannel, American Block, etc.

Retail Prices in New York.

Table listing retail prices in New York with columns: Per ton of 2000 lb. Includes Liverpool House Orrel, Liverpool House Cannel, American Block, etc.

Coal Trade of Philadelphia.

June 24, 1874.

Reported by our Special Correspondents.

The advance of 15 cents per ton on board, on 1st of July next, according to the programme laid out last winter, has failed to stimulate orders even to the same extent as the previous advance. The consequences of such a revolution as the anthracite coal trade is now undergoing are peculiar and worthy of the attention of business men.

The following circular of the Philadelphia and Reading R. R. Co., has just been issued:

PHILADELPHIA, June 23d, 1874.

Notice is hereby given, that on Thursday, July 2d, the tracks crossing Richmond Street at Port Richmond will be cut for the purpose of putting in the iron girders for the bridge over the new sub-grade cross at that point.

On the same day a change of tracks at Port Clinton will be commenced, with the view of occupying the new route recently graded around the tunnel. During the progress of this work the passage of all trains (except passenger and merchandise trains) will be stopped.

J. W. JONES, First Vice-President.

The sub-grade crossing at Richmond Street and Port Clinton tunnel have been used before for the same purpose; under the old management of the Reading R. R. Co., the largest wooden bridges on the road were converted to stone or iron bridges without stopping the trade a single hour—but all that has been changed. One of the peculiarities of the present mode of interrupting the traffic—noticed on one occasion before, just one year ago—is that it does not include the passenger and merchandise trains. The officials who get together and cook up these absurd pretenses, believing that outside of their own circle it is swallowed, must think, that besides monopolizing the coal trade, they also monopolize all the common sense in the community.

We notice that the Miners' Journal, after inquiring to ascertain the truth in the statement of your correspondent, respecting the collieries of the R. R. Co. receiving extra supplies of cars, states that it is not true, and then goes on to explain how it is done. "Consistency thou art a jewel."

Bituminous Coal, Wholesale.

Table listing wholesale bituminous coal prices with columns: Penn. and Westmoreland (Gas), f.o.b., Greenwich, Broad Top, etc.

Bituminous, Retail.

\$6.00 in yard, per 2240 lb., cartage added. All bituminous coal shipped from wharves is sold per ton of 2240 lb. Coal sold in the railroad cars is all per ton of 2000 lb., R. R. freights being so charged.

Line Prices for June, 1874.

See our issue of June 13th, 1874.

Baltimore, Md.

June 23, 1874.

Reported by our special correspondents.

We have nothing new of interest to report. Trade still very dull, although receipts for last week at Locust Point were fully up to the average, and coal all put afloat. Freights low, charterers freely made to Boston at \$2.00@2.10. Rates to New Haven and Sound ports \$1.90, and New York \$1.70@1.75. Prices nominally \$4.75, f.o.b.

WHOLESALE PRICES PER 2240 lb.

Table listing wholesale prices per 2240 lb. for Anthracite and Bituminous coal, including Wilkes-Barre, Lump, steamboat or broken, etc.

BITUMINOUS.

Table listing bituminous coal prices with columns: George's Creek and Cumberland f. o. b. at Locust Point for cargoes, West Va. Gas Coal f. o. b. at Locust Point, etc.

Boston.

June 24, 1874.

Reported by our Special Correspondent.

Trade is very dull, with nothing of importance to note. Prices are without change.

CARGO PRICES TO TRADE.

Table listing cargo prices to trade with columns: Lingan coal, Caledonia, Picton, Block House, Red Bank Cannel, etc.

Burlington, Iowa.

June 20, 1874.

Specially reported by Messrs. WIGHTMAN & CUMMINGS wholesale and retail dealers and shippers of coal.

Per ton of 2000 lb.

Table listing prices per ton of 2000 lb. for Lehigh Lump, prepared, Bloisburg Smithy, etc.

Buffalo, N. Y.

June 23, 1874.

Reported by our Special Correspondent.

Per ton of 2000 lb.

Table listing prices per ton of 2000 lb. for Youghiogheny Gas Coal, Catfish Lump, etc.

Table listing prices for Anthracite f. o. b. vessel, Lump, Grate, Egg, etc.

Chicago, Ill.

June 23, 1874.

Specially reported by Messrs. RENO & LITTLE, Coal Merchants.

No change in prices of coal.

Retail prices per ton of 2000 lb. delivered to buyer.

Table listing retail prices per ton of 2000 lb. for Lehigh Lump, Lehigh prepared, Lackawanna, etc.

BITUMINOUS.

Table listing bituminous coal prices with columns: Briar Hill and Erie, etc.

Cincinnati, O.

June 23, 1874.

Specially reported by Messrs. A. BUCHANAN & Co., wholesale and retail dealers in coal and coke.

Please continue prices same as last week, though there is rather an upward tendency in the price, some of the dealers asking 25 and 50 cents more; retail business very dull.

Per ton of 2000 lb.

Table listing prices per ton of 2000 lb. for Youghiogheny, Pomeroy coal, Cannel coal, etc.

Cleveland, O.

June 22, 1874.

Reported by our Special Correspondent.

About 40 non-Union white miners went into the mines at the Plummer Hill Coal Mines at Straitsville, but were taken out the same day by Union miners. Seventy-six cars per day are being mined and shipped from Nelsonville daily. Prices are without change.

Per ton of 2000 lb.

Table listing prices per ton of 2000 lb. for Youghiogheny, Briar Hill, etc.

Council Bluffs, Iowa.

Reported by our Special Correspondent.

Per ton of 2000 lb.

Table listing prices per ton of 2000 lb. for Blossburg (blacksmith), Anthracite, Iowa, etc.

Detroit, Mich.

June 23, 1874.

Specially reported by Messrs. ROBINSON & KEYS, dealers in all kinds of coal.

Coal has been arriving more freely the past week than at any time since the opening of navigation. Prices remain unchanged as yet. We quote:

Per ton of 2000 lb.

Table listing prices per ton of 2000 lb. for Lehigh Lump, Lehigh nut, Wilkes-Barre, etc.

Denver, Col.

RETAIL PRICES.

Per ton of 2000 lb.

Table listing retail prices per ton of 2000 lb. for Canon, Marshall, Murphy, Baker, etc.

Erie, Pa.

June 24, 1874.

Reported by our Special Correspondent.

Freights to Chicago and Milwaukee 50c., Detroit 40c., currency, and Toronto \$1.25, gold, including canal tolls of 20c., gold.

Wholesale, per ton of 2,000 lb.

Table listing wholesale prices per ton of 2,000 lb. for Anthracite f.o.b. vessels, Lump, Grate, Egg, etc.

Bituminous f.o.b.

Table listing bituminous f.o.b. prices for Briar Hill, etc.

Retail, per ton of 2,000 lb.

Table listing retail prices per ton of 2,000 lb. for Anthracite, Lehigh, chestnut, etc.

Bituminous.

Table listing bituminous coal prices with columns: Chenango Valley (Ormsby), Mahoning Valley (Briar Hill), etc.

Indianapolis, Ind.

June 22, 1874.

Specially reported by Messrs. H. McCoy & Co.

No change in the prices of coal. Operators have determined to hold prices at the mines firm at present quotations, as the reductions already given have not increased the demand.

We quote at wholesale prices on board cars in the city:

Per ton of 2000 lb.

Table listing prices per ton of 2,000 lb. for Bituminous, Best Block coal, Best Highland, etc.

ANTHRACITE (Lackawanna).

Table listing anthracite (Lackawanna) prices for Grate, Egg, etc.

Louisville, Ky.

June 23, 1874.

Specially Reported by Messrs. BRNE & SPEED.

We have no changes in coal to report, except an advance of 1c. per bushel on Kentucky coal, in consequence of freight being \$1 per car higher.

Table listing prices for Pittsburgh, Pomeroy, Buckeye Cannel, etc.



New Orleans, La.

June 22, 1874.

Specially reported by Messrs. P. & R. DeVERGES, Wholesale and Retail Dealers in Pittsburgh, Anthracite and Cannel coal.

We have nothing new or important to report in the coal market. There is no activity, and very little demand.

Table listing coal prices for Pittsburgh, Pa. including items like Pittsburgh coal, Anthracite, and Spadra (Arkansas) coal.

Pittsburgh, Pa.

June 23, 1874.

Reported by our Special Correspondent.

Per ton of 2000 lb. and Bushel of 76 lb.

Table listing coal prices for Pittsburgh, Pa. including items like Youghiogheny coal, Anthracite, and Connellsville coal.

San Francisco.

From the Commercial Herald, June 11.

Imports of coal from January 1st to June 1st:

Table showing coal imports for San Francisco from various sources like Vancouver Island, Bellingham Bay, and Rocky Mountain.

Recent cargo sales of Australian coal at hand have been made at \$10@10 25. Imports for the week include the following cargoes: Per Cosma, 76 days from Newcastle, N. S. W., with 905 tons; Queen of the Bay, 80 days from same, with 547 tons; Washington Libby, 1130 tons from same; A. W. Minot, 1455 tons from same.

St. Louis, Mo.

June 22, 1874.

Specially Reported by the COLLINSVILLE COAL AND MINING COMPANY.

The market is believed to have reached the lowest point for his season—demand very light. No change in prices.

Anthracite

Per ton of 2000 lb.

Table listing anthracite prices for St. Louis, Mo. including items like Lehigh Lump, Lackawanna, and Femi Anthracite.

Bituminous

Per ton of 2000 lb.

Table listing bituminous coal prices for St. Louis, Mo. including items like Washington Indiana, O'Fallon, Ills., and Missouri Cannel.

Toledo, Ohio.

Per ton of 2000 lb.

Table listing coal prices for Toledo, Ohio. including items like Scranton, all sizes, Lehigh Lump, and Blossburg.

Halifax, N. S.

June 23, 1874.

Reported by our Special Correspondent.

The prices of coal at Halifax to-day remain about the same as when we last advised you, viz:

Prices per ton of 2240 lb. in gold.

Table listing coal prices for Halifax, N. S. including items like Sydney (old mines), Gowrie, and Victoria.

Montreal.

June 23, 1874.

Reported by our Special Correspondent.

Anthracite prices are well maintained in view of advancing general freights.

Per ton of 2240 lb.

Table listing coal prices for Montreal. including items like Scotch Steam, Pictou, and Anthracite at retail.

Anthracite at retail, 2,000 lb., delivered:

Table listing anthracite prices for Montreal. including items like Egg, Stove, and Nut.

Toronto, Ont.

Prices in gold, per ton of 2000 lb.

Table listing coal prices for Toronto, Ont. including items like Scranton, all sizes, Lehigh prepared, and Blossburg.

Towing.

Per ton of 2240 lb.

FROM NEW YORK TO POINTS ON THE HUDSON RIVER.

Table listing towing rates for various points on the Hudson River from New York.

Boats of 100 tons and under—per boat.

Table listing boat rates for various locations like Manhattanville, Yonkers, Sing Sing, and Newburgh.

ON LONG ISLAND SOUND.

Table listing boat rates for Long Island Sound locations like Norwalk & Bridgeport, New Haven, Derby, Southport & Westport, Milford, Branford, New London, Middletown, Norwich, Hartford & Stonington, Mystic, Harlem, and Mott Haven.

Harbor Towing

From Hoboken to

Table listing harbor towing rates for various locations like 53d st., Gowanus, Newtown Creek, Port Johnston, 130th street, North River, and From East River to Weehawken.

Freights.

Per ton of 2240 lb.

Large table listing freight rates for various ports and locations, including Augusta, Albany, Amesbury, Bangor, Bath, Baltimore, Boston, Bridgeport, Bristol, Derby, Dighton, East Cambridge, Fall River, Hackensack, Hartford, Hoboken, Hudson, Jersey City, Middletown, Newark, New Bedford, Newburyport, New Haven, New London, Newport, New York, Norfolk, Norwalk, Norwich, Pawtucket, Philadelphia, Portland, Portsmouth, Providence, Petersburg, Richmond, Rockport, Saco, Sag Harbor, Salem, Savannah, Stamford, Stonington, Taunton, Troy, Warren, Washington, Wareham, and Wilmington.

Freights from Rondout are either 20 cents over New York rates, or New York rates and towing up and down as vessels may elect.

Under 150 tons, 50c. per ton. This is the rate alongside. Delivery on wharf costs 15c. additional. Towing extra. 7 1/2 c. per ton per bridge extra.

\* Freights from South Amboy are 5c. above these rates.

Coal Freights from the Anthracite Mines to the Principal Markets.

There are no important changes in these freights. We refer to our issue of June 6, any one desirous of consulting the same.

Freights on Bituminous Coals from the Mines to Tide Water Shipping Ports.

From the Mines to Cumberland and State Line the charge is 3 cents per ton of 2240 lb. per mile.

From Cumberland to Baltimore, \$2 58 per ton of 2240 lb., or \$2 30 per net ton.

From State Line to Amboy, \$4 00 per ton of 2000 lb. On coal shipped beyond that point there is a drawback of 50 cents per net ton.

From the Mines to Piedmont, 5 cents per ton of 2240 lb. per mile on distances less than 5 miles, and 4 cents per ton per mile on distances not over 10 miles.

From Piedmont to Baltimore, \$2 97 per ton of 2240 lb., or \$2 65 on net ton.

From Cumberland to Georgetown by canal, \$1 86 per ton of 2240 lb. To Alexandria, Va., 11 cents per ton more.

From Cumberland to Baltimore by B. and O. R. R. per 2000 lb., \$2 70; 4 cents additional per gross ton for use of cars.

From any point in the Kanawha Valley to the James River wharves below Richmond by C. and O. R. R., including terminal charges, per ton of 2000 lb., for Cannel coal, \$5 35. Subject to rebate on large quantities.

Do., do., for Semi Cannel or Splint, \$3 65.

From Irwin to W. Phila. per P. R. R. Penn. and Westmoreland gas coal, per ton of 2000 lb. \$5 00

From Occochee to W. Phila. per T. & C. R. R., bituminous coal of 2000 lb. 3 55

From Fairmount and Clarkesburg to Baltimore via B. & O. R. R. including loading, per 2000 lb. 5 20

On through coal after deducting drawback. 4 15

From Richmond, Va., to New York, per 2000 lb. \$2 00 @ 2 10

From Richmond, Va., to Boston " " " " 3 00

From Richmond, Va., to Philadelphia " " " " 1 75

Geneva and Ithaca R.R.

COAL TARIFF.

Per ton of 2240 lb.

Lackawanna Junction to State Line for local points. \$2 00

for Auburn via I. & G. and I. R. R. 1 65

for all other points on N.Y. O. R. R. 1 31

Through rate Lack. Junction to Buffalo 3 72

for Rochester 3 22

for Philadelphia 2 97

An addition of 10c. on lots of less than 25 tons.

Lackawanna Junction to Erie Junction for through points on Erie or A. & G. W. R. R. 1 39

Lehigh and Delaware Division Canals.

MAUCH CHUNK, PA., March 25, 1874.

Until further notice the following rates of toll, via the above canals will be adopted:

From Mauch Chunk to Easton per ton of 2240 lb. 46c

From Easton to Bristol or New Hope. 70c

Towing from Bristol to Philadelphia 70c

On local shipments the toll sheets of 1873 will remain in force.

Erie and Champlain Canals.

NEW YORK AND SHIPPING POINTS IN THE VICINITY TO

Per ton of 2240 lb.

\* Buffalo and Lockport. \$1 85

\* Rochester. 1 75

\* Burlington, Vt. 1 75

\* Albany. 85

\* Alongside.

\* Montreal, Canada, gold. \$2 75

\* St. Johns, N. B. 2 50

\* Quebec. 3 25

\* Harbor towing extra.

Delaware and Raritan Canals.

Tolls and Towing for Cargoes exceeding 110 Tons.

Per ton of 2240 lb.

Fairmount to N. Y. 64 c.

Greenwich " 66 1/2 c.

Trenton " 35 c.

Port Richmond, semi bituminous. 65 1/2 c.

Port Richmond anthracite. 8

Philadelphia bituminous. 65 1/2

Mauch Chunk to N. Y. alongside. \$2 45

Freight on Pittston Coal—From Newbur., h.

By boats of the Pennsylvania Coal Co., per ton of 2240 lb.

To Troy, Albany and Stuyvesant. 60 c.

Nyack and Hudson and Boston R.R. dock, Hudson, discharged to cars. 50 c.

Hudson, except as above, Rondout and Poughkeepsie. 35 c.

Catskill, at mouth of creek, Sing Sing, Tarrytown, Piermont, and Yonkers. 55 c.

Fishkill Landing and West Point. 25 c.

Peekskill, Haverstraw, Saugerties, and Tarrytown. 45 c.

New York. 65 c.

REVIEW OF THE BRITISH COAL AND IRON TRADES.

The following is a review from our exchanges bearing date to the 6th inst.

England.—The probabilities of an early adjustment of the strike of ironstone miners in the North of England are not so evident as at the date of our last. Both masters and men show much firmness, and the masters have declared their determination to make a further reduction, equal to 20 per cent. in all, if the men do not resume work on Monday. As there is no probability of the men resuming, the strike may continue for several months, although they are advised by their more clear-sighted leaders to accept the masters' terms, as it is not a pro, per time to resist them; for at the present cost of producing iron, the masters are unable to procure orders at paying prices, and there is no inducement for them to keep their furnaces blowing. The coal trade of this district continues without change. There is a good demand for house coals, and prices are maintained. There is a fair demand for steam coals and prices are firm.

The miners' strike in South Staffordshire having continued about ten weeks, shows no indications of a settlement. Both miners and masters stand firm, and as non-Unionists have resumed work at the full reduction there is enough coal being mined to meet the requirements of the market, thereby plac-

ing the masters in a strong position and the miners, or particularly their families, in a very pitiable one. Considerable dissatisfaction was exhibited by the men, owing to a delay in the payment of the fortnightly allowance, amounting to about £5,000, to the men on strike in the Darlaston district. Some of the miners are in great distress, and, unless something is done, will certainly have to give in.

The demand and prices of coal continue as heretofore reported. Messrs. WILLIAMS & Co., manufacturers of the "Mitre" brand of iron have reduced their quotations to the basis of £12 per ton for bars. The Baborsfield Company, Bilston, have re-lighted one of their furnaces, thus raising the total number in blast, in the district, to 43. Such of the pig-iron makers who will not sell at a concession find difficulty in disposing of their stocks, which are accumulating. In some special descriptions of finished iron there are more orders, but they are mostly for immediate requirements.

The question of a reduction of wages is under consideration in several of the districts, and some local strikes exist, but it is impossible to predict the probable results. Trade shows a slight improvement, especially in coals, but it is bad enough all around. The Bessemer steel business continues quite good; Russia being a very good customer. The following are the wages in the Cannock Chase colliery district, per day of 8 hours: Roadmen in pit, 5/5@5/6d.; Onsetters, 4/6d.@5/6d.; Coalgetters, 5/3d.; Coal loaders in pit, 4/6d.@4/9d.; Banksmen, 3/4d.@4/4d.; and Off-takers, 4/6d.@5/6d. Allowance coal 4 cwt. per week to each married man.

The receipts of coal at London from Jan. 1st to May 31st, were 3,732,563 tons, as against 3,209,791 tons during the corresponding period of 1873; showing a decrease of 177,228 tons. The exports were 666,001 tons as compared with 719,395 tons last year; showing a decrease of 53,394, making a total decrease in trade within the London district of 123,834 tons.

At Darlington, household coals remain at 15/17 for best for the land sale department, though less is taken for shipment; secondary sorts, 13/14; unscreened manufacturing coals can be bought from 8/6d. to 10/, and screened ditto, 11/13 at the pit; gas coals, 13/14. Coke is ordinarily quoted at 18/20 at the pit, though superior qualities are 21/. The Lancashire prices are as follows: Arley mine coal, 15/6d.@16/; burgie, 7/6d.@7/6d.; and slack, 6/8/ per ton according to quality.

In the North of England, No. 1 pig iron is quoted at 90/95 per ton, and very little is to be had at these prices. No. 3 sells at 72/60.@75/; No. 4 (foundry), 67/; No. 4 (forge), 60/, and mottled and white may be had for 3/ or 4/ per ton less. Quotations in South Staffordshire are nominal at £3 10/£4 for common cinder pig, and £5 10/£6 for all mine. At Barrow-in-Furness, No. 1 Bessemer pig is held firmly at £5 12/6d.; No. 2, £5 10/, and No. 3, £5 7/6d.

Wales.—The condition of trade remains the same as last reported, with no change in prices. The notices of contracts between workmen and masters have expired. The majority of the men are willing to submit to a reduction of 10 per cent., but the masters will not make engagements beyond the day, until all the members of the union accept the reduction; and as there are a large number who object to it, trade is very much unsettled, both buyers and producers showing no anxiety to enter into contracts. A meeting of the masters will take place on Tuesday, when it is thought some understanding will be arrived at to permit work to proceed with regularity. At Cardiff, double screened steam coals are quoted 16/20/, and household coals 14/15/. Coke is very quiet and price easy.

Scotland.—The market for pig iron is very irregular, and prices have advanced, not from an increase in the demand, but owing to speculation on change. Business has been done in warrants at from 88/95/3d. The shipments of pig iron for Scotch ports for the week ending May 30th were 7,016 tons as compared with 16,800 tons for the corresponding week of 1873, and showing a total decrease from December 25th, of 104,969 tons. The imports of Middlesbrough pigs into Grangemouth for the week were 1,920 tons as against 400 tons in the corresponding week of 1873, showing a total increase since January 1st of 26,775 tons. There are no indications of a settlement of the dispute between capital and labor. The men appear firm, while the masters, with the present condition of trade, have no inducement to re-light their furnaces. The malleable iron trade continues in a very depressed condition. The production of pig iron appears to be fully up to the requirements of trade. Owing to the masters at the trade collieries yielding the second 20 per cent. reduction, the men have flocked to their mines, and although prices have been steadily maintained there is a prospect that they must fall, as there is more coal being mined than the trade requires. In some districts miners and their families continue to be ejected from their houses by the sheriffs without offering opposition, and there are a large number camping in the fields.

The following are the quotations of makers' brands, some of which are merely nominal:—Gertsherrrie No. 1, 107/6d.; Summerlee, 102/6d.; Shotts, 105/; Carnbroe, 100/; Monkland, 96/; Eglinton, 92/; Glengarnock, 98/; Carron, 92/, and Kinniel, 92/6d.

By cable we learn that the strike of the ironstone miners in the North of England is ended, the men having submitted to 12 1/2 per cent. reduction.

IRON MARKET REVIEW.

Import Duties.

The following are the duties in Gold on Iron: Flat Iron, not less than 1, nor more than 6 inches wide, nor less than 3/8, nor more than 2 inches thick. Round Iron, not less than 3/8, nor more than 2 inches in diameter, and Square Iron, not less than 1/2, nor more than 2 inches square. Flat Round or Square Iron, of larger or smaller sizes than the above mentioned, per lb 35-1000. Provided, that all iron in slabs, blooms, loops, or other forms, less finished than bars, and more advanced than pig iron, except castings, shall pay the same as iron does. Provided, that none of the above iron shall pay less than 31 1/2 per cent. Railroad Iron, 63c. per 100 lb. Boiler plates, or other plate iron not less than 3/16 of an inch thick, per lb 35 100 c. Scrap castings per ton 5 40. Scrap wrought " 7 00. Pig iron per ton 6 30. Iron ore 10 per cent. ad valorem.

New York.

June 26, 1874.

There is a better feeling in the iron trade, with more inquiries, but there is no noticeable increase of business. Although the sanguine dealers and brokers anticipate a very lively fall trade, yet the more thoughtful and experienced think there can be but a very moderate business, and that the demand will not be great enough to give strength to prices. The adjournment of Congress, and the knowledge that certain questions before it will likely have a six months' rest, is certainly beneficial to business.

American Pig.—The Pacific Mail Steamship Company advertised for 1000 tons of iron, which they wanted for ballast. They have had orders at \$20@21, but on asking the quality of the iron, we were informed that it was impossible to mention its grade, which was most probably a mongrel, and as likely to be designated as a "what is it" as anything else, but was heavy and would make good ballast. We were unable to learn that they had purchased. We note sales aggregating about 1000 tons of Thomas foundry irons at \$30 for No. 2 and \$32 for No. 1. A portion of the forge iron embraced in the 3000 tons sale reported in our last, was purchased as low as \$24 80 at the furnace. The quotations of the market are as follows: No. 1 foundry, \$31@32; No. 2, \$29@30; and gray forge, \$27@28.

Scotch Pig.—There is very little doing. We note sales of 150 tons of Summerlee, 200 tons Carnbroe, and 200 tons Eglinton, at about the quotations below; also 1000 tons Glengarnock, part on spot and balance to arrive, said to be at between \$34@35 from ship. This concentrates the stock of Glengarnock, and it is now held at \$38. There is nothing new from Scotland, prices remaining about the same. Makers' brands of No. 1 iron are scarce and held high, but contracts for delivery a month hence are made at 10s. a ton below the ruling prices of to-day. We quote; Eglinton, \$34; Carnbroe, \$35; Summerlee, \$36; and Glengarnock, \$38. Colness to arrive is quoted at \$40.

Iron Rails.—We note the sale of 1000 tons of American rails at \$57 in Philadelphia. This is reported to be a sale from one Southern Company, which bought the rails and was unable to pay for them, to another. We also note the sale of 350 tons of English in bond, on private terms. We quote: American, at \$56@56.50, currency, at the mill; and foreign, at \$52@54, gold, here.

Bessemer Rails.—We are unable to learn of any transactions and quote nominally: American, at \$98@100, currency, at the mill; and foreign at \$95@97 50, gold, here.

Old Rails.—There is a great abundance of old rails offering from all sections of the country, with no buyers. Latest advices from London by mail state that a large business has been done with Russia, at the equivalent of £4 15/ f. o. b. In the absence of important transactions, prices may be stated nominally at \$36@38.

Scrap Iron.—We are unable to learn of any transactions, and quote at \$36@38 for No. 1 wrought and cast at \$22@28.

Spiegel Eisen.—There is nothing doing, and we quote nominally at \$55, gold.

Baltimore.

June 20, 1874.

The market for pig is dull, and we learn of no movement but one small sale for foundry purposes. We quote as follows: Anthracite at \$33 per ton for No. 1; \$32 for No. 2; and \$29 for No. 3. Baltimore charcoal forge at \$43, and Scotch pig, nominally, at \$45 from yard.—American Commercial Advertiser.

Cleveland.

June 23, 1874.

Specially reported by Messrs. C. E. BINGHAM & Co., dealers in pig iron and iron ore.

We have no change to report since last week. Market is very quiet. We quote as follows:

Table with 2 columns: Item and Price. Items include No. 1, Anthracite Foundry, No. 2, Bituminous, No. 1, Grey Forge Bituminous, No. 2, Close Grey, No. 1, Massillon Black Band, No. B-1, No. 2.

Table with 2 columns: Item and Price. Items include No. 1, Lake Superior Charcoal, No. 2, No. 3, Nos 4, 5, 6, American Scotch.

Chicago.

June 22, 1874.

Specially reported by Messrs. ROGERS & Co., dealers in Scotch and American pig iron.

There is no change in the pig iron market since our last report.

Table with 2 columns: Item and Price. Items include No. 1 Colness, No. 1 Gertsherrrie, No. 1 Summerlee, No. 1 Glengarnock, No. 1 Eglinton, Warner's "American Scotch", No. 1 Grand Lower Mo. ores (Bituminous), No. 2, No. 1 Forge, Union "A" (Anthracite), Union "B" (Anthracite), No. 1 Lake Superior (charcoal), No. 2 Lake Superior, No. 3 Lake Superior, No. 4 Lake Superior.

Cincinnati.

June 23, 1874.

Specially reported by Messrs. TRABER & AUBREY, commission merchants for the sale of pig iron, blooms, ore, etc.

Business in our Pig Iron Market has been dull during the past week, the demand is confined to the current wants of the trade. Prices are slightly lower. We quote:

CHARCOAL.

Table with 2 columns: Item and Price. Items include Hanging Rock, No. 1, Foundry, No. 2, Mill, Tennessee No. 1, Foundry, Tennessee, No. 2, Missouri, No. 1, Foundry.

STONE COAL.

Table with 2 columns: Item and Price. Items include Ohio No. 1, Foundry, No. 2, Ohio Mill, Missouri, No. 1, Foundry, No. 2, Mill.

CAR-WHEEL.

Table with 2 columns: Item and Price. Items include Hanging Rock, C. B., Tennessee, Missouri, Alabama.

BLOOMS.

Table with 2 columns: Item and Price. Item: Charcoal, 85 00@ 95 00—cash.

SCRAP IRON.

Table with 2 columns: Item and Price. Items include Cast, Wrought.

Detroit.

June 15, 1874.

Table with 2 columns: Item and Price. Items include Scotch pig, net, Lake Superior pig, No. 1, No. 2.

Indianapolis, Ind.

June 23, 1874.

Specially reported by NELSON KINGMAN, broker and dealer in pig iron, etc.

I have no material change in prices to note since my last report, except a slight depression in pig metal. I quote:

Table with 2 columns: Item and Price. Items include New Rails at mill, Old Rails, Indiana No. 1 Foundry pig Planet furn., No. 2, No. 1 Forge, No. 2, Ohio No. 1 Foundry pig, No. 2, Merchant Bar, card rates, 1st quality C. H. No. 1 Boiler Plates, per lb., 1st Com. Sheet, for No. 24, W. G., 1st Charcoal Sheet, Best Bloom Galvanized Sheet, discount 20 per cent., 2d quality f o. b. in Indianapolis.

Louisville.

June 23, 1874.

Specially reported by GEORGE H. HULL, Esq. Prices are steady, but the market is dull, and sales are confined to small lots for immediate use.

The usual time, 4 mos., is allowed on the quotations below:

HOT BLAST—CHARCOAL.

Table with 2 columns: Item and Price. Items include No. 1 foundry, from Hanging Rock ores, No. 2, No. 1, forge, Tennessee, No. 1, foundry, Alabama, No. 2, No. 1, forge, Iron Mountain, No. 1.

HOT BLAST—STONECOAL.

Table with 2 columns: Item and Price. Items include No. 1, foundry, from Missouri ores, No. 2, No. 1, forge.

COLD BLAST—CHARCOAL.

Table with 2 columns: Item and Price. Items include Car Wheel from Hanging Rock ores, Tennessee, Alabama, Georgia, Missouri, Kentucky.

San Francisco.

June 11, 1874.

From the Commercial Herald we learn that there has been no change since our last, and that Scotch and English soft iron is quoted at \$36@40, and best brands at \$42 5

**Pittsburgh.**

June 23, 1874.

Specially reported by A. H. CHILDS, Esq., commission merchant for the sale of pig iron, blooms, ore, &c.

There has been some activity in mill irons during the past week, and considerably more iron purchased than is needed for present use. Foundry metal, however, is very dull, and can be bought at a decline of fully \$1 per ton. For other grades quotations are unchanged.

No. 1 Foundry, anthracite or bituminous. \$30 00@31 00—4 MOS  
 No. 2, " " " " 28 00@29 00—4 MOS  
 Gray forge " " " " 27 00@27 50—4 MOS  
 White and mottled " " " " 24 00@25 00—4 MOS

The Pittsburgh Commercial reports the following sales for week ending June 19, 1874:

**IRON MADE FROM LAKE SUPERIOR ORES, SMELTED BY BITUMINOUS COAL.**

900 tons gray forge, .....	\$27 00—4 MOS
400 " " " " " " " " " "	Private terms.
300 " " " " " " " " " "	27 00—4 MOS
100 " " " " " " " " " "	25 00—4 MOS
100 " " " " " " " " " "	25 00—4 MOS
70 " " " " " " " " " "	25 00—4 MOS
60 " " " " " " " " " "	30 00—4 MOS
30 " " " " " " " " " "	30 00—4 MOS

**CHARCOAL HANGING ROCK.**

100 " a mixed lot, .....	Private terms.
50 " " " " " " " " " "	34 00—6 MOS
38 " " " " " " " " " "	\$37 00@38 00—5 MOS
32 " " " " " " " " " "	38 00@40 00—4 MOS
23 " " " " " " " " " "	45 00@63 00—4 MOS

**ANTHRACITE.**

100 " Chickies foundry, at furnace, .....	31 00—4 MOS
50 " " " " " " " " " "	26 50—4 MOS
30 " " " " " " " " " "	31 00—4 MOS

**ORE.**

484 " Iron Mountain, .....	13 00—cash.
275 " " " " " " " " " "	13 00—cash.

**St. Louis, Mo.**

June 20, 1874.

Trade is quiet, with prices about the same as at the date of our last.

**STONE COAL FIG.**

No. 1 foundry from Iron Mountain and Maramac ores, .....	\$30@34
No. 2 foundry from Iron Mountain and Maramac ores, .....	29@31
No. 3 forge from Iron Mountain and Maramac ores, .....	26@28
No. 1 Massillon, .....	38@40
No. 1 Tennessee, cold short, .....	35@..
No. 1 Ohio, cold short, .....	35@..

**HOT BLAST CHARCOAL FIG.**

No. 1 foundry from Iron Mountain and Maramac ores, .....	33@35
No. 2 foundry from Iron Mountain and Maramac ores, .....	30@32
No. 1 foundry from Tennessee ores, .....	33@35
No. 1 forge from Tennessee ores, .....	31@33

**COLD BLAST CHARCOAL FIG.**

Hanging Rock car wheel, .....	56@58
Tennessee, .....	48@50

**MISSOURI IRON ORES.**

Iron Mountain, per ton, .....	\$8 00
Benton Creek, " " " " " " " " " "	7 00
Surface ores, " " " " " " " " " "	8 00
Red and brown hematites, per ton, .....	5 00@6 50
Pilot Knob, per ton, .....	5 50
Maramac, .....	5 00

**RAILS.**

50 to 60 lb. inclusive, .....	65 00@63 00
-------------------------------	-------------

**METALS.**

NEW YORK, June 27, 1874.

**Gold Coin.**—During the week past gold has ranged from 111 to 112, and closed yesterday at 111½.

**Bullion.**—Fine silver bar is quoted at \$1 27½@1 29, gold, per ounce, and fine gold bar at par (\$20 67, gold, per ounce). The decline in silver is attributable to a better supply in this market.

**Copper.**—There was but a moderate trade during the past week, sales aggregating about 250,000 lb. Lake, at 24½@24¾c. The latest London quotations show an upward tendency in that market. The following is the latest cable information: "Stock of copper decreasing, market firm, Chili pig £80, and best selected £88 10/." The latter quotation is equivalent to 27½c. here.

**Tin.**—The trade is entirely confined to jobbing transactions, which are reported as quite fair. The latest cable quotation from London is £101 for L. & F. L. & F. in this market is held at 21c. @21½c.; Refined English, 22c.; Straits, 23½c. @23c.; and Banca, 26c. @26½c., all gold. In tin plates there is a fair jobbing trade, charcoal tins being quoted at \$10 25@ \$10 50, and coke at \$8 25@8 37½; charcoal ternes \$9 00@ \$9 50, and coke at \$7 00@8 00.

**Lead.**—The stock in this market will not reach beyond 2000 tons, of which 1200 to 1500 tons are domestic, and about 500 tons foreign. Domestic is selling moderately at \$5 80. Spanish is dull. One sale of Western lead was made at \$5 25, currency. Foreign may be quoted at 6½c. @6½c., gold.

**Spelter.**—There is not much doing. Domestic is quoted at 7@7½c., currency, and foreign, to arrive, 6½@6¾c., gold.

**Zinc.**—The market is quiet, with Foreign sheet at 8½c. @8½c., gold, and Domestic at 8½c. @8½c., gold.

**Antimony.**—There is comparatively nothing doing, and we quote as heretofore, at 12½c., gold.

**Manganese.**—Good brands are scarce. The quotations are as follows, and without change: Manganite, Ga. and Va.,

3c.; N. B., 3½c.; Pyrolusite, N. B., 85 per cent., 50, and German Manganite, 6½c.

**Quicksilver.**—There are no new features to notice in the trade for this article. The demand is still ahead of the supply, and prices as heretofore reported are: in this city \$1 42 per lb., and in San Francisco \$1 35, both gold. In London £19 15/ per flask, (76½ lb.)

**San Francisco Stock Market.**

BY TELEGRAPH.

NEW YORK, June 24, 1874.

We have advices from the San Francisco Stock Board dated the 23d inst. A slight decline in Meadow Valley is the only exception to a decided advance of the list. The Crown Point Mining Co. have declared a dividend of \$3 per share, payable on the 12th ult. The report is as follows:

Savage, .....	92	Imperial, .....	87½
Crown Point, .....	82	Raymond & Ely, .....	21½
Yellow Jacket, .....	88	Meadow Valley, .....	8½
Kentuck, .....	17	Eur ka V G. Bid, .....	9
Hollar Potosi, .....	77	Opbir, .....	—
Gould & Curry, .....	25	Hale & Norcross, .....	—
Belcher, .....	81		

**Boston Stock Market.**

BOSTON, June 24, 1874.

We give below the closing bids for Copper Stocks. The sales effected during the day were 15 shares of Quincy at \$38 25 and 175 shares of Allouez at \$7 per share.

Allouez, .....	6½	Pewabic, .....	8
Calumet and Hecla Co., .....	145	Phenix, .....	14
Copper Falls, .....	19	Quincy, .....	38½
Central, .....	—	Ridge, .....	6
Franklin, .....	3	Rockland, .....	—
Mesnard, .....	1	St. Clair, .....	1¾
National, .....	3	Star, .....	—
Petherick, .....	1½		

**American Institute of Mining Engineers.**

OFFICIAL BULLETIN.

**Announcements to Members and Associates.**

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

II. Dues (ten dollars per annum) are payable on election and at the annual (May) meeting. Members and associates elected at the February meeting pay ten dollars only to May of the following year. Remittances should be made, as far as possible, by P. O. Order, payable to the Secretary.

III. The Council earnestly requests members to forward to the Secretary, for preservation, copies of all printed mining and geological reports, particularly pamphlets, which may fall in their way. It is believed that by this means a large amount of valuable fugitive information concerning different regions and properties in this country, may be caught and preserved.

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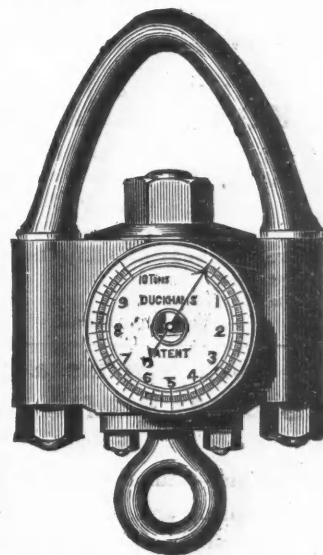
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