

ENGINEERING and MINING JOURNAL.

VOL. XXIII. No. 26.

RICHARD P. ROTHWELL, C. E., M. E., } Editors.
 ROSSITER W. RAYMOND, Ph. D., }
 T. F. VAN WAGENEN, M. E., Denver, Colo., }
 DON ANTONIO DEL CASTILLO, Director of the } Staff Correspondents.
 School of Engineers, City of Mexico, Mexico, }

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

Business communications from the Western Department should be addressed to the Western Office at Denver, Colo.

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"THE ENGINEERING AND MINING JOURNAL" ADVOCATES THE ADOPTION OF THE METRIC SYSTEM OF WEIGHTS AND MEASURES, and urges all who are interested in the simplification of our present complicated and unsatisfactory systems to aid, by their active sympathy and encouragement the early intrupocion of this muchneeded reform.

AMERICAN INSTITUTE OF MINING ENGINEERS.

[OFFICIAL BULLETIN.]

The members and associates of the Institute are hereby informed, in accordance with a recent decision of the Council, that the ENGINEERING AND MINING JOURNAL will not be sent to those in arrears for the current year after July 1. The JOURNAL will be resumed when the annual dues are received, but the Institute cannot guarantee that back numbers will be supplied.

EASTON, PA., June 1, 1877.

THOMAS M. DROWN, Secretary.

FERRO-MANGANESE IN BLAST FURNACES.

We publish in another column a letter from Mr. WILLARD P. WARD, of Cartersville, Georgia, in reply to the recent communication of M. VALTON to the Institute of Mining Engineers. Private advices from Mr. WARD convey the pleasant intelligence that his furnace has been running very satisfactorily since the erection of the new Weimer blowing-engine. The product is now about two tons daily of 50 per cent. ferro-manganese; and there are orders in hand for a month ahead. We congratulate Mr. WARD on the success with which his skill and perseverance have been crowned.

SILVER DOLLARS.—II.

It seems a hopeless task to stem with argument the tide of vague and reckless assertion which, born of the convulsion of a desperate financial crisis, and impelled by the wind which demagogues know how to raise, threatens to sweep away the landmarks which experience, after many centuries, had succeeded in establishing. We are called to meet fallacies which we supposed were dead; to repeat experiments of which we thought the world had had enough; and to go back, to "the fathers" for expedients which the fathers themselves found futile. The party which recently shouted for unlimited greenbacks now sounds the praises of the silver dollar—the only apparent recommendation of which is the fact that it happens at present to be worth about as much as the paper promise of a dollar. The chimera of a double standard raises its two heads once more with unabated vitality, and unhorsed politicians, deeming this monster a likely stud for a ride to power, are making haste who shall be first in the saddle.

There are, of course, many degrees of this mania, involving different degrees of peril to the country—from the wild notions which would inflict upon the public credit an almost fatal wound to those which would merely involve us anew in the embarrassments which a double standard involves, and from which, in the return to specie payments, we have an admirable opportunity to make good our escape. We shall not commit the error of pronouncing all these schemes equally bad; but we cannot surrender our judgment that the only safe and wise course is an adherence to the single standard, and that standard gold. Whether the labor be hopeless or not, we deem it our duty to set forth, to the best of our ability, the reasons for this opinion.

The talk about the desirableness of a bimetallic currency, and the inadequacy of the supply of gold alone to transact the business of the country, deceives many, who suppose that silver is excluded from use by the maintenance of a gold

standard. But the truth is that the two metals can be kept in circulation together in two ways only: first, by a general agreement among commercial nations fixing their relative value as money; or secondly, by the simple expedient of making one of them standard and the other subsidiary. The first is the condition recently insisted on by M. CERNUSCHI, whose views on the subject so keenly disappointed Senator JONES and his party. We shall on another occasion discuss them more particularly. The second is the present system of England, Germany, and the United States.

It should be clearly comprehended at the outset that in establishing a single standard the State does not attempt to fix any value whatever. All it does is to furnish a convenient measurement by which values may adjust themselves. It says, "The pieces of coin which we issue shall have such a weight and fineness, of which our stamp is a guaranty." The word "dollar" would be entirely superfluous but for the habits of business, which render it more convenient than the current terms of weight. But everybody knows that it means a certain weight of a certain fineness, and that a gold coin, when worn by circulation below its legal weight, is no longer a legal tender. Nor would any contract to pay "dollars" be equitably fulfilled by the payment of "dollars" of another weight or fineness than those contemplated. It is to save the citizen from the necessity of specifying, in every transaction of business, the exact weight and fineness of the coins he promises to pay or receive that the government fixes the legal definition of a dollar. If this be true, money is simply a commodity, selected as the most convenient measure of the value of other commodities; and it is evident on general principles of political economy that the system which does not interfere to fix, or attempt to fix, the value of any other commodity in terms of that one is the best. Theory shows such an attempt to be unwise; experience proves it to be futile.

At this point we must meet and answer several questions which plausibly impugn the principle we have laid down.

1. In the case of a single standard does not the standard itself vary? Undoubtedly; and its variations play some part (we think a subordinate one) in general advances or declines in prices throughout the world. These cannot be avoided; but they are reduced to a minimum by the employment of a metal as standard of which there is a large stock in the world, and of which all nations recognize the value, so that local surpluses or deficiencies can be equalized by international overflows. When the ocean is the reservoir, freshets and droughts on the coast do not perceptibly affect its level, and only slow continental changes can affect the average distribution of the rain.

2. Would not equity and convenience be better served by the employment of two metals, either of which might be the legal-tender standard, so that practically the standard would be optional, and at any given time that metal which was overvalued in coinage would take the place of the other? This we answer in the negative, reserving, however, for a more extended discussion the consideration of the point.

3. What is the nature of the measure by which a government issues legal-tender notes? It is a forced loan, without interest. The notes are the promises of the government to pay money. They may be used as currency, because the government decrees that courts shall consider the tender of such notes as legal satisfaction for contracts; that is, the validity of the promise of the government to pay money shall not be questioned, and the holder of that promise shall be content to wait for its performance. If the promise is never fulfilled, the loan becomes confiscation.

4. What is the nature of the measure by which a government establishes a subsidiary currency and makes it legal-tender for small amounts? A true subsidiary currency is a token-coinage, containing a smaller amount of fine metal than its nominal value indicates, but redeemable at the treasury, according to its face, in standard coin. The intrinsic value of the coin is made as high as is consistent with the necessity of keeping it always below the nominal value—the Scylla and Charybdis to be avoided being the disappearance of the coin on one hand, and profitable counterfeiting on the other. Hence, the loss to the citizen in accepting it for small debts is insignificant, and even this may be recovered at any time by the simple process of exchanging it at the treasury. In this transaction, therefore, the public convenience is served without sensible injustice to the citizen. When subsidiary coinage is not exchangeable at the treasury, the restriction of its amount by the government may produce practically the same effect in keeping it afloat; but no artificial adjustment can be as good as that natural equilibrium which comes from self-adjustment.

We shall have occasion to discuss this subject still further, and to consider more particularly the arguments in favor of a bimetallic standard. But we repeat that all such arguments, if they are absolutely unanswerable in the abstract, would be futile in support of the proposition now advanced by the inflation party, that the United States shall attempt single-handed to remonetize silver.

AFFAIRS IN THE BLACK HILLS.

Staff Correspondence of the Engineering and Mining Journal.

The rush of miners to the Black Hills this summer is unprecedented in the history of the West since the opening of California in 1849. The arrivals amount to fully 100 per day, the vast majority of whom reach Deadwood with almost nothing left with which to support themselves. It is estimated that there are now fully 10,000 men in the Hills, and many judge as high as 15,000. Of course there is not enough day work for these, and so far no new gulches capable of supplying ground for as many men as Deadwood has have been found.

Prospecting parties are already starting off to Big Horn, Wind River, the Yellowstone, and Tongue River. The gulches and ranges of these localities are thought to be auriferous, and before the 1st of July, judging by the number of men already starting off, there will be five thousand miners scattered through the gorges of Northern Wyoming. The country to be explored lies to the southeast of the Montana placer districts. In 1861, 1862, and 1863, repeated attempts were made by prospectors from that Territory to explore these ranges, but in every case the venturesome miners were either driven back by the fierce Sioux and Crows or massacred. This year the results will be different. The season's work, even if it should result in no important gold discoveries, which is highly improbable, will doubtless inaugurate another excitement over the wonders of the Yellowstone Valley, and, by calling attention to it, indirectly aid in opening a new route from Cheyenne or some point on the Union Pacific in Wyoming to Montana.

In Deadwood good work is being done. A majority of the claims are yielding finely, and the production of dust is footing up better than was expected. A great deal of attention is being given to lode mining. At the head of the gulch a number of very large veins have been found which are easily worked and are quite rich. About 60 stamps are now running, and fully 200 more are on the road or in process of erection. The charges for crushing are down to \$5 per ton, and will probably go lower when the new mills are up. There is an abundance of water for all purposes.

No new discoveries of silver mines have been made. In fact, the silver excitement has died out. In all probability there will be some valuable discoveries of ores of this metal outside of the Black Hills before long in that part of the Nasatch Range which extends through Northern Utah and Idaho. A revival of interest in the Sweetwater mines would also not be a surprising outcome of the present rush to Wyoming.

SUMMER TRIPS AMONG THE MINES.—No. 1.

Staff Correspondence of the Engineering and Mining Journal.

It would seem strange to most of the readers of the JOURNAL, if they could take a look at Caribou to-day, to select this camp as the first in a series of "Summer Trips." For Caribou town is over 9,000 feet above the sea, and the great snow banks which accumulate in the winter are still lying on the north side of the hills to the depth of 10 and 20 feet, and covering many acres. And from these the water is pouring in hundreds of streams down the narrow gulch, swelling the flood that rushes down through the steep and precipitous cañon below.

To reach Caribou one takes the Colorado Central or Boulder Valley Railroad at Denver, and after a few hours' ride reaches the town of Boulder at the mouth of the cañon of the same name. At this pretty and enterprising little city the traveler has his choice of the stage, a buggy, or a horse to take him up the gorge to the silver mines. At this time of the year the cañon is beyond description beautiful. The stream is bank full, and the water rages and tosses in its narrow rocky bed till it is white as chipped ice. The gulch is everywhere a bright fresh green, except where the granite cliffs tower up so perpendicularly that no soil can obtain a foothold upon it, and even in these places, here and there, the hardy spruce and pine find root in the crevices of the rock and shoot upwards.

Passing up the gulch, all traces of the dull farmer who struggles with drought and the grasshopper on the plains disappear, and nothing is seen but the work of the miner. For the first few miles one passes mills and concentration works. About six miles above the mouth of the gulch the edge of the tellurium belt is reached, and the peculiar bluish gray granite in which those lodes occur shows itself very plainly. Farther on the formation changes into one of a more gneissoid character, and the prospect holes and tunnels show the silver rock of Grand Island District. The gulch broadens out, the mountain slopes become less precipitous, and suddenly the traveler emerges from the shadow of the great Castle Dome rock, upon the level and wide bottom in which is nestled the little town of Nederland, sixteen miles up the cañon.

Nederland is a little camp, supported heretofore almost wholly by the silver mill of the Mining Company Nederland (now defunct). Since the unfortunate failure of that company the town has been a quiet one, living almost wholly on hope and in the future. At Nederland the road branches off into Beaver Creek, and for four miles winds up the eastern slope of that gulch, gradually gaining altitude until the town of Caribou is reached, nearly on the edge of timber line, and surrounded by banks of deep snow. Back of it only a few miles and in plain sight is the White Range, rising up to altitudes varying from 10,000 to 13,000 feet above the sea.

In winter and early spring there is a wind in Caribou. Whether it starts as a zephyr or a full-grown tempest on the range or not has never yet been satisfactorily determined. But it comes bowling down from the snow-banks at any velocity you may imagine, and drops down into the town with a vigor and persistence that "makes Rome howl." A wilder spot than this in a good mountain storm it would be impossible to find. The cutting blasts from the west, laden with sharp snow crystals, are fearful to contemplate and horrible to experience. The traditional scape-goat of the paragonist, who innocently leans against a circular saw making 2,000 revolutions a minute, and then calmly folds his hands and is measured for a coffin, would experience new delights in bracing up against a Caribou storm. But in summer and fall the little camp rests quietly amid the thick timbers of the surrounding hills, and enjoys a climate that is incomparable. The great belt of mines that has made the town famous crops out on Caribou and Idaho hills, on the north side of the town. It is

about three-quarters of a mile wide, and fully four miles in length. Within this area the mountains are completely cut up with mineral veins, crossing each other at every conceivable angle. A close study of the veins on Caribou Hill has revealed the existence of three sets of lodes of different age; and probably the same could be shown on Idaho and Boulder County hills. It is difficult, however, to walk fifty feet in any direction on the former without passing over well-defined crevices. Of course it is highly probable that below many of these will unite, forming a comparatively few fissures of great size.

Caribou has a history, with a great many interesting details in it. In the flush days of the Dutch Company which bought the Caribou lode for \$3,000,000, it was a "roaring" town. It is difficult to write or think of that unfortunate company without feelings of regret—first, that the poor Holland burghers were so fearfully taken in, and, second, that during their brief reign so few were found who refrained from reaching down into the pockets of the Dutchmen in search of a little stake for themselves. It may be unpopular to refer to this at all, but many were the games of poker played in Caribou when the stakes were silver nuggets, worth from \$10 to \$70 each, brought out from the mine in dinner pails and overall pockets. In those days the mine was showing a number of magnificent ore pockets in which lumps of solid silver would occur, and huge bunches of wire metal, and chunks of rich sulphurets. It is said that that mine has yielded from \$50,000 to \$100,000 in specimens, hundreds, nay thousands of which were preserved as pocket pieces, paper weights, etc., for years, and are still. And many thousand pounds of rich ore answered the purposes of chips at faro and poker, and only went to the melting pot after considerable wandering.

But those halcyon days ended when the Mining Company Nederland passed into history. To-day the town is quite orderly and comparatively dull. A new set of miners has taken the place of those who worked for the Hollanders, a new spirit has animated the place. It has taken many long months to clear away the wreck of the big company, but now all the debris has been swept aside, new capital has come in, and new enterprises have sprung up.

Another mine has come to the front—the Native Silver, yielding the same rich ore, and in as large quantities in proportion to the development as did the Caribou.

The two mines, in fact, are on one and the same great vein, the mother fissure of the district. The Native Silver is the west extension. It is now sunk to a depth of 275 feet, is in the hands of a strong and capable company, which has built a mill to the west of the town a few hundred yards further up the gulch, and which is spending money freely in opening the mine. So far these operations have been attended with complete success, and there is no doubt whatever that future development will show anything unfavorable.

To show the new spirit abroad in the life of this wonderful little camp, it is only necessary to look around on the hills and see what is being done. The Sherman and No-Name Company is working its mine solely for development. The Monitor Company is building a fine shaft-house, and will, as soon as that is completed, go to work in earnest to open that excellent vein. On the Boulder Company a systematic plan of operation has been adopted and is being carried out. On the Spencer and Poorman, which have both been remarkably rich and productive, development is progressing steadily, and it would be difficult to find two mines anywhere that will show a finer record than these. A few minor properties are working, and more will soon be opened. For it is shown beyond question that this belt of silver mines is second to none in Colorado in point of richness, quality of ore, and productiveness. When a proper degree of development is reached on a number of mines, a very heavy production of ore will be maintained, and it will be beyond the power of any one or two companies, by reason of failure, if that should occur, to affect the growth and prosperity of the camp. Many think this time has already arrived. I believe this summer's work will bring about such a state of affairs, beyond the shadow of a doubt. We know now too much of the mines, and of the ore they will produce, ever to doubt the capacity of the camp or lose faith in its future.

In spite of its great altitude, its fierce winters, and its snow banks, some of which never entirely disappear, Caribou is a town never to be forgotten by those who take the trouble to pay it a visit. To drink the ice-cold water of the gulch will be a new sensation to the man who spends his life in the city, and only tastes that element after it has traveled through miles of iron pipes, which steal its bead and rob it of its purity. To stand at the mouth of any of the great silver mines on Caribou Hill, and look eastward over the hills to the brown plains beyond, whose level horizon stretching to the north and south for a hundred miles reminds one of the ocean, gives new ideas of the extent of our fatherland, and leads to broader thoughts. To go down into the mines and see the sparkling ore in its granite safe, to follow it as the miner tears it out with his drill and pick, as it is loaded in the cars and carried through the long levels and up the shaft to daylight, as it falls into the iron jaws of the mill, and after tortures innumerable emerges a bright and glistening bar of white metal—in other words, if the traveler will take a look into the minutiae of silver mining as it is to be seen in this little camp among the clouds, he will find himself interested to a degree most unexpected.

When the Caribou people put up a stove anywhere, it is put up to stay. There is seldom an evening in the year when its glow is uncomfortable, while two blankets on the bed are always a necessity. Consequently, when one retires, the hours of the night are devoted strictly to business. There is no growling with Morpheus over the heated term and the thermometer well up in the nineties, no gasping for a breath of cool air. The night breeze comes to you straight

from the white snow banks two miles away, dry as tinder, and bracing as wine. Verily the home of the silver miner has its charms.
CARBON, June 12, 1877.

A GLEAM OF DAYLIGHT.—PIOCHE, NEVADA.

Staff Correspondence of the Engineering and Mining Journal.

The news from Pioche is more favorable now than it has been for many months past. A change for the better has apparently taken place in the lower levels of the Raymond & Ely Mine, and, consequently, there is a brighter look to the once famous camp. The ebb and flow of life in a mining town is always more or less the result of changes in the fortunes of the "big mine," and eras of depression always come and go periodically, until there are so many well-opened mines that one or two can be out of pay without being noticed. Pioche has certainly had for the last ten years a hard time, and since the discovery of the Leeds Mine, just across the border in Utah, it has passed through the mortifying experience of suffering almost total extinction in favor of a younger rival.

The history of the great vein of Pioche, on which the Meadow Valley and the Raymond & Ely mines are the principal claims, is an interesting one, and especially of late when many have been disposed to consider the mine exhausted. In 1869, attention was first drawn to the camp, which then was so remote from any settlement, and so comparatively unknown, that it was not certain whether it lay in Utah or Nevada. The first company of note formed was the Meadow Valley, though previously to the commencement of operations by that organization Messrs. RAYMOND and ELY, two prospectors, had erected a five-stamp mill at the camp, to work the ore from their part of the same lode. The Meadow Valley Company commenced business by building extensive smelting works, under the impression that the ores were of a smelting character and contained a high percentage of lead. Results showed this to be a very serious error, and as the stamp mills erected did not save 50 per cent. of the precious metals, the district commenced its history with a very heavy drawback, and mining almost ceased for a time. In the spring of 1870, however, the Meadow Valley Company began to test the ores at White Pine, and it was shortly found that the Washoe process was admirably suited to them. A 20-stamp mill was immediately built on this system, which started in August of the same year, and after some few weeks' delays, caused by the usual difficulties in working in a remote camp, the mill was put into successful operation. Up to the end of the year the district had yielded about 2,200 tons of ore, worth nearly \$175,000, and enough had been done on the mines to show that the camp was an excellent one, and worthy of extended exploration.

In 1871 the district opened so magnificently, so far as the two principal mines were concerned, that a genuine excitement arose, and Pioche received a large addition to its inhabitants and a great accession of capital. Numerous new companies were formed on outside ledges, a great many of which were found, and, in general, these ventures were successful. The most noted were the Alps, Bowey, Pioche, Washington, and Creole companies. At the close of the year the bullion shipments of the district footed up the handsome figure \$3,982,000. The Raymond & Ely Mine had produced 12,250 tons, which yielded \$1,360,000 in round numbers, \$615,000 of which was paid out in dividends, and a depth of nearly 400 feet had been gained on the vein. In the same time about 17,000 tons of ore, which yielded about \$1,800,000, and the developments, which had been pushed to a depth of over 300 feet, had thrown into sight as much more. The other mines turned out about \$800,000 between them.

The succeeding year showed Pioche in its glory, the second best mining camp in the West. The production amounted to the enormous figure of \$5,200,000 in silver bullion, \$130,000 in argentiferous lead, and \$50,000 in gold. Almost the whole of this came from the Meadow Valley and Raymond and Ely, the outside mines having rather retrograded, and showing but meager results. But while the success was gratifying from one point of view, it was exceedingly discouraging from another, for, induced by the enormous production, numerous lawsuits sprang into existence, adverse claims were filed against the two great mines, and a vast amount of expense entailed. Nevertheless, dividends to the total amount of \$2,470,000 were paid, and there was apparently no reason to believe that the two mines would cease their productiveness for some time to come. In this year the Raymond & Ely forged ahead of its rival, producing \$2,900,000 against \$1,600,000 from the Meadow Valley. Of the outside mines, the Pioche Company was the only one paying dividends. A depth of nearly 700 feet had been attained at the close of the year on the vein.

The returns for the year 1873 showed the effects of the litigations which had been begun in the previous year. The yield of the camp had decreased to \$3,700,000, of which the Raymond & Ely produced \$2,300,000, the Meadow Valley \$750,000, and outside mines about \$700,000. A decrease in the value of ores had also taken place, and a large block of ground, containing some of the finest ore found, was closed up by the courts till the questions of title at issue were decided. In the Meadow Valley the deeper explorations failed to show up any new bodies of ore, and the prospects for the mine were rather discouraging. The same condition of affairs to a somewhat less degree prevailed at the Raymond & Ely. In the stock market these troubles were noted by a decided decline in the value of the shares, but at the mines no lack of confidence was felt in the results of deeper explorations. The total dividends paid amounted to \$630,000. But the troubles which came to the camp will be more clearly

understood when it is stated that nearly \$600,000 (all but \$9,000 of which came from the Raymond & Ely) were paid out during the year on account of lawyers' fees and to purchase disputed ground. The construction and exploration accounts of the two mines were also unusually large.

During 1874 the bullion yield of Pioche showed a steady and gradual decrease. It became evident that the great ore body which had given the district its fame had been exhausted, and that extended explorations must be made before mine deposits could be hoped for. Nevertheless a total of \$1,900,000 in bullion was shipped from the camp, of which the Raymond & Ely Mine yielded \$700,000, and the Meadow Valley about \$900,000. At this time the vein had been penetrated to a depth of 1,200 feet with no encouragement. The bulk of the bullion produced was taken from ore mined above this depth. The vein, though almost completely barren at this depth, still showed a perfect formation, and encouraged prospecting. A heavy body of water was struck, however, at this depth, and new and more powerful machinery was required. These difficulties finally placed both mines on the assessment lists, where they have remained with considerable persistency ever since. Explorations have never ceased, however, on the larger veins. Shafts have been sunk, levels driven, and enough ore taken out to make the levies on stockholders always light, and frequently unnecessary. But the bullion yield from the camp decreased during 1875 and 1876, till now it is averaging about \$12,000 per week, or \$576,000 per year, the bulk of which still comes from the two prominent mines on which the camp was founded.

Recent reports from Pioche indicate an improvement in the character of the ore found in the lower levels of the Raymond & Ely Mine, and the explorations promise to result in a general improvement in the yield of the district. Outside of the great vein some important consolidations of adjacent mines have taken place, and the prospect of the camp is decidedly better. We hope these anticipations will not prove deceptive. Pioche has had a long turn of ill luck, and the tenacity with which owners have held to their property is worthy of reward.

GEN. F. L. VINTON, now visiting Colorado on a professional tour, intends, we hear, to establish himself permanently in that attractive State. He is a graduate of West Point, and of the Paris School of Mines, and was one of the founders of the Columbia College School of Mines, where he has held the Chair of Mining Engineering since the organization of the school. General VINTON's extensive acquaintance with the literature of mining, supplemented by some experience in several of the mining regions of this country and of Central America, will be of great value to him in his new field of labor. The General, who is an accomplished artist as well as an engineer, will certainly be welcomed as an acquisition in the professional and social circles of the new State.

BOOKS RECENTLY RECEIVED.

ANNUAL RECORD OF SCIENCE AND INDUSTRY FOR 1876. By SPENCER T. BAIRD. pp. 609. Harper & Brothers. New York.
THE ECONOMIC THEORY OF THE LOCATION OF RAILWAYS. By ARTHUR M. WELLINGTON. C. E. pp. 230. Railroad Gazette. New York. Price \$2.00.
35TH ANNUAL REPORT OF THE BOARD OF EDUCATION. New York. 1876. pp. 304.
TRANSMISSION OF POWER BY WIRE ROPES. By ALBERT W. STAHL, M. E. pp. 124. D. Van Nostrand. New York. Price 50 cents.
STEAM INJECTORS—THEIR THEORY AND USE. By M. LEON POCHET. pp. 79. D. Van Nostrand. New York. Price 50 cents.
TRANSACTIONS OF THE WISCONSIN ACADEMY OF SCIENCES, ARTS, AND LETTERS. Vol. III. pp. 75-76.
ON REFRACTION RESULTING FROM RADIATION. PRELIMINARY NOTE ON THE OTHESCOPE. By WILLIAM CROOKES, F. R. S. London. 1877.
WILLIAMS' TOURIST'S GUIDE AND MAP OF THE SAN JUAN MINES OF COLORADO. Price 50 cts.
TOURIST'S MAP OF COLORADO, AND ROUTES OF TRAVEL TO SAN JUAN MINES. HEALTH AND PLEASURE RESORTS OF THE ROCKY MOUNTAINS. Henry T. Williams. New York. Price 50 cents.
UNITED STATES COMMISSION OF FISH AND FISHERIES. COMMISSIONER'S REPORT, 1873-74 AND 1874-75. Washington, D. C. 1876.

CROWN POINT GOLD AND SILVER MINING COMPANY.—(Annual Report.)—The annual meeting of this company was held in San Francisco on the 4th inst. The Superintendent in his report states that during the past year 1,150 feet of drifts and cross-cuts have been run on the 1700-foot level, developing nothing but low grade ores, assaying from \$2 to \$5 per ton. The main incline has been advanced 577 feet. It has been thoroughly demonstrated that no pay ore exists on the 1700-foot level, and to open a new level it was deemed best on the score of economy to continue the incline to a depth of two thousand feet and there open a new level. On this level a distance of 300 feet, through hard blasting ground, was run before the vein was struck. At the time the vein was struck they also tapped a strong flow of water, and they dare not increase this flow of water with their present pumping facilities. The vein, so far as exposed, shows quartz of a good character, giving assays of from \$2 to \$7 per ton. From the 1100-foot level 5,101½ tons of ore were extracted, from the 1200-foot level 6,986 3-5, from the 1300-foot level 5,893, from the 1500-foot level 425 from the 1600-foot level 1,137 1-5. Most of this ore was of a low grade, which has been accumulating during past years and been stowed away for future working. The shaft has been retimbered from the 700-foot level to the bottom. The joint pump shaft has reached a depth of 1950 feet. At 1950 feet a new level has been started easterly to tap the ledge. He concluded by saying that the mine has never been in a better condition for the extraction of ore, and all that is needed is that pay ore be found. In the Secretary's report it was shown that the receipts of the company for the year were from six assessments, \$525,314.80; sale of bullion, \$277,584.85; overdrafts, \$129,153.27; other sources, \$17,201.26. Total, \$948,254.18. The disbursements were: General milling expenses, \$383,862.35; Rhode Island mill, \$85,828.08; Nevada Mill Company, \$105,250.85; legal expenses, \$5,651.65; office expenses in San Francisco, \$10,326.20; taxes, \$8,133.25; advertising, insurance, and expense of the Gold Hill office, \$25,590.26; mine improvement, \$21,587.02; discount on bullion, \$30,596.50; interest and exchange, 14,510.77; assaying, \$2,972.87; Belcher and Crown Point joint shaft, \$149,320.84; reclamation of bullion and freight on treasure, \$2,573.17; Superintendent's balance on hand, \$1,042.14; overdraft of May 1, \$100,020.23. Total, \$948,254.18. The present liabilities of the company are \$71,346.06, as against assessments other than cash on hand, of which there is none, valued at \$463,462.39.—Stock Report, June 5.

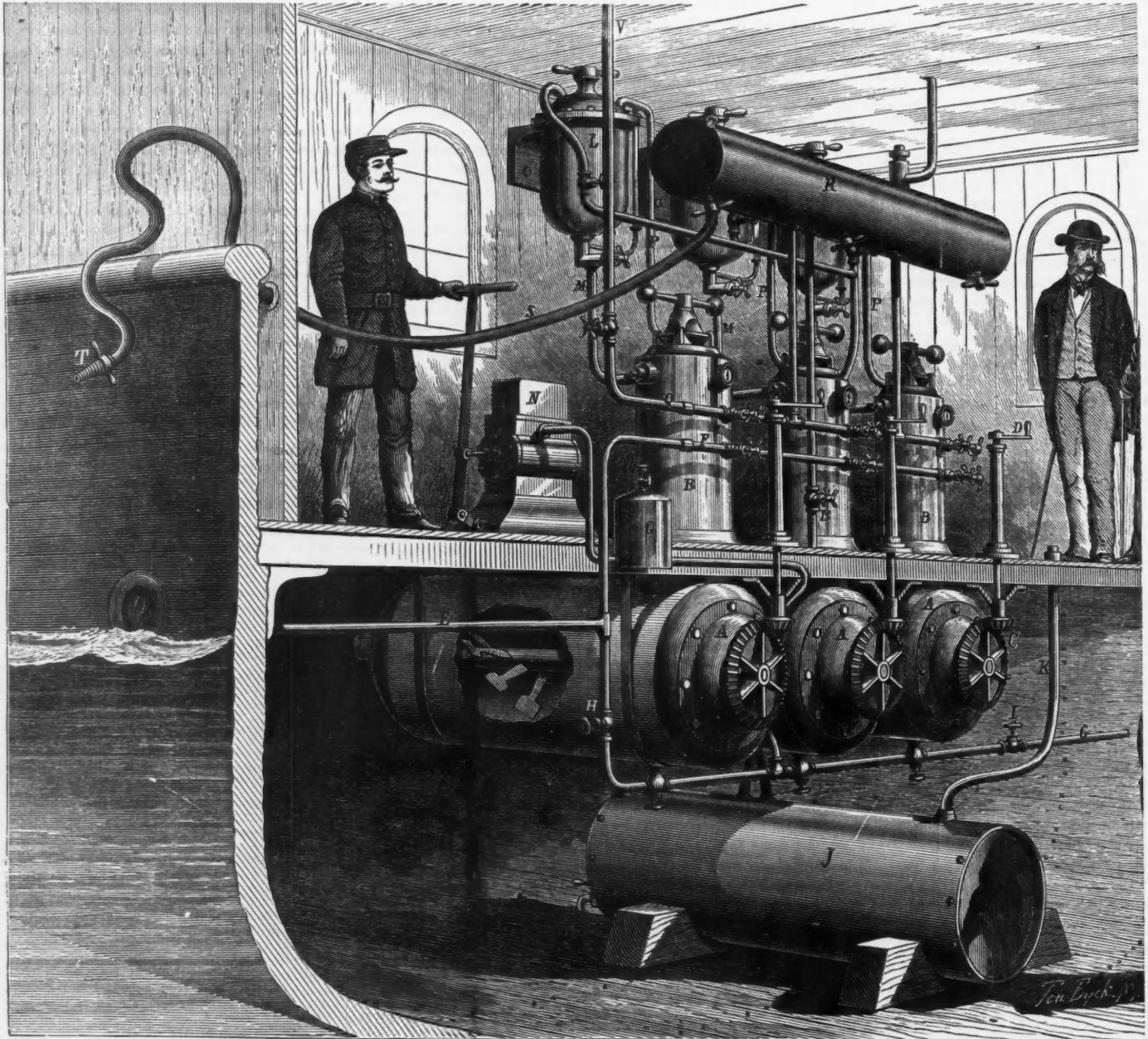
CARBONIC ACID GAS APPARATUS FOR EXTINGUISHING FIRES.

The accompanying illustration, which we take from the *Scientific American*, shows an apparatus devised by Mr. A. M. GRANGER for extinguishing fires on board ships, and which is said to be in use on the *Protector*, a vessel used to prevent fire among shipping in New Orleans Harbor. It is equally well adapted for use aboard the ship it is to protect. Last year it was the means of extinguishing fire on three cotton-loaded vessels in the above-named harbor. These ships carried respectively 1,400, 900, and 3,200 bales of cotton, and were valued with their cargoes at an aggregate sum of \$375,000. We are informed that, with the exception of the bales of cotton which had actually been on fire, in two of the vessels the cotton, after the flames had been subdued, was discharged "in as good order and condition as it would have been at port of destination had there been no disaster." In one instance the flames, which were rising twenty-five feet above the hatches, were brought under control in twelve minutes after

"The proposition is to make use of the well-known extinguishing properties of carbonic acid gas; but in a manner which I believe has not hitherto been proposed. The plan is to have, in some convenient locality on the spar deck, or in any other suitable place, a flask or flasks, about three feet in length and one foot in diameter, containing about one hundred pounds of the gas in a liquid condition. From the top or upper side of the flask a small iron pipe is to be permanently fitted along the water ways (or just under the deck) throughout the entire length of the ship. From this main pipe, at suitable intervals, are branch pipes at right angles to the main, passing down next the skin to every store-room and hold of the ship, so that every compartment of the vessel shall have its own pipe or pipes, reaching from its bottom to the main pipe on the spar deck. There is to be a cock in the main pipe near the gas flask, and one in each branch pipe near the main, any one of which can be turned from the spar deck.

"Liquid carbonic acid gas exerts a pressure on its containing vessel of about six hundred and ninety pounds per square inch at 42° Fahrenheit, eight hundred and fifty-five pounds at 60° Fahrenheit, and twelve hundred pounds at 86° Fahrenheit."

One of the chief objections to the use of carbonic acid gas is in the danger caused by its diffusion through portions of the ship where it is not wanted.



the gas had been admitted to the ship. The United States Board of Inspectors examined the vessels saved, and in an official report recommends the adoption of the apparatus aboard all steam vessels.

We have several times called attention to the advantages that might result to vessels engaged in carrying freight more or less subject to ignition (more particularly coal and petroleum vessels) from carrying carbonic acid gas, or the means of producing it rapidly, in some convenient apparatus. The Granger apparatus, illustrated herewith, seems to us exceedingly complicated and expensive, and probably unsuited for general use on ships; but it seems to have done good service in a special vessel for harbor use. In the *ENGINEERING AND MINING JOURNAL*, July 3, 1875, we described a very much simpler apparatus, devised by Lieut. F. M. BARBER, U. S. N., in which he proposes to use liquid carbonic acid, which he claims is produced by the chemist at Newport torpedo station at a cost of fifteen cents a pound. We reproduce extracts from this article as follows:

There can be no doubt it can be adopted with advantage in ships carrying bituminous coals, and more particularly those that are liable to spontaneous ignition. In extinguishing fires in mines it has been employed with advantage in many cases,* but the Granger apparatus is much too complicated for mine use. Indeed, we illustrate it merely because it has received successful practical application, not because we consider it the best apparatus of the kind in use. The following is a description of the apparatus:

A, copper cylinders (generators) lined with tin. Strength, 300 lb. per square inch. They are about 26 inches in diameter by 9 feet long. Each holds 448 lb. bicarbonate of soda, mixed with water to a paste.

B, domes 36 inches high, through which chemicals are admitted.

C, D, gearing and crank for rotating shaft for mixing acid in generator.

* See *ENGINEERING AND MINING JOURNAL*, vol. xxii. p. 411, for description of apparatus used at Wynnstay Colliery, Ruabon, Wales.

E, F, water supply pipe.
 G, waste pipe.
 J, acid reservoir of lead; capacity, 213 gallons.
 L, distributing receptacles to hold acid in small amounts till needed. They are of copper, lead lined. The acid is pumped by an air pump, N, from the reservoir, J, to the vessels, L.
 B, gas holder.

A MINING LABORATORY.*

By Prof. Robert H. Richards, of the Massachusetts Institute of Technology, Boston, Mass.

The Institute of Mining Engineers has shown so much interest in the educational problem of profitably combining theory and practice, that it seems especially appropriate to lay before its members the methods and aims of the mining laboratory of which I have charge, and in which one form of combination of hand with head work is now being tried. If anything may be contributed toward the solution of this problem by the discussion which follows, my purpose will be attained.

Whether it were wise or not to establish a mining school so far from the principal mining centers, does not now enter into the question. Given, a mining school already begun, how shall it be made most efficient in developing engineers who are trained to think for themselves as well as versed in the works of others? This is the question with which we have had to deal.

In considering the bearing of this laboratory work upon the students' preparation, it will be convenient to take it up under five different heads:

1. The methods and aims of the laboratory.
2. The advantage to students of having a part, at least, of their practical work in the curriculum of their school.
3. The advantage to be derived by mines and works.
4. Degree of accuracy which may be attained in working ores on a small scale.
5. Results of work in the laboratory.

1. *The Methods and Aims of the Laboratory.*—During the May meeting of 1873, held in Boston, I had the privilege of reading before you a paper stating the plans and aims of this laboratory. Since that time we have been constantly following out those plans, and are more than ever convinced that we are working in the right direction. We do not feel that the time we have spent has been in any sense thrown away. Perhaps the aims of the laboratory can be most clearly shown by illustration. Many young engineers leave school thinking that they know everything. They go to the works and expect to teach the superintendent something and the men a good deal, regardless of the fact that it is this spirit that has prejudiced workmen against schoolmen. They are often more trouble than they are worth for a considerable period of time. They have simply learned metallurgical processes from books, but they have not derived from them a realizing sense of the meaning of the word economy, nor do they understand how to carry it out in actual practice. They are too apt not to perceive that the profit of works lies in the little savings in material, in labor, in time and power, etc., and that the difference between making these little savings and in not making them is almost always the difference between profit and loss or between success and failure. In fact, our young engineers are not, as a rule, fully enough aware of the fact that failures in mines and works are quite as often the result of errors in judgment as they are from poverty of the deposit or process.

The aim of this laboratory is to correct this state of things, and to turn out men who have learned somewhat of the value of economy; who have found out by their own experience that little losses taking place here and there and everywhere in their work mount up enormously in their final account of stock.

For the sake of example, we will suppose that a silver lead ore is given to a student who is entirely inexperienced in such matters and who is inclined to be self-sufficient. On reading up he finds that such ores, when worked on the large scale, are subject to a loss, which we will say is 15 per cent. of the silver, and which takes place largely in the smelting. He is surprised at this, and thinks it is a large loss, and expects to do as well or better. On taking account of stock, however, we will suppose he finds his losses are: silver in dust while crushing and handling, 2 per cent.; roasting, 15 per cent.; agglomerating, 3 per cent.; smelting, 15 per cent.; fume in refining, 2 per cent.; handling in refining, 6 per cent.; fume in cupeling, 4 per cent.; parting and recovering, 3 per cent.; total, 50 per cent.

He is astonished to find that his total loss amounts to 50 per cent., and that by carelessness in handling alone he has lost 11 per cent., the whole of which might have been obviated as well as not; that in roasting he used too high a heat, and in cup-ling the same; that by having large condensing flues he might have saved a large proportion of the loss in smelting and refining.

In fact, this man has either learned a lesson in the economy of metal working that will last him his life, or he has failed to learn it.

In either case, whatever may be the risk incurred by a works in taking an untried man from a school, the risk is in some degree lessened by this test of the man. We believe that ability to offer to works a selection of men is all the incentive we need for developing this laboratory. We hold that the school owes a duty to the works as well as to the student, and that the supplying of works with good men is fully as important a duty of the school as the finding of places for the students. The methods of working the laboratory will best be given by a brief description of the last year's work. The course began in February with a class of thirteen students. The work was allotted so that each student had the entire responsibility of a whole process or of a part of a process.

A quantity of low grade ore from the Merrimac Mine, weighing $4\frac{1}{4}$ tons, was treated first.

Two students, A. and B., took charge of the mineral examination, and of the crushing and washing. They were assisted in the washing by their whole class, who had this opportunity to operate the washers, and to make themselves familiar with the principles on which they work. The class came on, five men at a shift, and they worked ten shifts of four hours each; in this way every man had an opportunity to work and to study every machine.

The captains, A. and B., meantime took charge on the alternate shifts, so that one of them was always on hand to keep watch, and to see that waste did not take place, that samples were taken at the proper intervals, and that everything went on as it should. When the work was through, they dried, weighed, sampled, and assayed all the final products. They found out then whether the refuse was poor enough to throw away. They found out which machine did the greatest work, and which the least. In fact, they were in condition to report upon the economy of the process from beginning to end. They afterward made numerous tests on sands falling into water, and speculated on possible altera-

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

tions which would be desirable if the washers were to be used exclusively for the ore in question. These tests were rendered possible by means of a series of samples which had been taken at every stage of the process. A. reported especially upon the crushing machines and the washing jigs, while B. reported upon the Spitzkasten and on the tables which are used in washing.

Three products were the result of this treatment:

1. Smelting ore.
2. Middle grade ore.
3. Refuse.

C. and D. took charge of the smelting ore; this was first roasted by reverberatory furnaces. The whole class came on by shifts of four hours each, and the operation went on night and day continuously until finished. The total time required was 52 hours. C. and D. then agglomerated the ore, sampled it, analyzed it, and also their fluxes (limestone, tap cinder, magnetic iron ore, etc.). They planned their smelt to obtain a given slag, matte, and metal. When it was smelted in the shaft furnace all the class came on by shifts, and by means of this run, and several others during the term, every man was able to serve in every place, and thus to learn the principles which underlie the whole operation, as well as the details by which it is carried on in the laboratory. This smelt yielded

1. Lead.
2. Matte.
3. Slag.

C. followed up the metal, and turned out silver, lead, and gold. D. followed up the matte, and turned out copper, lead, and silver. Their reports consist of a detail of the operations, results of analyses, and tables showing where, when, and how the losses took place, with suggestions as to how they would mitigate them another time.

Messrs. E. and F. undertook to work the middle grade ore, and they tried Ziervogel, Augustin, Von Paterna, as well as roast, chlorination with amalgamation, and a number of other methods. They divided the processes, one taking the responsibility of a part, the other of the rest. They report moderate success in some and dead failures in others.

A sulphureted copper ore was allotted to G. and H. This ore, as a matter of course, required to be first roasted. We have two methods of roasting, by reverberatory furnace and by kiln. But as a kiln had never been tried in the laboratory, and as it was to a certain extent doubtful whether it could be made to work, a division was made. G. took the kiln roasting, followed by the subsequent smelting, roasting and smelting, etc., while H. took the method by reverberatory furnace, followed by the subsequent processes. This work was carried on in the same spirit as before indicated.

K. took up nickel, looked up the published methods, and experimented upon its extraction.

L. worked a gold ore by Atwood's amalgamators, concentration, and gas chlorination. This method is still in its experimental condition with us.

M. Had a barrel of quartz galena assigned to him.

N. had a barrel of silver ore assigned him, which was to be treated by pan amalgamation.

O. worked out a problem on a copper ore from a mine at Santa Fe. The question to be settled was whether it would pay best to turn out a slag lean in copper, and at the same time a poor copper pig, or to turn out a pure copper pig, and at the same time allow some metal to enter the slag. His results are very interesting.

Thus it will be seen that every student who has worked in the laboratory during the last year has not only had a definite work of his own to do, but has also had the opportunity to watch or to assist in a very considerable variety of other work.

2. *Advantage to the Student of having a part of his Practical Work in the Curriculum of his School.*—We learn by our mistakes. Men can try, and fail; can find out usually why they failed; can repeat the work with the failure in part or in whole corrected. They can learn economy by their own lack of it.

Large works cannot afford to spoil a charge to show a student what happens from a little carelessness. A well-regulated establishment may go on a long time without such a slip, and unless the superintendent is used to giving instruction, and takes pleasure in it, the student may be at a works months without finding out what the KEY to the success of the establishment is.

Again, a student learns the value of chemistry as a check upon metallurgical work. Who would attempt to run a blast furnace on lead ores or on iron ores without knowing something about the composition of slags and of the fluxes at hand? The students here plan the proportion of the fluxes to be used from their own analyses of the same. And if they find from their reading that a slag of 30 per cent. SiO_2 , 45 per cent. FeO , 15 per cent. CaO , 10 per cent. Al_2O_3 , should give a good melt and a slag clear of lead, they put in fluxes containing these elements in the above proportions, and when they get through they analyze their slag, to see if they got what they tried for, and to see if it was as lean in lead as they wished it to be.

But perhaps the greatest advantage of all to the student, and the one which will stay with him through his whole life long, is the spirit of investigation which is awakened by his work, and which is made evident by the questions he asks and by the zest and intelligence with which he carries on his work. This we consider has been proved beyond all question.

We wish to disclaim any pretensions which we may be supposed to have that this laboratory is in any sense of the word a substitute for the works. What we do claim is that it prepares students to go into works and profit by them.

3. *Advantage to Works.*—We have already noticed one advantage, viz., that the men have had a chance to test themselves and find out where they are weak. There is, however, another advantage which may grow out of their experience in the laboratory. These men are used to testing processes on a small scale, and if they are, when older, called upon to erect costly works and to devise new and expensive processes, they will naturally spend a thousand or two dollars in trying the process practically. Most of us are familiar with large and costly failures which might have been prevented if the process had been studied in this way. For while work on the small scale does not pretend to deal with the relation between the cost of production, of transportation, and the market value, it does test most thoroughly the chemical and mechanical principles on which the process must depend. Again, this practical work enables us to make a far more just division of hand-men from head-men than could possibly be made from recitations and examinations alone. And if we have an application for a man who may by-and-by be needed to superintend, we recommend a very different man from what we do when we are asked for an analyst or a surveyor.

Advantage to Mines of having their Ores treated in the Laboratory.—We will cite one example. The Merrimac Mine of Newburyport has recently called an engineer from a distance to systematize their smelting works. He informs me that the figures furnished by the students' work were of very great value to him in

which under no circumstances has been known to decrease in quantity. It is in equilibrium at an elevation 36 feet above its present outlet. From observations made at the several wells there is no doubt but they are all connected with the same source of supply. The depth necessary for the working barrel of the pump is that due to the elevation of the mouth of the well above the level of the fresh water, to which must be added the difference of level of the salt water within the pump as being of a greater specific gravity. The suction pipe (tail pipe) is made of sufficient length to penetrate the beds as the only means of dividing the salt from the fresh water. The foregoing, together with a knowledge of the fact that the lowest feeder, said to be given off at the depth of 360 feet, yields a pressure of 150 pounds on the square inch, gives not an incorrect idea of the labor to be encountered.

The location of a shaft, keeping in view the dissolution of the beds by the present wells, requires some study, from the fact that large cavities have been formed in the beds which are now reservoirs, having direct communication through the bore hole with the feeders already spoken of as being in the strata above.

These cavities, it is hardly necessary for me to say, must be avoided as fatal to the enterprise. An approximate estimate of the cubical capacity of them may be roughly estimated, but of their form and superficial extent we can know but little, or how much of the beds severally; yet no one anticipates that any of the present operations will interfere with the projected shaft. Still, the time may not be far distant when a solution of this question may be desired in another location.

An examination of the map of the Province of Ontario shows Goderich as occupying one of the most favorable positions for the distribution of any product to be obtained in mining. The quantity of salt shipped during last year to the American market being given as 11,375 tons, at the same time there were shipped to the Canadian market 5,965 tons, making a total of 17,350 tons.

About 600 feet distant from Lake Huron, and 40 feet above its level, on the north side of the river Maitland, within the harbor of Goderich, is a most desirable position for the location of the proposed shaft. From there the product can be shipped direct from the mine into vessels trading to any of the Lake ports of Canada or the United States. The construction of a bridge over the river Maitland would make a connection with the Grand Trunk Railroad and all its connections.

For sinking the shaft one of two methods may be adopted. These I will call the English system and the Chaudron system. By the former the sinking through strata bearing heavy feeders of water is performed in the ordinary manner of dry sinking, pumping the water to maintain the bottom of the shaft in a sufficiently dry state for men to work until the feeders are severally passed, and impervious measures found, upon which to rest the lining. This may be of two kinds: for feeders of high pressure brickwork will answer all purposes, but for heavy pressures metal tubing must be resorted to.

The former is built upon an oak curb of sufficient strength to carry brickwork of 9 or 14 inches thickness, as the case may be, filled in with puddled soil. This is commonly called brick coffering, and is built with the best material, the brick being made to suit the form of the shaft. Work of this kind has been used with success in excluding water from shafts under considerable pressure. The latter, necessary, as before said, to sustain heavier pressures, is built upon a metal curb in line with the earlier work. Upon this the tubing is erected in segments. Between every joint is laid (with the grain towards the center of the shaft) sheet pine lumber, about $\frac{3}{8}$ of an inch thick and the width of the flange of the tubing, each tier or course breaking joint with the preceding one until the casing of the shaft is complete to the last course or matching pieces, when it is not unlikely special castings of a suitable height to close in the work will have to be made. If the curb has not been laid level, or from any cause the tubing has not been built uniformly the last space then becomes of variable height, and a special pattern for every segment becomes a necessity. The building up being complete, all the joints are wedged with dry, soft pine wedges, first the horizontal, then the vertical, until it is almost impossible to enter a steel point. Each segment has in the center a small hole for convenience of handling, the lower course having larger ones, that the pressure may not be brought upon the tubing until the work is complete. These, then are all plugged up, beginning at the bottom. Where there is more than one setting it is in all cases necessary to connect them to permit the flow of water or air from one to the other. Concrete is used to fill in behind giving great strength to the work. As illustrating the method of sinking through water-bearing measures by the English system, no better example can be had than that of the Murton Winning, in the county of Durham. This work, consisting of three shafts, was begun in 1838 and pursued under great difficulty until complete. Engines and pumps were employed equal to 1,478 horse power and 10,000 gallons per minute. For further detail see *Winning and Working of Collieries* by Matthias Dunn.

The same plan of operations was used by my father in England sinking the Exhall shaft. The tubing was founded at 411 feet from the surface, and built to the height of 183 feet. Upon this was built 168 feet of brick coffering 14 inches thick, and 60 feet of iron tubing. The water stood at 351 feet above the foundation of the tubing. The heaviest pumping done during the sinking was 1,646 gallons per minute, and the measures for long distances from the shaft were completely drained, so that at the Victoria Colliery, about a mile distant, they took out the old and put in new metal tubing.

The "Chaudron" system is an improvement by a Belgian engineer of the original invention of "Kind," and is known by their joint names (Kind and Chaudron). It has been used on the Continent of Europe with great success after the failure of other methods, and is now about to be adopted in England by the Cannock & Huntington Colliery Company. By this process all the operations are performed from the surface under water, the details of which it is not necessary for me to enter into, the process having been lately so fully described by Mr. Julien Deby, C. E., of Belgium, in a paper read before the Institute.

Those who will consult the latest example of shaft sinking through water-bearing measures for purposes of mining will find but little improvement in the shape and form of application since iron was first introduced as a material for tubing back water. We are not bound to have the interior of the shaft perfectly smooth. The flanges should come on the inside, the joints planed perfectly true, and the segments put together with screw bolts, with a more perfect material for the joints after the manner of steam fitting.

It is undoubtedly wrong to make the joints of wood, relying only on the wedging (and that from the inside in direct opposition to the pressure) to secure a water-tight shaft. By the former process the work would be finished in as many days as by wedging it now takes weeks; besides the cost is immense.

Shaft sinking through water, in whatever form it may be pursued, is a costly operation, taxing not only the finances, but the ingenuity and skill of the best mining engineers of the present day. Three years ago but little was known at Goderich of the number and thickness of the salt beds, the difficulties to be

encountered in sinking to them, or the cost of such a work. To-day these difficulties are reduced by the knowledge obtained in putting down the bore hole.

In so far as Mr. Attrill profited by opinions and advice given nearly three years since.

CARBON IN FERRO-MANGANESE.

TO THE EDITOR: SIR—Some remarks from me seem to be called for, on the subject of the percentage of carbon contained in the ferro-manganese produced at the Diamond Furnace, by the communication of Mr. F. Valton, read by Mr. Holley before the Institute of Mining Engineers, at the Wilkes-Barre meeting.

If Mr. Valton means to say that all ferro-manganese contains six per cent. or thereabouts, of carbon, he is certainly in error. An analysis of my product, made by Mr. Werth of Pittsburg, Pa., who is usually considered one of the very best analysts in the country, and who enjoys particularly the confidence of the steel-makers of the country, gave 55.22 per cent. of metallic manganese, and 1.86 per cent. of carbon.

Mr. Valton says that he "would have had no other observations to make on Mr. Ward's paper had he taken into account the results obtained in the same line in other centers of production," and then proceeds to give an account of what he saw in Sweden in 1871 (an 18 per cent. spiegel), and of the exhibit at the Vienna Exposition of 1873 of 33 per cent. ferro-manganese. It seems to me that he ought to show some published account of the production he refers to, before implying that I had not been willing to give credit to others for what they had done. I saw many engineers who visited the Vienna Exposition, but never heard any of them mention such a thing as blast-furnace ferro-manganese, and the American reports of the Exposition were not published till 1876. Prof. Blake, it is true, read a paper on the subject before the Institute at the Washington meeting, in February, 1876, but as I presented a paper giving my results to the same meeting, I do not think that I can be said on that account to have failed to give due credit to others. I know that eminent metallurgists engaged in the steel industry were unaware of the production of ferro-manganese in a blast-furnace till they heard of my results. Can Mr. Valton cite the publication of the facts which he mentions in any American or English scientific periodical?

I should have no further remarks to make concerning Mr. Valton's paper had he not shown his want of knowledge regarding the manufacture of alloys of iron and manganese in blast furnaces by saying that "before 1870 spiegel with 8 to 10 per cent. of manganese only was known among blast furnace products." In Percy's *Metallurgy of Iron and Steel*, London, 1864, page 119, will be found the following sentences: "A fine quality of German spiegeleisen, analyzed in my laboratory by Mr. Tooke, contained 11.12 per cent. of manganese and 4.77 per cent. of carbon. The late Mr. T. H. Henry found 11.50 per cent. of manganese in spiegeleisen made from Franklinites in the United States, and not less than 6.90 per cent. of carbon. Richter, of Leoben, in Styria, found 7.578 per cent. of manganese and 1.902 per cent. of silicon in a spiegeleisen from Janerburg in Carinthia. In another specimen from Theresenthal, in Bohemia, the same observer found 22.183 per cent. of manganese, 2.732 per cent. of silicon, and not more than 2.311 per cent. of carbon. It was not attractable by a magnet, and it did not throw down metallic copper from a neutral solution of the chloride (CuCl), but reduced it simply to dichloride (Cu₂Cl₂), which separated." This last analysis is taken from the *Berg- und Huttenmannisches Jahrbuch*, G. Faller, ii. p. 295, Wien, 1862.

The importance of the subject to me is such that an insinuation of unfairness on my part, in not crediting to others what they have accomplished, cannot be passed over in silence. It may also be noticed that the ores I employ are a brown hematite iron ore, almost free from manganese, and manganese ore, a mixture of manganite and pyrolusite, almost free from iron.

Yours truly,

WILLARD P. WARD.

CARTERSVILLE, GA., JUNE 15, 1877.

LECTURES ON MINING.—No. XLII.

By Prof. W. W. Smyth, M. A., F. R. S., Royal School of Mines, London.

UNDERGROUND HAULAGE.

Fifty years ago there was a great difference as regarded one point in different districts; the mineral was conveyed along the horizontal drifts in vessels which were not intended to pass up the shaft. In metal mines, for instance, where the barrow, or "dog," was employed, the material was capsized at the bottom of the shaft, into heaps or into plats, ready to be drawn up when convenient. This necessitated a second filling of the mineral into the kibble, which passed only up and down the shaft, thus increasing the expense, and in the case of such minerals as tender coals breaking them up more. A very few years ago this method might be seen surviving in Somersetshire, in Belgium, and other districts. But the plan in the North of England was to load the coal into baskets, and then place the basket on a sled, to be pushed to the main or rolley way, where the basket was placed on a frame set on broad wheels, called a rolley, or trolley, which was intended to carry three of the corves, or baskets. This constituted a great difference and advance on the old plan, but it has again changed to a great extent within the last forty years. Sometimes the wheels are made to turn on the axle, so that each can turn separately, but inasmuch as this, amongst other things, produces a great side friction of the flanges against the rails, it has generally been sought to fix the wheels to the axle, and make the axle turn in bearings; or, again, where they have to run through irregular places both wheels and axles may be loose. At the present time it has become almost universal in the larger works of northern and central England to endeavor to get the rails as near to the face of work as possible, and then to carry the coal in the same wagons, without any shifting, to the shaft, draw them up to the surface, and then run them to the screens, or wherever the material is needed. The most convenient form of wagon is very much that which was proposed by Mr. Curr, which was adopted in Somersetshire in 1835, but it was a number of years after that before its use became general. From about the year 1840, from the great improvement due to the use of cages sliding on regular guides in the shaft, and carrying from one to six of these wagons, they have become universally adopted. It may be that the tubs cannot be brought close to the actual face of work, they will then be brought as near as possible, and the material carried to them. Very commonly, instead of strong boys being employed in pulling the wagons to the main roads, small ponies are used in the northern collieries driven by younger boys. On reaching the main roads horses are employed to drag a set of wagons to the shaft; in some of the larger mines from 80 to 200 horses are employed, so that the whole question as to the horses and wagons becomes a very serious one. Where the roads are properly constructed the horse may draw twelve to fourteen of these small tubs; in the iron mines the number may be less, but each may weigh more. In some of the iron

mines, where a large quantity is taken out daily, and where there is head room sufficient, they find it advantageous to employ the best and finest horses they can get. The question of the road must also be brought in in considering the amount which can be done by the horses; both the preliminary roads and also the main roads, the latter being sometimes miles in length.

Another plan of conveying the coal to considerable distances may be used where the coal is worked to the rise—the "jig-brow." At the upper end of the road is a wheel, round which a rope passes, the full tubs running down one side draw up the empty tubs, the speed being regulated by a simple brake. This principle, in a ruder form, may be sometimes seen where a little face of long wall is carried up at sufficient inclination; a boy goes down with the full sledge, which, on slippery clay, may have no rolls at all, the boy regulating the speed with his feet. Sometimes a counterpoise is used instead of the empty wagons, and occasionally the employment of a horse is assisted up a hill by means of what the colliers call a "billy"—a horizontal wheel, round which a rope goes, fixed at one end to full wagons, the others being fastened to the empty wagons, which have a tendency to descend. In certain cases the cost of conveyance is a not inconsiderable fraction of the total value of the mineral, so that the question is one which deserves very careful consideration in all its bearings in order to determine what is the most satisfactory system.

Much valuable information is to be found in the papers of Mr. Nicholas Wood in the Transactions of the Northern Institute. His experiments were very interesting, showing that at the outside, with every advantage, a horse on a level road, pulling an ordinary tram with edge rails, would, at the maximum, draw 133 tons one mile in a day, or we may say that a common performance of an ordinary horse on a road kept in good repair would be 100 tons for one mile per day. In mining work, unless there is very accurate discipline, there is apt to be considerable delays in passing, to say nothing of the carriages getting off the rails, etc. When Mr. Wood examined what was being done in the collieries, he found it very much less than the maximum; with wheels of 12 in. diameter only 30 to 50 tons per day were drawn by each horse, while with 10 in. to 11 in. wheels, and with very considerable delay, only 11 to 15 tons per day were drawn. The use of larger wheels with the tubs preferred in the central and northern districts is very difficult; in South Wales they prefer much larger tubs, of sheet iron, which may contain as much as one ton, and with larger wheels, instead of the tub weighing three to four cwt., and conveying only eight or nine cwt., as used in the former districts. The disadvantages of these larger tubs are that they cannot always go up the shaft, and if they get off the rails it requires several men to get them right again, and this may occasion much delay, whereas one man could probably put right a smaller tub. In Germany and France the subject of tubs has been carefully studied, and one may see a great variety there; in some cases, in order to get a higher wheel, they have greatly modified the form, but it is doubtful whether such has any advantage as to economy over the simpler English tubs. Iron and steel tubs have been used during the past few years, and while some praise them very much for their strength and durability, the objection to them is that, if an accident occurs and they get twisted out of shape, it is a difficult matter to repair them, while with a wooden one the taking out of a plank or two is a matter easily done by the mine carpenter.

One of the greatest improvements in mining has taken place in the last quarter of a century, though it is quite true that certain varieties of machinery were brought into play comparatively early in this century. It is quite evident that the fruitful mind of George Stephenson was at work on these things, for in the classic mine of Killingworth he introduced apparatus for bringing the coal to the pit bottom when the coal to the rise had been exhausted. In most of these early cases the engines were erected at the surface, and a rope or chain passed down to the bottom, and was taken down the inclined plane by a pulley. Both by calculation and experiment Mr. N. Wood showed that an inclination of 1 in 30 was the most suitable for the main roadways. If you have an angle of 1 in 30, you may make the full wagons run down of themselves, and draw up the empty ones, if the road is in tolerably good order; below the angle you require horses or machinery. If you have a dip of 1 in 28 below the level you may let the empty wagons run down by themselves, and they will drag out the rope for the drum, but must draw them up by the engine. The improvement specially referred to was that of the employment of underground engines, placed somewhere near the pit bottom for the purpose of drawing the mineral along the roads. Usually a small double-acting cylinder engine is placed in a special chamber, and worked either by steam brought down the shaft or from boilers adjoining, the steam and smoke being delivered into the upcast.

In the main and tail rope system drums or rope rolls are used; a main rope is attached to the full tubs, which are hauled in by the engine winding the rope on a drum; at the same time a lighter rope is attached to the hinder end, and is being drawn out; this will serve afterwards to draw back the train of empty tubs to the far end of the working. The ropes have to be protected and carried by pulleys, which prevent their rubbing on any point. The economy to be gained is so obvious that where there is a considerable output a plan more or less of this kind must be carried out. The second system is that which has been practiced in some parts of Lancashire with success. Instead of having a train of wagons and a rope, there is substituted for the rope a chain traveling at a low rate of velocity, and the tubs are brought in from the place of working, and the chain is thrown over a fork on the top of each tub, and carries it on, the chain hanging in a series of catenary curves between the several tubs which are traveling. The distance between the wagons varies from 10 to 30 yards; an empty wagon may be put in here and there to keep the chain off the ground. In this manner the whole series of wagons will be brought in to the hanger-on, who will just unhitch the wagon by throwing off the chain. The third plan is that of having an endless wire rope, the wagons being clipped on to this rope; or in another modification the endless rope rests on the wagons, just as in the case of the chain in the second plan. This reminds one of the plan of conveyance at the surface by a wire-rope, about which so much has been said in late years, and which in certain parts of the country, and where small quantities only have to be conveyed, seems very satisfactory. The rate given to the wagons is, of course, very moderate in the two latter systems, not more than three or four miles an hour; where the main and tail rope method is used a considerable velocity is got up; a train of 20 to 50 wagons will be carried along at the rate of 10 to 15 miles per hour, the speed being easily checked as they approach the shaft by throwing them on to an inclined plane. The systems of endless chain or rope are very suitable for one line of communication, but scarcely suitable where you have branched communication to follow out. With the tail-rope system this branched communication is easy; there will be a pulley at the end of the branch, and the two ends of the rope in the branch can easily be attached to the two ends of the principal rope unhooked. In some of the larger collieries this underground work has been admirably carried out with engines working by compressed air, the compressing machines being situated at the surface. The engines have enabled the horse labor to be done away with, unless it be the

use of small ponies in the subordinate roadways, and as the expense of this engine plane varies between 1d. and 2½d. per ton per mile, the gain is enormous. The question has even asked whether locomotives could not be employed, and in some American mines, in the partially covered-in surface levels, special locomotives have been used; the engines being only 12 ft. by 4 ft. 4 in., with gauge 3 ft. 6 in., and the engine weighing only 1,100 lbs., with fuel and water included. It is very doubtful, at the present time, where locomotives could be employed in many cases for underground traction, it having to be remembered that the quantity of carbonic acid generated by the fire of a locomotive is very great, and this, together with the smoke and steam, would be quite incompatible with any ordinary ventilation.

There is still one other method of underground conveyance to be mentioned—water conveyance. About 100 years ago this was very differently thought of from what it is now; it was thought great advantages might be obtained in some cases by cutting the levels somewhat deeper than usual, and using them as canals. A very remarkable instance may still be seen in the Bridgewater mines in Lancashire, where, at one time, upwards of 40 miles of navigable underground canal was open. These canals were 10 ft. wide, the boats were small and flat bottomed, and each contained about 10 tons, while certain larger boats were used, which could be drawn out into the open canal adjoining. There is no comparison of this system, however, with railways, and the improvements in the latter have led to their ousting this method of water conveyance.—London Mining Journal.

PETROLEUM NOTES.

PRODUCTION, STOCKS, SHIPMENTS, ETC., OF THE PENNSYLVANIA OIL FIELDS, BY DISTRICTS, FOR MAY.

Number and Name of Districts.	PRODUCTION ACCOUNT.					DRILLING WELL ACCOUNT.						
	No. bbls. of oil on hand at the wells at the close of the month.	No. of bbls. of oil produced in the month.	Average per day for the month of oil.	No. of bbls. of oil in iron tanks, pipe lines and receptacles.	Total No. of bbls. of oil held in all the districts.	No. of wells producing.	No. of wells drilling.	No. of wells completed in May.	Aggregate daily production of new wells.	Daily average of new wells.	No. of Rigs building.	Dry holes in May.
Butler	80,000	747,410	24,110	2,322,434	2,402,434	3,700	314	172	1,484	4.7	154	36
Parker												
Clarion												
Scrubgrass	3,500	108,500	3,500	12,000	15,500	130	71	30	2,246	75	50	2
Franklin	500	13,175	425	40,000	40,600	350	19	7	42	6	6	2
Reno		3,100	100	8,000	8,000	31						
Oil City	500	31,000	1,000	280,000	280,500	350	5	4	30	7.5	9	2
Rouseville	400	12,400	400	8,000	8,400	100	1	1				2
Rynd Farm	400	12,400	400	7,000	7,400	125			6	6	1	
Columbia	9,006	4,247	137	5,000	14,006	30						
Petroleum Cr.	400	3,100	100	15,000	15,400	48						1
Shamburg	450	3,100	100	10,000	10,450	92			10	5		
Titusville	1,254	40,920	1,320	75,000	76,254	730	4	11	70	7	2	4
Pithole	400	6,200	200	16,652	17,052	78			4	4	1	
Fagundas		6,200	200	37,150	37,150	150	2		5	2.5		
Tidioute	5,000	13,330	430	90,000	95,000	235			9	4.5	1	
Warren	1,000	15,779	509	8,796	9,796	90	8	27	388	14.4	7	7
Bradford	8,700	100,533	3,243	122,566	130,566	580	78	59	514	8.7	42	5
Beaver	1,000	6,200	200	3,500	4,500	128	10	2	5	2.5	8	1
Totals	111,910	1,127,594	36,374	3,061,098	3,173,008	7,037	512	320	4,813	15	284	61

PETROLEUM DISCOVERIES.—New discoveries are continually being made in the Bullion Run region, in Venango Co., Penn., and the prospects for an oil excitement, like that which the "strikes" of 1863 created are likely to be renewed. A correspondent of the New York Times writing from Bradford County, Penn., says: "This place, from a country cross-roads, has grown to a city, and with it Tarpot, Limestone, Babcock's, and State Line, villages of from 1,000 to 3,000 in population, have sprung up in the valley, each of which is the center of active oil operations. Over 500 wells, producing about 3,000 barrels of oil a day, are now in operation, and probably as many more are going down. Some of the wells have been sunk as deep as 1,600 feet before striking oil. Many of the original test wells have been deepened and are among the best in the region. The oil business has turned the attention of the people of this section away from every other interest. Formerly, lumbering and farming were the principal industries, the Tuna Valley sending annually immense quantities of pine and other lumber to market by way of the Allegheny. The dairy products were also important. Farms are now leased to oil speculators, and the lumberman has deserted the woods and joined in the search for a shorter way to fortune. The excitement extends up and down the Allegheny for miles, through Cattaraugus County, and into Chautauqua County, N. Y., in the west, and thence into Warren County, Penn. Eastward, the fever has penetrated to the very center of Allegheny County, and great discoveries in oil are expected as the result of hundreds of wells now going down in all that territory. At Salamanca, Rock City, Randolph, Little Valley, Jamestown, in New York, and all along the river in Pennsylvania, oil is being found in paying quantities, and operations at Olean and other places eastward are meeting with satisfactory results. By a pipe line from Bradford and the other places along the Tuna, the oil of the producing mills is pumped to the Erie Railway at Olean, 13 miles from Bradford, over a high bridge. The crude oil of this district is of a dark amber, with an average specific gravity of about 40 degrees. The wells are mostly pumped, although there are several flowing ones. The oil developments made in Warren County, Penn., are still more important than those in the McKean district as regards capacity of wells. Several wells that flowed 200 barrels and over have been struck near Warren, and a 50-barrel well is a common strike. Some of the greatest oil operators in the country are interested in the development of that section, and no territory was ever so completely metamorphosed in a short time as that about Warren. . . . Among the great enterprises that are to be carried forward to early completion by the operators in oil are a pipe line from the heart of the Bradford district to Buffalo, so that the product can be forced directly to that city, and the gigantic undertaking of extending a line of pipes from the Allegheny up into the State of New York, and thence following somewhat the course of the Erie Railway through the counties of Allegheny, Steuben, Chemung, Broome, Delaware, Sullivan, Orange, and Rockland, to a point, probably Piermont, on the Hudson River."

The Pittsburg Commercial Gazette, under date of the 23d inst., says: "A rough calculation shows that the strikes at Bullion Run constitute an increase of production equal to 25 or 30 per cent. of the average of last month. In that view of the case it is not remarkable that prices should give way from \$2.25, the quotation at the opening of the month; to \$2 at the first of the week, and then take a sudden plunge down to \$1.50. It is not alone the increase of production thus developed, but the large addition of possible producing territory which sends prices down, and makes it possible that prices this summer will seek the level they reached in 1873. As some of the banks have loaned quite freely on certificates as collateral at \$1.50 they will be obliged to call for more margins, which is likely to further assist the demoralization. There is another view of the matter which is

worth considering. When oil went up to \$5 we argued that such an increase in price must necessarily restrict the consumptive demand and produce a reaction. Whether the history of the past six months has justified that view we leave others to say. Now when the demand, both foreign and domestic, seemed to be about equal to the old production on a basis of \$2.25@2.50, it is no more than reasonable to suppose that a decline of a dollar will bring an increase of consumption fully equivalent to the increase of production. If, therefore, the petroleum trade could be established on a steady basis free from the domination of rings and the influences of speculation, we see no reason why the market should not be sustained, and the entire production marketed on a basis of \$1.25@1.50, with a moderate degree of prosperity, both for the old and new districts of production."

The *Pittsburg Commercial* of the 18th inst. says: "We have no means of getting at the exact production at the present time, but it is estimated at from 32,000 to 35,000 barrels per day, whereas the consumption is placed at 40,000 to 45,000 barrels; there appears to be no doubt that the consumption is in excess of the production, but the increase in the latter has been so rapid recently as to weaken the market despite the very heavy consumption. The Bullion Run district promises to be the most prolific territory opened up for several years, and in consequence of the numerous strikes there recently, some operators have commenced to cry out dollar oil again. It is said that the Standard Oil Company have sold some 900,000 barrels within the past ten days, of which 250,000 barrels are to be delivered at Baltimore. We do not know that this is true, yet there is no getting over the fact that the business, to use a common expression, has been immense during the past month or two."

The *Philadelphia Ledger* says: "There seems to be a good prospect of the inauguration of a spirited combat between the giants representing the two combinations now seeking to gain supremacy in the oil fields of Pennsylvania (where as much, if not more, capital and enterprise are represented as in the coal regions of the State), and it remains to be seen which will become successful in the great struggle, which must certainly occur before the close of many days. Both organizations are well fortified with capital and influence, and the contest for power must be a warm and long one."

The *New York Shipping and Commercial List* of the 27th inst. gives the exports of Petroleum to that date, since January 1, as under:

	1877.	1876.	Same time 1875.....	gals 89,951,831
From N. Y. gals.	97,923,834	47,946,821	" 1874.....	100,230,071
Other Ports	38,951,708	45,473,267		
Total....	gals. 136,875,542	93,420,088		

"The dealings in certificates at the Petroleum Exchange have been fair and at improved prices, the market having partially recovered from the panicky feeling occasioned by the recent discovery of large wells, but closing with the advance partly lost. The transactions since the 22d inst. aggregate 165,000 barrels. United at \$1.70% @ \$1.85% regular, of which 45,000 do. yesterday at \$1.70% @ \$1.78%. Oil City \$1.71% bid; shipments not quotable. Parker's—United \$1.73%; shipments not quotable."

EMLENTOWN AND SHIPPENVILLE RAILROAD.—The contracts for the extension from Edenburg, Pa., to Clarion, Pa., have been closed, and the work is being pushed as rapidly as possible, the grading being nearly completed to Shippenville. The funds for the extension are provided by an issue of \$150,000 first mortgage 7 per cent. bonds, a considerable amount having been taken along the line. The road serves a large oil region, and the completed section is said to be doing a large business.

THE PETROLIA (ONTARIO) OIL INDUSTRY.—From the *Toronto Monetary Times*, we learn that the Home Works at Petrolia are making a business of shipping refined oil to Manitoba and other western points. There have been a few paying wells struck, but the best was that on Durham Creek, Enniskillen, by Townsend & Fish. These gentlemen are troubled with a great deal of water coming into the boring, but when that is reduced the well is good for 40 or 50 barrels per day.

The London Oil Association is still working, and their object is to keep all other refineries from doing the same by making the price of refined so low that small refineries cannot compete. They are now trying to form another controlling association, taking crude oil as their basis.

The total shipments of oil from January 1st, 1877, to June 14th, are:—Crude, 146,093 barrels; Distillate, 38,551 barrels; Refined, 7,216 barrels. For the week ending 14th June:—Crude, 5,525 barrels; Distillate, 1,320 barrels; Refined, 66 barrels. Business is generally flat. Markets, June 18: Crude, \$1.10 to \$1.25 per barrel; Refined (per wine gallon), 10c. to 11c. per gallon.

RAILWAY GRANT TO THE OIL REGIONS.—Petrolia has granted a bonus of \$25,000 to the Sarnia, Chatham & Erie Railway Company. The township of Enniskillen will shortly vote upon a by-law granting \$10,000 to the same company.

LAKE AINSLIE OIL COMPANY.—The *Halifax Chronicle* of the 9th inst. says: "Private advices from Lake Ainslie are to the effect that oil is being taken every day. The oil is remarkably pure, and has already been pretty generally utilized in a small way by the farmers in the neighborhood of the lake for grease for their wheels. A gentleman who lately visited the scene of the boring operations could hardly account for the strong odor of petroleum noticeable while traveling about in carriages, etc."

MINING NEWS.

Staff Correspondence of the Engineering and Mining Journal.

COLORED.

It is highly probable that the Boston & Colorado Smelting Works will be removed from Black Hawk to Denver this summer. The company have had such a move in mind for some time, and are now only delaying until it is ascertained whether Colorado lignites can be used in the furnaces in place of wood. Fuel (wood) is rapidly becoming scarce in Black Hawk, and advancing in price. In view of this fact a move of some kind is necessary. Probably the company conclude it is cheaper to move their furnaces towards the coal than to carry coal up the cañon to the Black Hawk. This move will be an important one.

From a recent supplement of the *Fairplay Sentinel* we clip or condense the following in regard to the mines and placer works of Summit, Park, and Lake counties:

"The Revenue tunnel at Geneva is 650 feet in length. On the mine there are three shafts 130 feet deep each, in which there is shown a good body of ore. The tunnel will cut this vein after 150 feet more of work.

"*Fairplay Gold Mine*.—In 1876 540 feet of fluming was laid. The average width of 'cut,' 40 feet; average depth, 14 feet; out of this was taken 342 oz. 6 dwts. 12 grs. of gold, averaging \$18 per ounce, currency value, or \$6,161.85. The amount of gravel removed and washed, 11,200 yards; an average of 55 cents per yard. In addition to this, through the medium of side sluices, 35,414 yards were removed, from which there was 1,182 oz. 2 dwts. and 2 grs. gold;

currency value \$19,477.87. Total amount of dirt removed during the season, 46,614 yards; number days' work on the flume and small sluices, 9,000, giving an average of over 5 yards per day of ten hours to the man. During the season 298 boxes were laid in the lower and upper flumes. Labor employed, Chinese. Dividend on capital invested, 18 per cent.

"*Dolly Varden*.—Statement of the number of tons of ore and the number of ounces of silver produced by the Dolly Varden Mine in the years 1874, 1875, 1876, and from January 1 to May 1, 1877:

Year.	Tons.		Silver.		Year.	Tons.		Silver.	
	oz.	dwts	oz.	dwts		oz.	dwts	oz.	dwts
1874	159	1190	15,061	34	1876	460	1071	61,801	021
1875	233	214	28,668	08	1877 .to May 1.	57	1836	19,161	93
						911	1211	124,692	371

"*French Gulch Placer Mine*.—The mine is two miles in length, with an average width of 800 feet. The main flume is 1,600 feet in length, with a grade of three inches to the box of twelve feet, giving ample force and dump sufficient to carry off the waste material of the mine. That this may be facilitated, a dam has been built near the mouth of the flume across the Blue River, and that stream so diverted that the full force of the current is utilized in carrying off the debris which otherwise would accumulate and be a great hindrance to the economical and successful working of the mine. The water privileges are first-class and belong to the estate. The yield of the gold is one-half ounce in gold per day to the man employed.

"While the construction of the flume is progressing, the development of the mine was being carried on by means of 'bed rock' drifts and tunnels. These were driven at right-angles to the gulch, a distance of 200 feet. The bed-rock, thus explored for a distance over 3,000 feet, has demonstrated the gravel to be half-ounce diggings.

"*London Mine, Mosquito Gulch*.—Up to the present time there have been driven on the London and its extensions, the Paris, Liverpool, and Mother tunnels, aggregating upwards of 1,500 feet. The openings show, in each instance, large and well-defined veins of ore, varying from eight to fifteen feet in width. The main tunnel openings of the London are 288 feet in length, with an average width of pay matter which mills at \$200 per ton of six feet. The upper tunnel on the same vein is 120 feet in length, and in this a continuation of the ore veins noted in the lower are noticeable. The ore in the main is carbonates of lead, carrying gold and silver. The vein material is nine feet in width, and the ore vein proper four feet.

"The Paris, lying to the westward, has been opened by a tunnel 134 feet in length, and in this, as well as the London, the general characteristics prevail as regards width of veins between walls. The ore on the pay streak is twenty-eight inches in width, and mills for \$180 per ton. On the dump 400 tons await treatment by the company's works, which will be in active operation the present summer.

"The Mother lode, a continuation of the Paris, is well defined and yields a high grade of ore. The seam is four inches in width, and mill runs have determined its value to be 200 ounces of silver per ton. In linear feet these lodes are over a mile in length, and the number of acres embraced in the estate for mining purposes is upwards of sixty. The entire management of the mines and construction of the mill devolves upon Larkin Ford, Esq., a practical miner, and one well adapted to fill the responsible position he occupies.

"*Ford*.—The Ford has been opened by two tunnels or adit levels; they are about twenty feet apart. One is 200 feet in length, and the other 150 feet. They are not parallel, for one intersects the other, and were driven to inclose a large body of ore. From the point of junction a level or drift has been carried forward 40 feet, and in the end a seam of very rich silver ore, four inches in width, is now standing; on the west side the deposit appears to be without diminution in quantity. The ore body, like that of its neighbors the Moose, Hiawatha, and Dolly Varden, lies chiefly on a floor of clay. These floors constitute the normal slides or primitive displacements. They dip at an angle varying from 15° to 45°, but where cut into are generally well defined; polished slickensides form a characteristic feature in many places. The ore ground is from eighteen inches to four feet in thickness; but where pockets occur, it is sometimes from eight to twelve feet in thickness. The silver produce is from 36 to 400 ounces per ton, specimens assaying as high as 800 and 1,000 ounces. Last year the mine was worked under a lease by Moynahan & Co. The average milling value exceeded 130 ounces per ton, with the low grade ores to hear from.

"*Security*.—The mine, on first being opened, carried an abundance of the red oxide of iron, yielding gold, silver, and copper, and carrying but very little gangue. For the last two years the product was 1,400 tons; average value per ton, \$41.42—a gross value of nearly \$58,000. Of this amount 300 tons were treated in arrastras, and gave an average yield of \$16.48 per ton, or about 80 per cent. of its value in gold. As a flux ore for smelting the silver ores of the region, it is invaluable, and finds a ready market at the Boston & Colorado Smelting Works. Last year's sales amounted to \$30,000; the cost of mining does not exceed \$10 per ton, and transportation a trifle less than \$3 per ton. The workings consist of about 1,500 feet of tunnels and drifts. Tramways for the transportation of ore traverse the mine in all directions. The ore veins vary from three to five feet in width.

"*The Lead Deposit in California Gulch*.—The *Rocky Mine* has opened splendidly, exceeding the most sanguine expectation of its owners. The work during the past winter has been shaped exclusively, to the end of opening up the mine, and has resulted in tracing the vein for 800 feet long, and has an average width of 40 feet. The openings are five in number, four of which are connected by drifts and winzes, affording excellent ventilation. Winzes at two different points, which are at present 25 feet deep, show the ore firm, and the usual grade. The amount of ore in sight may safely be represented by these dimensions: 800 feet by 40 feet by 25 feet; 800,000 cubic feet, which, in place, weighs 300 pounds per cubic foot; 240,000,000 pounds, or 120,000 tons.

"The Stone Mine has been opened at three different points—at both ends and in the center—showing the same grade of ore, and of like quantity. Present developments show the ore to be practically inexhaustible. One thousand tons mined last fall averaged \$130 per ton.

"The Lime Claim vein is opened at two points, and shows an immense body of carbonate ore, with some galena at points in the northerly opening, where the most work was done and perhaps 150 tons taken out. The ore shows rich and pure, and of the thickness to yield 40 or 55 tons per fathom across the vein, or say a thickness of about 8 feet.

"In the next opening south on the Lime, but little is done beyond showing the vein in place and of good quality.

"On the west end of the Stone claim, a large opening shows the vein large and rich; 200 to 300 tons of ore were taken out, and the opening shows a vein that will yield 35 to 45 tons of good ore per fathom across the vein, or about 8 feet thickness.

"The Bull's Eye, near the north end, where opened, shows a foot wall of limestone. The opening is small, but shows good ore in considerable quantities.

"The Dome Lode has been sunk 12 feet in length, extending across the vein, the cut being in ore mainly lead carbonates.

"La Plata, eastward from the Rock, is owned by Miller & Co. A tunnel has been run a distance of 70 feet, and near the breast a fine body of carbonates has been exposed, 6 feet in width.

"Wm. Redick, owned by McLain, Dougherty & Co. The mining superintendent in charge, John Hayes, Esq., has sunk his main shaft 60 feet, the last 13 feet being in solid ore. Drifts have been started north and south, and the deposit gives indications of widening. The ore is principally carbonates of lead, although some galena is occasionally found. The ore mills 70 ounces of silver and 60 per cent. of lead, and contains a trace of gold. The daily produce averages five tons.

"The Adelaide, on the southern slope of Stray Horse Gulch, belonging to Walls, Powell & Co., has been opened by two tunnels, each 60 feet in length. In the Discovery Tunnel is a vein of ore 6 feet in width, and carrying 25 ounces of silver and 50 per cent. of lead per ton. At the breast of tunnel No. 2, the ore pitched into the hill, and at this point a vertical shaft has been sunk 15 feet in solid ore. On the western boundary of the Adelaide, a shaft has been sunk 25 feet, and in this the depth of ore is 5 feet, and is worth \$250 in silver, and carries 60 per cent. lead per ton.

"The Terrible, belonging to McConville & Appleby. The shaft is 25 feet in depth. The ore deposits vary from 4 to 7 feet in depth, and are rich in silver, and carry a high per cent. of lead.

"The Pine, belonging to Drennon, Milner & Co., has been opened by a shaft 22 feet in depth, and the mineral exposed is a very high grade, and ranges from 5 to 8 feet in depth. First grades mill from \$350 to \$400 per ton in silver, and 60 per cent. of lead. The discovery shaft proper at 25 feet has been sunk through 4 feet of carbonates. The boys owning this property are hard working miners, and are driving the work of development as rapidly as possible.

"The Camp Bird, belonging to the Gallagher Brothers, by reason of extended developments shows to better advantage than any mine in the immediate vicinity. The main tunnel is 135 feet in length. At the face of the tunnel, and extending a distance of thirty feet toward the entrance, the ore will average six feet, the height of the tunnel, which has been driven through solid ore. Drifts have been started north and south, and in these seven feet of ore has been exposed. One hundred and five feet from the entrance a drift has been run south in the form of an arc a distance of eighty feet. The dimensions of the drift will average three feet in width and six feet in height, and throughout its entire length it has been driven through ore, and at this writing it is impossible to determine the width of the deposit. About thirty feet from the main tunnel, in the south drift, at the point of intersection with the discovery shaft, it has been sunk through nine feet of ore, and with no visible signs of its giving out. Throughout the main tunnel and the south drift of the Camp Bird the deposits carry a vein of ore varying from six to fifteen inches in width, that mills 702 ounces in silver, 3½ ounces in gold, and 54½ per cent. in lead per ton. Large and commodious shaft and ore houses have been built, and every convenience introduced which will facilitate mining.

"Near the head of Evans Gulch, and in a formation which is doubtless identical with that in Mosquito District, several valuable veins have been found.

"The Best Friend, owned by Lee & Doyle, is a true fissure, well defined and of good width between walls. The average width of the ore vein is twelve inches. The ore mills \$200 per ton, while specimen assays have given returns ranging from three to four thousand ounces per ton. The openings consist of a tunnel on the vein fifty feet in length. The ore is galena, gray copper, ruby, and brittle silver. The mine has been worked throughout the winter, and on the dump the owners have about thirty tons of ores awaiting shipment.

"Little Nellie, belonging to the Lee Bros. & Doyle, is lime. The ore is quite valuable, and the openings show a good deposit of ore.

"The Victor, owned by Demara & Co., is large, shows well, and produces a fine quality of ore.

"The Columbia, owned by Ritche & Co., a level eighty feet long has been driven on the vein. Ore one foot in width; first class assays, 240 ounces per ton."

NOTES.

SILVER DISCOVERY IN INDIANA.—A special telegram to the Chicago *Inter-Ocean*, dated Logansport, June 14, says: "During the sinking of a well on the farm of George Clinger, ten miles north of here, a substance was reached yesterday which proved to be a thick vein of galena."

LITTLE FALLS AND SALISBURY (N. Y.) R. R.—A survey is being made for a narrow-gauge road from the Erie Canal at Little Falls, N. Y., to the Salisbury steel ore bank, in the north-east part of the town of Salisbury, Herkimer County. The distance is about 18 miles. The ore deposit is said to be very large and of fine quality.

COAL DISCOVERY ON THE YELLOWSTONE.—Major H. M. Lazelle, of the 1st infantry, has lately reported to General Sheridan the discovery of lignite coal on the Yellowstone, about a hundred miles from its mouth. It is reported as exceptional in purity, depth of vein, and facilities for working, and steamers plying on the river can run directly to the coal beds when the water is at an average stage.

FATAL MINING ACCIDENT IN A NEW JERSEY ZINC MINE.—PHILLIPSBURG, N. J., June 27.—Yesterday seven miners, while engaged in drawing a bucket filled with zinc ore from a mine in the mountains between Waterloo and Newtown, Sussex County, accidentally caught the rope on a sharp stone and cut it in two. Five of the men were precipitated into a washed-out mine, and four of them, Baxter Jones, William Garvey, Henry Peters, and Richard Atgar, were so badly injured that they died this morning.

BASIS FOR MINERS' WAGES IN SCHUYLKILL COUNTY, PA.—The collieries drawn from which to arrange wages for the month of June were as follows:

Wadeville Shaft Colliery (P. & R. C. & I. Co.)	\$1 50
Bast Colliery do.	1 46
Turkey Run Colliery (Hass & Brenneizer)	1 57 50-100
Thomastown Colliery (P. & C. & I. Co.)	1 48
Draper Colliery	1 49 57-100

The average of these prices is \$1.50 21-100, and the rate of wages to be paid in June, 1877, is, therefore, thirty-three per cent. below the \$2.50 basis.

THE BRITISH COLUMBIA QUARTZ ACT OF 1877.—The government of British Columbia, under date of May 31st, 1877, has issued the following announcement: "The sum of fifteen thousand dollars will be paid by the Government of British Columbia to the Company which first erects, at some place north of the Quesnelle River, within the Electoral District of Cariboo and in the neighborhood of

some well-defined Quartz Ledge, a good and sufficient Ten-Stamp Quartz Mill capable of crushing ten tons of Quartz per diem, to the satisfaction of the Lieutenant-Governor in Council, in accordance with the provisions of the 'Quartz Act, 1877.' By Order, T. ELWYN, Deputy Minister of Mines."

IRON WARRANTS AS COLLATERAL.—An improvement in the facilities of conducting the iron trade has been introduced by the Pennsylvania Warehousing Company, in the form of its "iron warrants." These warrants or receipts represent so many tons of iron stored in the warehouses, and are transferable from one holder to another, or as collateral, and thus facilitate trade. This system is prevalent in the iron markets of England and Scotland, and is very much similar to the storage certificates for grain, petroleum, spirits, and other articles, which are used to expedite trade in these articles. In all cases the certificate or warrant represents a certain amount of the article deposited with a reliable custodian, and the pieces of paper pass by indorsement from seller to buyer, or from borrower to lender, much the same as a check, whilst the actual goods that are the subject of the transfer remain untouched in store until they are needed for consumption or export.

THE INVERNESS COAL, IRON AND RAILWAY COMPANY OF NOVA SCOTIA.—The annual meeting of this company, which was incorporated and organized last year, was held on the 15th inst. The Directors' and the Agent's reports were read, also communications to and from the Local Government relating to the Broad Cove and Canso Railway, which the company offer to build on the terms and with the aid of the subsidies granted for that route by the Legislature last session. The company have begun mining operations at Broad Cove, C. B., and will probably export 3,000 to 4,000 tons of coal from their 7½ foot seam, which is of excellent quality for domestic and general use, and has proved to be a valuable steam coal also. Owing to natural position and local facilities, this coal can be mined at less cost than any other in the Dominion, and having 26,000,000 tons on land and 34,000,000 under sea on one area alone, there is no fear of the quantity being soon exhausted. The company's iron mine is at Iron Mountain, Whyccomagh, C. B., and 200 tons of ore are now ready for shipment. The deposit of ore here (which is red hematite) is immense, but the Directors do not intend to work the mine largely until the matter of the railway is definitely settled. The ease and economy with which a special dock or harbor for vessels can be made at Broad Cove will probably induce the Directors to proceed at an early period with that work. The financial exhibit of the company's affairs up to date gave much satisfaction, as there is a balance on hand after paying all expenditures.—*Halifax Chronicle*, June 16.

BANK OF ENGLAND NOTES.—Few of the persons who handle Bank of England notes ever think of the amount of labor and ingenuity that is expended on their production. These notes are made from pure white linen cuttings only, never from rags that have been worn. They have been manufactured for nearly 200 years at the same spot—Laverstoke, in Hampshire, and by the same family—the Portals, who are descended from some French Protestant refugees. So carefully is the paper prepared that even the number of dips into the pulp made by each workman is registered on a dial by machinery, and the sheets are carefully counted and booked to each person through whose hands they pass. The printing is done by a most curious process in Mr. Coe's department within the Bank building. There is an elaborate arrangement for securing that no note shall be exactly like any other in existence. Consequently, there never was a duplicate of a Bank of England note except by forgery. According to the *City Press* the stock of paid notes for seven years is about 94,000,000 in number, and they fill 18,000 boxes which, if placed side by side, would reach three miles. The notes, placed in a pile, would be eight miles high; or, if joined end to end, would form a ribbon 15,000 miles long; their superficial extent is more than that of Hyde Park; their original value was over £3,000,000,000, and their weight over 112 tons.—*The Engineer*.

THE HEAT OF THE SUN.—In an important memoir on the mean temperature of the surface of the Sun in the *Annales de Chimie et de Physique*, M. J. Violle arrives at the following conclusions: (1) The intensity of solar radiation at the limit of the atmosphere is equal in absolute measurement to 2°54; that is, the quantity of heat falling in one minute on one square centimeter of surface would be capable of raising the temperature of one gram of water by 2°54 degrees C. (2) The radiation is enfeebled by its passage through the atmosphere in a definite ratio, which depends upon the barometric pressure, tension of the aqueous vapor present at the time, etc. (3) The effective temperature of the sun, deduced from actinometric measures, is 1,500 degrees. The effective temperature is defined to be the temperature which we must attribute to a disk of the same apparent diameter of the sun, in order that it should, when endowed with the unit emissive power, send to us in the same time the same quantity of heat as the sun actually sends. (4) This temperature is confirmed by direct measures effected in an inclosure at an elevated temperature. (5) In estimating the mean emissive power of the surface of the sun as equal to that of steel in a state of fusion at 1,500 degrees, the mean true temperature of the surface would be 2,000 degrees; and taking the most probable value of the emissive power of sources of heat consisting of incandescent vapors, we find the mean true temperature of the surface of the sun to be 2,500 degrees C.

ASSAY DEPARTMENT OF THE ENGINEERING AND MINING JOURNAL.

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

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

No charge will be made for these examinations or replies.

Where assays are desired, the following rates will be charged. The amount should invariably accompany the order.

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

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ANSWERS.

ASSAYS.

New York Office:

- III. E. D. B., Cleveland—Silver 1.34 oz; gold none.
- IV. Morton, Va.—Gold 3.26 oz.
- XI. Central, Va., Copper and Gold Mg. Co.—Copper 26½%.
- XII. I. S. B., Ark.—Compact antimony sulphide.
- XIII. I. T. B., Ark.—Silver 7½ oz; gold a trace.
- XV. L. H., N. Y.—Iron and copper pyrites, contain a small amount of nickel.
- XVI. L. H., N. Y.—Galena with blende, contains silver 77.07 oz; gold a trace.
- XVII. L. H., N. Y.—Is magnetite.

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines. Comparative Statement for the week ending June 23, and years from Jan 1st.

Tons of 2,240 lb.	1877.		1876.	
	Week.	Year.	Week.	Year.
Wyoming Region.				
D. & H. Canal Co.....	50,506	1,048,960	51,333	868,105
D. L. & W. RR. Co.....	49,742	1,051,458	20,102	589,051
Penn. Coal Co.....	23,936	593,935	5,457	404,654
L. V. RR. Co.....	20,482	466,043	10,190	412,562
P. & N. Y. RR. Co.....	1,741	25,250	293	12,406
C. RR. of N. J.....	25,938	719,635	1,382	550,390
Penn. Canal Co.....	16,782	151,265	9,704	122,538
Lehigh Region.				
L. V. RR. Co.....	189,127	3,966,546	98,461	2,959,706
C. RR. of N. J.....	68,587	1,389,404	29,792	991,639
D. H. & W. B. RR.....	34,307	697,748	1,069	501,957
		6,311		16,304
Schuylkill Region.				
P. & R. R. RR. Co.....	102,894	2,093,463	30,861	1,509,900
Shamokin & Lykens Val.	128,733	2,737,386	4,613	1,747,402
	19,135	290,561	17,788	360,482
Sullivan Region.				
Sul. & Erie RR. Co.....	147,863	3,027,947	22,401	2,107,884
	35	5,069	121	26,314
Total	439,924	9,093,025	151,844	6,603,804
Increase.....	288,080	2,489,221		
Decrease.....				

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

Receipts and shipments of coal at Chicago, Ill., for the week ending June 23, and year from January 1:

	Week.	Year.
	Tons.	Tons.
Receipts.....	42,269	649,593
Shipments.....	4,922	90,438

The receipts by canal and shipments of coal at Cleveland, Ohio, for the week ending June 23 were as follows: Receipts by canal, 4,272 tons; shipped coastwise, 7,882 tons; total for year, 82,641 tons; foreign shipments, 4,054 tons; total for year, 29,293. Total of coastwise and foreign shipments for week, 11,936; for year, 111,924.

Receipts of Coal at Boston, for the week ending June 22, and years from Jan. 1.

Tons of 2,240 lb.	1877.		1876.	
	Week.	Year.	Week.	Year.
From				
Alexandria and Georgetown	6,362	22,850	1,472	20,610
Philadelphia.....	20,478	249,667	13,003	218,716
Baltimore.....	4,459	56,522	4,191	54,241
Other places.....	14,388	122,465	4,414	119,050
Great Britain.....	52	1,249		3,806
Nova Scotia.....	622	5,983	1,732	4,425
Total	46,361	458,736	24,812	420,848

Shipments of coal at Pictou, N.S., for the week ending June 23, and year from January 1:

	Week.	Year.
	Tons.	Tons.
To Canada.....	1,755	6,220
" United States.....	1,001	6,991
" Other Provinces.....	1,853	12,242
Total tons	4,609	25,453

The Exports of Coal from Baltimore for the week ending June 22 were 972 tons, and since January 1st, 20,462 tons as against 17,460 tons for the corresponding period of 1876

Perth Amboy business: Tons. Received for the week..... 30,701 Shipped for the week..... 27,386 On hand June 23..... 124,936

The Receipts of Coal at Rondout, N.Y., by the Delaware & Hudson Canal for the week ending June 27 were 281 boats, carrying 34,911 tons.

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Piedmont Railroads amounts to 32,464 tons, as compared with the corresponding period in 1876.

Belvidere Delaware RR. report for week ending June 23.	Week.	Year.	Year.
	1877.	1876.	1876.
Coal for shipment at Coal Port (Trenton)	465	10,119	91,615
" " " South Amboy.....	8,475	305,471	198,336
Coal for distribution.....	3,139	83,398	64,742
Coal for Company's use.....	1,286	36,563	25,098

The production of Bituminous Coal for the week ending June 23, was as follows:

Tons of 2,000 lb., except where otherwise designated.	Week.	Tons.	Year.	Tons.
Cumberland Region, Md..				
Tons of 2,240 lb.....		36,454		651,432
Barclay Region, Pa.				
Barclay RR. tons of 2,240 lb.....		4,739		156,092
Broad Top Region, Pa.				
Huntingdon and Broad Top RR.....		1,444		66,490
*East Broad Top.....		1,089		23,014
Clearfield Region, Pa.				
*Snow Shoe.....		790		20,676
*Tyronne and Clearfield.....		25,188		582,987
Allegheny Region, Pa.				
*Pennsylvania RR.....		4,098		91,301
Pittsburg Region, Pa.				
*West Penn. RR.....		3,660		86,943
*Southwest Penn. RR.....		605		19,302
*Penn & Westmoreland gas coal, Pa. RR.....		13,728		340,896
*Pennsylvania RR.....		6,332		169,036
*For week ending June 14.				

The Production of Coke for week ending June 14.

Tons of 2,000 lb.	Week.	Year.
West Penn. RR.....	825	29,691
Southwest Penn. RR.....	12,551	276,289
Penn & Westmoreland Region, Penn. RR.....	1,201	36,490
Pittsburg, Penn. RR.....	1,698	63,919
Total	16,275	406,389

COAL TRADE REVIEW.

NEW YORK, Friday Evening, June 29, 1877.

Anthracite.

The Delaware, Lackawanna & Western Railroad Company offered at auction on Wednesday 125,000 tons of coal, divided as follows, for which the accompanying average prices were received, comparison being made with the previous sale:

Tons.	Average price	Average price
	June 27.	May 29.
12,000..... Steamer.....	\$2 18	\$2 48
35,000..... Grate.....	2 26	2 38
23,000..... Egg.....	2 41 1/2	2 51
35,000..... Stove.....	2 55 1/4	2 70
17,000..... Chestnut.....	2 35	2 57
3,000..... Pea.....	2 00

125,000 Total.

Without including pea size the general average was \$2.37 as against \$2.52 on May 29, and \$2.49 by the Pennsylvania Coal Company, June 13. There is no doubt that through the auctioneer's inexperience with coal sales some of the sizes brought less than they would otherwise have done. Yet, to recompense for this, he secured for stove size a price a little above what it could have been bought for previous to the sale, while it was anticipated that it would naturally go under the market. The attendance was very large, and the bidding, at times, quite spirited.

Knowing its important bearing on the trade, we have several times drawn attention to the enterprise of the Philadelphia & Reading Company in extending its trade. We are informed that the New Haven agency of this company, under the charge of Mr. Wells, has been doing a very important business, steadily removing the prejudices that have existed against all but a few coals that formerly monopolized that market. We have pointed to the extension of this company's trade up the Hudson, passing the shipping wharves of the Pennsylvania Coal Company, and the Delaware & Hudson Canal Company, and later of its making considerable sales along the Erie Canal to Buffalo; but we are now informed that Mr. F. A. Bassler, who has been instrumental in making the late inroads on trade that the Wyoming companies considered secure, will shortly visit all the leading Western markets, and judging from the past we may expect to see lively competition as the result of his visit.

At the present time the prices of coal in this market differ but little from the average of the last Pittston sale. The present cost of carrying coal to Buffalo and putting it on in vessels for Lake shipment, including all expenses, is not over \$1.35 per gross ton. The Anthracite Coal Association's prices per ton of 2,240 lb. f. o. b. vessels at Buffalo are as follows: Stove, \$4.59; nut, \$4.37; broken, \$4.20; egg, \$4.31. In adding \$1.35 to the average of the Pittston sale we get for stove, \$3.87; nut, \$3.81; broken, \$3.85, and egg, \$3.84. These prices show an advantage in the New York market of 72c. on stove; 56c. on nut; 35c. on broken, and 47c. on egg.

Many of the Western dealers see these advantages, and are here now negotiating for their fall and winter supplies. The effect of this state of things will be to send a very large part of the Western anthracite supplies through New York. And the fancied possession of the Northern and Western markets by the Wyoming and Lackawanna companies no longer remains even as a fancy. The Western market is as much a competitive one as that of New York, and the low rates that can be secured from New York to Buffalo over the Erie Canal as return freights will probably oblige even the Northern companies to send their Western coal to New York Harbor instead of direct by rail to the Lake shipping ports.

Owing to the execution of the eleven Molly Maguires last week the production was considerably curtailed, amounting to but 439,924 tons as against 481,622 tons for the preceding week, and 151,844 tons for the corresponding week of 1876. The total production from January 1 to June 23 was 9,093,025 tons as compared with 6,603,804 tons for the like period of last year, showing an increase this year of 2,489,221

tons. Of this increase the Reading Company has secured about 1,000,000 tons, the combined Wyoming companies an equal quantity, and the Lehigh Region about 500,000 tons.

Bituminous.

The strike of the boatmen on the Chesapeake & Ohio Canal had considerable effect on the output of the region last week, the total being but 36,454 tons, as compared with 43,203 for the preceding week. The production of this region from January 1 as compared with the like period of last year is, however, only 32,464 tons behind. Our report of the production of Clearfield coal, although not so great as earlier in the season, is in excess of the corresponding week of last year, and from January 1, as compared with the corresponding period of 1876 is still over 63,000 tons ahead. We note a contract by Messrs. Berwind & White to supply their "Eureka" Clearfield coal for at least half of the yearly requirements of the French line of steamships, the balance of the order going to the American Coal Co. of Maryland. That the Clearfield coals should be able to take from Cumberland an old and long established trade is not an encouraging feature for the striking boatmen on the Chesapeake & Ohio Canal. By their efforts to advance freights they will probably diminish the business of the canal many thousands of tons, with the ultimate result, as is usual in such times of great competition, of being compelled to accept no better terms than those which they had before striking. Another feature even more discouraging to their efforts is the prevailing low price of anthracite coal, and indications of a still further decline.

New York and Philadelphia.

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

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
*Lackawanna at Rondout.....	2 50	2 50	2 60	2 60	2 60	2 60
*Scranton at Hoboken.....	2 18	2 20	2 41	2 55	2 35	2 35
Wilkesbarre at Port Johnston.....	2 65	2 65	2 65	2 65	2 65	2 65
Plymouth, R. A.....	2 65	2 65	2 65	2 65	2 65	2 65
Susque: Coal Co., (S. H. Brown & Co.) At Amboy.....	2 50	2 50	2 60	2 65	2 75	2 60
Kingston at Hoboken.....	2 50	2 50	2 60	2 65	2 75	2 60
Pittston at Newburgh:						
A. S. Swords.....	2 55	2 55	2 55	2 55	2 60	2 55
*Penn. Coal Co.....	2 51	2 47	2 50	2 48	2 51	2 45
Wyoming at Perth Amboy.....						
Lehigh Coals.						
Old Company at port Johnston	3 25	3 25	3 25	3 25	3 25	3 25
Old Company's Room Run "	3 25	3 25	3 25	3 25	3 25	3 25
Sugar Loaf, Hobok. & Amb. "	3 25	3 25	3 25	3 25	3 25	3 25
Lehigh at Perth Amboy.....						
Honey Brook Lehigh.....	3 25	3 25	3 25	3 25	3 25	3 25
Mount Pleasant at Hoboken.....	3 25	3 25	3 25	3 25	3 25	3 25
Cross Creek at Port Johnston.....	3 00	2 70	2 75	2 75	2 75	2 75
Schuylkill Coals at Port Richmond, Philadelphia.						
Schuylkill white ash.....						
Schuylkill red ash.....						
Lorberry.....						
Lykens Valley.....						

*Boats towed by the D. & H. Co. at its expense to and from New York Harbor.

*These quotations represent the average prices of the last auction sale

Per ton. Freight from Hoboken and Weehawken to New York, 35c. " Elizabethport & Port Johnston to N. Y. 35c. " " South Amboy to New York..... 35c.

Freight by the boats of the companies from Hoboken, Rondout, Port Johnston, Weehawken, South Amboy and Perth Amboy to New York City and vicinity 50c. Pittston coal at New York delivered by Penn. Coal Co.'s boats 6c. per ton additional. Lackawanna coal delivered to carts in New York or Brooklyn, 50 cents per ton additional.

Wholesale Prices of Bituminous Coal.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Domestic Gas Coals.		
Westmoreland and Penn. at Greenwich,		
Philadelphia.....	\$4 50	\$5 50
" " at S. Amboy.....	5 00	5 50
Red Bank Cannel Pa. at Philadelphia.....	8 00	8 50
Youghiogheny, Waverly Co., at Balt....	4 50	5 05
Despard, West Va.....	4 50	5 00
Murphy Run, West Va., at Baltimore....	4 50	5 05
Fairmount, West Va., " ".....	4 40	5 70
Newburg Orrel, Md., " ".....	4 50	6 00
Cannelton Cannel, West Va.....	6 00	10 00
" Splint " at Richmond.....	6 00	7 00
" Gas Coal at Richmond.....	4 74	5 65
Peytona Cannel W. Va. at Richmond.....		10 00
Manufacturing and Steam Coals.		
Cumberland at Georgetown and Alexandria, Va.....	8 50@3 00	4 00
Cumberland, at Baltimore.....	3 15@3 25	4 50
Clearfield f. o. b. Canton, Baltimore.....	3 25@.....	4 50
Clearfield "Eureka" at mines per ton 2,000 lb., 75c.; f. o. b. Baltimore and Philadelphia per ton of 2,240 lb., \$3.25; f. o. b. South Amboy, \$4.25; alongside at New York, \$4.50.		

Foreign Gas Coals.

Table listing foreign gas coals with columns for location, price in Sterling, and price in Am. cur'cy.

Retail Prices in New York.

Table showing retail prices for anthracite and bituminous coals in New York, including grades like Pittston, Lackawanna, and Wilkes-Barre.

The Cost of delivery for Pittston and Lackawanna coal ranges from 40 cts. to \$1 10 per ton, according to distance from the yard.

We quote Boston wholesale prices as follows: Coal is dull and somewhat unsettled. A few dealers have thought it advisable to increase their stocks in view of the strong grounds for believing that a new combination is about to be formed on Mr. Gowen's plan for selling all competing coal through one house.

Freights to Boston are a trifle firmer from Philadelphia, quoting \$1.25@1.40. From Baltimore the rate is \$1.55@1.65; Alexandria and Georgetown, \$1.65@1.70; New York, \$1.20@1.25.

Table of Boston wholesale prices for anthracite, bituminous, and stove coals.

Cincinnati, O. June 19, 1877.

Table of Cincinnati coal prices, including Youghiogheny lump, Camden, W. Va., and other grades.

Cleveland, O. June 19, 1877.

Table of Cleveland coal prices, including Brier Hill, Straitsville, and other grades.

The following are the prices established by the Coal Exchange until further notice:

Table of retail trade prices for various coal grades, including Brier Hill, Masellon, and Del Carbo.

Indianapolis, Ind. June 19, 1877.

Specially reported by Messrs. CORB & BRANHAM. Wholesale on board cars, and retail delivered to consumers.

Table of Indianapolis coal prices, including White River, Brazl Block, and other grades.

Hamilton, Ont. June 25, 1877.

Specially reported by H. BARNARD. I beg to hand you state of our market corrected to date.

Table of Hamilton coal prices, including Grate, Egg, and Nut grades.

Louisville, Ky. June 19, 1877.

Specially reported by Messrs. BYRNES & SPEED. Below find latest quotations:

Table of Louisville coal prices, including Pittsburg and Raymond City grades.

Milwaukee, Wis. June 23, 1877.

Specially reported by Messrs. R. P. ELMORE & Co. Retail price per ton of 2,000 lb.

Table of Milwaukee coal prices, including Anthracite, egg, chestnut, and stove.

Philadelphia, Pa. June 28, 1877.

Specially reported. The tonnage over the Reading is decreasing from two causes. Several collieries in the Mahanoy Region have been stopped, owing to efforts being made to bring a strike, but the movement is not likely to succeed.

Already the men have resumed work at some of them after losing a whole week. The main cause is more serious. The individual operators find themselves unable to stand the present low rates, and are stopping or slackening one after another. The tolls over the road, which appeared quite low in the beginning of the season, have become quite high, comparatively to the price of coal, after a series of declines which have reached such a point as never was reached before.

Sandusky, O. June 19, 1877.

Specially reported by C. E. BLACK, Agt. Con. Coal & Mfg. Co. We quote coal on cars at Sandusky, as follows:

Table of Sandusky coal prices, including Anthracite and Bituminous grades.

San Francisco, Cal. June 21, 1877.

From the Commercial Herald of June 21, 1877. COAL—Imports from January 1 to June 16:

Table of San Francisco coal imports, including Anthracite, Mt. Diablo, and other grades.

"The market shows increased firmness for Australian and other cargoes steam, both Scotch and English, all to arrive. Spot supplies are free, and the market fully stocked with Seattle, Nanaimo, and other Pacific Coast varieties. Indications all point to an increased Pacific Coast production, not only from Washington Territory but from the mines in this State and Nevada.

St. Louis, Mo. June 20, 1877.

Reported by JAS. J. SYLVESTER, Secretary of the Anthracite Coal Association.

Table of St. Louis coal prices, including Lackawanna, Wilkes-Barre, and other grades.

Toledo, Ohio. June 19, 1877.

Specially reported by Messrs. GOSLINE & BARBOUR. There is no change in prices of coal at Toledo to note.

Table of Toledo coal prices, including Straitsville lump, Shawnee lump, and other grades.

Table of freight rates for various ports, including Philadelphia, Baltimore, and Georgetown.

For retail delivery, from 50c to \$1 per ton in addition to above prices is charged. Prices soft coal f. o. b. vessel for Lake shipments will be from 15 to 20c. per ton more than prices on cars.

Freights. Representing the latest actual charges up to June 28. Per ton of 2240 lb.

Large table of freight rates for various ports, including Philadelphia, Baltimore, and Georgetown, with columns for 'From Philadelphia', 'From Baltimore', and 'From Georgetown'.

* And discharging and towing. † And discharging. ‡ And towing. § 3c. per bridge extra.

Rates of Transportation on Anthracite Coal.

Rates of Freights on Pittston Coal from Newburgh, and Lackawanna Coal from Rondout. By Company's Boats per ton of 2240 lb.

Troy and West Troy; if discharged above the bridge or locks, or at railroad docks.....	55
Troy and West Troy, except as above.....	50
Albany, Greenbush and Castleton Stuyvesant, Coxsackie, (lower dock), Catskill, (at mouth of Creek), German-town.....	55
Coeyman's.....	55
Hudson & Boston Railroad Dock, Hudson, discharged to cars.....	55
Hudson, (except as above).....	45
Saugerties, (at mouth of Creek), and Glaseo, Barrytown, Peekskill, (River Docks), Haverstraw (Peck's Dock), and Grassy Point.....	40
(If boats are moved from Peck's Dock to adjacent points, and returned there within two days, without expenses to the Company, no extra charge will be made.)	
Rhinebeck, and Hyde Park. Poughkeepsie and New Paltz Landing.....	30
Fishkill Landing, Cornwall, Cold Spring, West Point and New Windsor.....	25
Nyack, Sing Sing, Croton Landing, Verplanck, Tarrytown, Piermont, Yonkers.....	45

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

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

For freights on *Schuykill Coal* we refer to our issue of June 16.
 For freights on *Lehigh and Wyoming Coal* we refer to our issue of June 23.
 For freights on *Pennsylvania & New York Railroad* we refer to our issue of June 23.
 For freights on coal via *Geneva, Ithaca and Sayre Railroad* we refer to our issue of June 16.

Rates of Toll

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

Cents.	Cents.
Acid, sulphuric.....	0'1
*Car axles.....	0'1
Car wheels (iron).....	0'05
Castings, all iron cast-ings.....	0'1
Cement, fireproof.....	0'1
Clay.....	0'05
Coal.....	0'025
Coal oil.....	0'05
Copper ore, pig and smelted.....	0'05
Fire-brick.....	0'05
Gas pipes.....	0'05
Gypsum, ground and unground.....	0'1
Gypsum, product of New York State.....	0'05
Iron, articles exclusively manufactured of wrought iron not specifically enumerated when cleared at tidewater.....	0'05

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

Towing.

Rates of Towing from New York to places on the Hudson River Boats of 200 tons capacity and upwards. Per ton of 2,240 lb.

Manhattanville.....	7	Verplanck's Point and Haverstraw.....	15
Yonkers & Spuyten Duyvel.....	8	West Point & Cold Spring.....	16
Piermont.....	11	Newburg.....	17
Nyack, Tarrytown & Sing Sing.....	14	Poughkeepsie.....	18
Peekskill, Croton Landing, Rondout.....	20		

Rates for boats of 100 tons per boat are as follows:

Manhattanville.....	10	Sing Sing and Peekskill.....	20
Yonkers.....	15	Newburgh.....	25
Tarrytown.....	18	Poughkeepsie.....	30

Special Rates will be made for Saugerties and Catskill.

East River and Sound Ports, from the foot of Twenty-third Street to the following points, and return, per ton of 2,240 lb.

New Haven and Bridgeport.....	17	New London.....	32
South Norwalk.....	20	Middletown.....	46
Southport, Milford and Westport.....	25	Norwich, Stonington and Hartford.....	38
Branchford and Saybrook.....	30	Hartford.....	52

Derby 17 cts. per ton and 50 per boat extra.
 Rates to the following places and return per boat:

61st Street, E. R.....	8	Westchester & Flushing.....	25
79th.....	9	Little Rock, Pt. Washington, N. Rochelle & Glen Cove.....	40
93d " and Astoria.....	10	East Chester (Town Dock).....	50
Harlem and Mott Haven.....	14	Roslyn, Mamaroneck, Port Chester and Stamford.....	50
West Farms (mouth of creek).....	20	Darien.....	60
College Pt. & White-stone.....	23		

Boats carrying less than 200 tons will be charged the same as if carrying that quantity. Boats for New Haven will be landed at Bell Dock, or Canal Dock only; all towage to Derby Dock, and to yards, to be paid by consignees. Boats for Bridgeport will be landed at Naugatuck R. R. Dock or Housatonic R. R. Dock only. All towage to yards to be paid by consignees.

Rates via the Hudson River are furnished to us by A. B. VALENTINE, No 41 Jay street. Rates via the East River are furnished by the Eastern Transportation Line.

IRON MARKET REVIEW.

New York. FRIDAY EVENING, June 29, 1877.

American Pig.—The Thomas Iron Company report sales of 1,000 tons of iron on the basis of \$19 for No. 1 Foundry. The market is weak, however, especially for prompt cash, it being rumored that good Lehigh iron has been sold on this basis at as low as \$17.50 per ton. The inquiry is very light, and purchases are being made for only pressing necessities.

Scotch Pig.—The business doing in this article is only in a small way at unchanged prices. We quote: Coltness, \$27.50; Eglinton, \$24.50, and Glenarnock \$25.50.

Rails.—We are reported sales of 1,600 tons of steel and 250 tons of iron rails on private terms.

The market is generally very quiet and prices nominally unchanged. We quote iron rails at \$33@36, and steel at \$44@46.

Old Rails.—We note a sale of 120 tons at \$19, and quote at \$18.50@19.

Scrap.—We are reported a sale of 100 tons of scrap at a price equal to \$22.50. We quote nominally at \$23@24.

Boston. June 23, 1877.

Pig is as dull as ever. In New York there were sales of 250 tons No. 1 on p.t., and 100 tons No. 1 (an outside brand) at \$17.50 cash. We quote \$22.50@23.50 for No. 1, \$21.50@22 for No. 2, and \$21@22 for gray forge. Scotch pig is neglected and prices are easier. We quote \$24@30 for store lots. The foreign markets are dull. A circular received this week states that from Staffordshire, Lancashire, and Sheffield nothing is heard but Continental and American competition.

Bar is dull, quoting \$46@47 for refined, and \$37@38 for common. Nails are in light demand at unchanged prices. Sheet is selling at 3@3 3/4 c. per pound. Russia is quiet at 12c. currency. We quote English spring steel 7@8c. gold; 9@11c. for German; 9@11c. for machinery; 14@15c. for cast; 10@12c. for blister; 8c. for American spring; 13 1/2@14c. for cast; 9c. for blister; and 8c. for machinery.—Commercial Bulletin.

Chatanooga, Tenn., June 19, 1877.

Specially reported by J. F. JAMES, dealer in pig iron, ores, etc. Tenn., Ala. and Ga. Charcoal, No. 1 Foundry... \$18 00@19 00
 Tenn., Ala. and Ga. Charcoal, No. 2 Foundry... 17 00@18 00
 Tenn., Ala. and Ga. Charcoal, Gray Forge... 15 00@16 00
 Tenn., Ala. and Ga. Coke, No. 1 Foundry... 19 00@20 00
 Tenn., Ala. and Ga. Coke, No. 2 Foundry... 17 00@18 00
 Tenn., Ala. and Ga. Coke, Gray Forge... 16 00
 Charcoal or Coke, white and mottled... 14 00@15 00
 Tenn., Ala. and Ga. Cold Blast (car wheel)... 22 00@28 00
 Old rails... 18 00@19 00 Wrought scrap,
 Old car wheels... 16 00@17 00 No. 2... 12 00
 Wrought scrap... Cast scrap... 10 00
 No. 1... 17 00 Muck bar... 32 00@33 00

Iron Ores.

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

Cleveland, O. June 22, 1877.

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

FOUNDRY IRON.

No. 1, L. S. Charcoal.....	\$26 00	Am. S., No. 1, Ch. Val.....	\$24 00
No. 2, ".....	25 00	" " B. 1, ".....	22 00
No. 1, Anthracite.....	24 00	" " No. 2, ".....	21 00
No. 2, ".....	22 00	No. 1, Massillon.....	24 00
No. 1, Bituminous.....	24 00	" " B-1, ".....	22 00
No. 2, ".....	22 00	No. 2, ".....	20 00

CAR WHEEL AND MALLEABLE IRON.

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

RESERVE IRON.

Nos. 1 & 2, L. S. Char. \$26 00 | PIG IRON.

No. 1, Gray..... \$19 00 | White and Mottled... \$18 00

Cincinnati, O. June 26, 1877.

Specially reported by Messrs. TRABER & AUBERT, commission merchants for the sale of pig iron, blooms, ore, etc. Below we hand the closing quotations of our pig iron market.

Hanging Rock A1 Extra.....	\$25 00@25 50	4 mos
" No. 1 Foundry.....	\$24 00@24 50	4 mos
" " B. 1.....	23 00@23 50	4 mos
" " No. 2.....	22 00@22 50	4 mos
" Soft Silver Gray.....	23 00@23 50	4 mos
" Mill.....	20 00@21 00	4 mos
Tennessee, No. 1 Foundry.....	23 00@23 50	4 mos
" " No. 2.....	22 00@22 50	4 mos
" Mill.....	20 00@21 00	4 mos

STONE COAL.

Ohio, No. 1 Foundry.....	21 50@22 00	4 mos
" " No. 2.....	20 50@21 00	4 mos
" Salsary.....	19 50@20 00	4 mos
" Mill.....	@	4 mos

COKE.

Ohio & W. Va. No. 1 Foundry.....	23 00@25 00	4 mos
" " No. 2.....	22 00@23 00	4 mos
" Mill.....	@	4 mos

CAR-WHEEL.

Hanging Rock, C. B. Car Wheel.....	38 00@40 00	4 mos
Tennessee, ".....	30 00@32 00	4 mos
Missouri, ".....	30 00@33 00	4 mos
Alabama, ".....	30 00@35 00	4 mos

BLOOMS.

Charcoal..... 50 00@.....-cash.

SCRAP IRON.

Cast.....	50c.@ 65c.-	"
Wrought.....	75c.@ 1 00-	"

Louisville, Ky. June 26, 1877.

Specially reported by Messrs. GEORGE H. HULL & Co. Market heavy, but with more decided inquiry for

foundry irons and fair demand for good mill, but with low offers from buyers of the latter. The usual time, four months, is allowed on the quotations below.

FOUNDRY IRONS.

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

MILL IRONS.

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

CAR-WHEEL AND MALLEABLE IRON.

Hanging Rock, and Cold Blast.....	35 00@38 00
Alabama and Georgia.....	26 00@23 00
Kentucky Cold-blast.....	25 00@26 00

Montreal. June 19, 1877.

There is no change of any account in the state of this market since the date of last week's report, general quietness being the usual complaint. Prices do not exhibit any quotable change, and we therefore continue our quotations of last week: Pig Iron, Garscherrie \$20 to \$20.50; Summerlee, \$19 to \$19.50; Eglinton and Clyde, \$18.50 to \$19; Langloan \$19.25 to \$19.75; Coltness, \$20.25 to \$21; Hematite, \$23 to \$24; American, \$20 to \$21. Bars—Scotch and Staffordshire, \$1.90 to \$1.95; best do., \$2.20 to \$2.25; Swedes and Norway, \$4.50 to \$5; Lowmoor and Bowling, \$6.25 to \$6.50.—Monetary Times.

Milwaukee, Wis. June 23, 1877.

Specially reported by Messrs. R. P. ELMORE & Co. The market for pig iron still bears about the same aspects as previously reported, sales being made to meet immediate wants only. The general good appearance of the crops in the West, however, gives a firmer feeling, or hope for a better state of things, and demand for manufactured goods of iron is looked for by the manufacturers of agricultural implements. We now quote sales as follows, viz:

No. 1 Lake Superior per gross ton.....	\$25 00-4 mos.
No. 2 ".....	24 00-4 mos.
No. 1 anthracite per gross ton.....	\$25 00-4 mos.
No. 2 ".....	24 00-4 mos.
No. 1 anthracite per gross ton.....	\$25 00-4 mos.
No. 2 ".....	24 00-4 mos.
Warner's Am. Sc'th (Bk. Bend) per ton.....	\$25 00-4 mos.
Soft Silvery per ton.....	22 00@23 00-4 mos.
Lake Superior and Lake Champlain ores.....	24 00@25 00-4 mos.
Sharpsville (Penn.) native ores.....	24 00@25 00-4 mos.
Lake Superior ores per ton.....	\$25 00@26 00-4 mos.

Philadelphia, Pa.

[Weekly Report of the Philadelphia Iron Market, furnished for THE ENGINEERING AND MINING JOURNAL, by JUSTICE COX, Jr., & Co., Iron Merchants, 333 Walnut Street, Philadelphia, Week ending June 28, 1877.]

PIG IRON.—Dullness continues to be the most conspicuous feature of the iron market this week. The mills and foundries continue to shut down for summer repairs, making a slight increase in the stocks of pig iron. Good numbers being the scarcest and gray forge the most plentiful, we can scarcely give a fair quotation this week, as No. 1 is quoted all the way from \$18 to \$20.50, as to brand; No. 2, \$17 to 19; gray forge \$16.50 to \$18. Some even assert they have been offered at lower prices. We fail, however, to hear of lower sales, or even as low as our lowest quotations.

MANUFACTURED IRON.—As the month draws to a close orders become more scarce, nor do the mills care to have them just now, as this week will shut most mills for at least two weeks, and some for a longer time. We hear of two or three quite large orders for bars being placed for shipment after the first of the month, at full prices. Hopes are entertained that a good trade will spring up; whether prices are to be any better remains to be seen. We quote bars 2 to 2-10c. per lb.; Plate and tank, 2 1/2 to 6 1/2 c. per lb.; skelp, 2 15-100 to 2 1/2 c. per lb.

RAILS.—We have nothing new, except the small orders coming on the market for steel and iron rails—not very large. We quote steel, \$46 to \$50; iron, \$33 to \$36, all at mill.

OLD RAILS.—The supply is plentiful, with little demand. All the buyers of old rails report their wants supplied for the present. We quote \$20 to \$21.

MUCK BARS are quoted \$34.50 to \$36.50, with nothing new since our last. 2,000 tons are reported for summer and fall delivery.

SCRAP continues dull, with a plentiful supply. We quote wrought, \$20 to \$26; cast, \$14 to \$19.

OLD WHEELS are dull of sale and quoted \$17.50 to \$20.

Pittsburgh, Pa. June 19, 1877.

Specially reported by A. H. CHILDS. Any report of the metal market for this week must be simply a repetition of the last. But few of the mills are running, and the inquiry for pig iron is extremely limited. The quotations are:

No. 1 F'dry.....	\$22 00@24 00	Mottled & White.....	\$18 00@19 00
" " ".....	20 00@22 00	Hot blast C'coal.....	22 00@28 00
Gray Forge.....	19 00@21 50	Cold " Western.....	40 00@45 00

Richmond, Va. June 25, 1877.

Specially reported by ASA SNEYDER, Esq. About 150 tons charcoal irons have changed hands this past week. Quotations as before.

COAL TRANSPORTATION AND GENERAL MINING STOCKS.

Table with columns: Name and Location of Company, Feet on Vein, Capital Stock, Shares (No., Par Val.), Assessments (Total levied to date, Date and amount per share of last), Dividends (Total paid to date, Last Dividend, Rate per Ann.), Highest and Lowest Quo. per Share in Currency (June 23-29), and Sales.

g. Gold. s. Silver. L. Lead. c. Copper. ** Non-Assessable. Total Assessments levied to date \$41,375,530 Total Sales of Coal Stocks for the week 235,972 shares Total Mining Dividends disbursed to date 115,787,900 Total Sales of Mining Shares for the week 54,488

a reduction of its debt on construction account of over \$600,000, thereby relieving it of an interest payment of over \$42,000 annually. This settlement places the company in a position of financial ease, and is on all accounts a just subject of congratulation to its stockholders.

The Philadelphia & Reading R. R. Company will meet all its financial engagements, maturing in the month of July, and the payments will include over a

million of dollars in cash for interest and rentals on leased lines, etc. Receipts are now being given for the coupons, for which scrip is to be issued, which receipts will be exchangeable for the coupon certificates on and after the 2d of July.

Moshannon Coal Company.—1,000 shares of the stock of this company were sold at auction during the week at \$1 per share.

Schuylkill Navigation Company.—This company

will pay its regular semi-annual dividend on the common and preferred stock during the month of July.

Buck Mountain Coal Company.—The semi-annual dividend period of this company will occur in July.

Williams' Marble and Slate Manufacturing Company.—The annual meeting of this company will be held July 2d.

COUPONS AND INTEREST are payable on the bonds of the following companies during the month of July :

Allegheny Valley Railroad Company.—73-108 of 1866; interest.
Lehigh Coal & Navigation Company.—6 per cent. registered loan due in '84. Interest.
Mahanoy and Broad Mountain Railroad Company.—Coupons are due.
Northern Central Railroad Company.—2d mortgage 7s of 1885; do. cons. mortgage 6s of 1900; interest in gold.
North Pennsylvania Railroad Company.—6 per cent. and general mortgage 7 per cent. bonds; 1st mortgage 6s of 1885; general mortgage 7s of 1903; interest.
Pennsylvania Railroad Company.—Navy Yard 6s, 1881; interest; coupons.
Pennsylvania Canal Company.—Coupons on the first and general mortgage bonds.
Philadelphia & Reading Railroad Company.—6s of 1880; do. Deb. bonds of 1893; do. New Cons. 7s of 1893; coupons; interest.
Reading Coal & Iron Company.—Coupons.
Shamokin Coal Company.—Coupons.
Shamokin Valley & Pottsville Railroad Company.—7s of 1901; interest.
Chesapeake & Delaware Canal Company.—6s of 1882; interest.
Delaware Division Canal Company.—6s of 1878; interest.
Schuylkill Navigation Company.—2d mortgage 6s of 1907; do. mortgage 6s of 1895; interest.
Susquehanna Canal Company.—6s of 1918, and do. 7s of 1902; interest.

Copper Stocks.

Reported by Wilson W. Fay & Co., Bankers and Brokers, Room 7, Traveler Building, 31 State Street.
 BOSTON, THURSDAY EVENING, June 28, 1877.

The market still remains comparatively inactive and dull, with small sales in any of the stocks.
 Calumet & Heckla has strengthened somewhat, there being sales at 169¼, and 169½ bid, and 169¼ asked. Copper Falls remains unchanged, the company appearing to buy all the stock that offers at \$3 (asst. paid), and not bidding a cent over that price, there being but few sales.

Franklin still remains quiet, with a slight weakening in the price, \$5.50 being the best bid, and the stock offering at about \$7. In Quincy there has been no perceptible change, \$35.50 being bid, and \$36.50 asked. Osceola remains firm, there being sales at \$20, and closing at \$19.75 bid, and \$21.50 asked. Central closes firm at 38¼ bid.

The smaller stocks are very inactive, their being scarcely a transaction in any of them. The market, taken all together, looks pretty firm and some of the stocks look a little strong.

Gold and Silver Stocks.

NEW YORK, FRIDAY EVENING, June 29, 1877.

The principal features in the transactions at the American Mining Board during the past week have been the dealing in Moose, Cleveland Gold, Leopard, Merrimac, and the Best & Belcher Mining Companies. The total transactions amount to 36,588 shares, a decrease of about 37,000 shares from the business reported last week. The stocks of the Comstock Lode have received a fair degree of attention, and the quotations are generally well sustained. There is no special feature to note as to prices. It may be well to observe that the quotations are well maintained, considering the general dullness which always prevails at this period of the year.

The Ontario Silver Mining Company has produced during the week ending June 21, 24 bars of bullion, having an assay value of \$41,718.66. On July 2, two extra dividends, Nos. 5 and 6 of fifty cents gold each, per share, will be paid at the office of transfer agents Wells, Fargo & Co.

The Eureka Consolidated Silver Mining Company of Nevada.—The Eureka Sentinel says: Two thousand tons of high grade ore have been extracted from the fifth level of the Eureka Consolidated mine, from the various drifts, crosscuts, etc., and notwithstanding the extent of the explorations, the dimensions of this vast bonanza are yet undetermined.

The stock of the Richmond Consolidated Mining Co. is quoted at from \$30 to \$35 per share on the London stock market. We note the announcement that the case of the Eureka Con. Richmond Mining controversy will be heard on the 23d of July before Justice Field and Judge Sawyer in the United States Circuit Court.

Eureka Gold Mine, Grass Valley, California.—The San Francisco Stock Report, of the 22d inst., says: The shaft of the Eureka claim, at Grass Valley, has been covered over and work suspended. This mine has been one of the best paying properties in California. It was opened in October, 1865, and has produced about \$4,500,000, of which \$2,094,000 has been paid to stockholders in dividends. There have been no assessments. This is the second Grass Valley mine abandoned within the last two years, the other being the North Star, once a prosperous dividend paying claim, which many believe has never been worked out.

The Assessments on Nevada Mines for June, twenty-three in number, amount to \$553,872, about one-half that of May.

Grand Prize Silver Mine of Nevada.—We note recent sales of the stock of this Company on the San Francisco stock market at \$10¼ per share. The May Bullion output of this mine amounted to \$67,200.

The Commercial Herald of the 21st inst. says: "The past week was a perfect field day in stock circles, and the old-time excitement was quite refreshing, producing an elasticity in every department of trade that is truly remarkable. We had it never so

fully demonstrated as during the past week that the mining stock market is a very important element in our business circles, a rise in stocks having such a tremendous hydraulic lifting force as to cheer all departments of trade. If bonanzas are to lead north and south from the California and Con. Virginia Mines in their lowest depths, as many suppose, we may naturally look for one of the greatest stock excitements this market has ever experienced. Notwithstanding the losses and failures of so many during the past year the community possesses millions of ready cash to speculate with, and this will be poured out like water in hopes of profiting by the ventures. The present movement has already reduced the heavy balances lying idle in our banks, and with this and more in active circulation we may look for a brisk business revival."

We condense the following from the Gold Hill News of the 20th inst.:

Work is being resumed in many of the outside mines, and those which suspended operations during the great depression, and although there is new ore development to mention outside of the rich bonanza of the Consolidated Virginia and California, yet the prospects of the deep workings at various points are good and of increasing interest.

The Consolidated Virginia Mine is yielding 500 tons of rich ore per day.

The north drift from the Gould & Curry on the 1750-foot level is steadily advancing, the face in very hard blasting rock. This drift is east of the ore vein, and is now being pushed ahead to connect with the joint double winze now being sunk near the California line. This winze is now down 33 feet, the bottom still in rich ore. On this level the west drift is being made large enough to lay a double car track when needed. The yield of bullion for this month is far in advance of the yield at the same date in May, so that the payment of the usual dividend of \$2 per share is already an assured fact.

Sinking the C. and C. shaft has been resumed, and is making the best of progress, considering the steady flow of water and the extreme hardness of the rock encountered. The compressor for this shaft is about four and a-half times larger than the largest that has yet been put in operation on the Comstock. Its weight is 63,850 pounds, and its air cylinder is 42 inches in diameter. It is expected to furnish a much larger volume of air when running at a much slower rate of speed than the old machines. This will be a very great advantage, as the air furnished will be much cooler than that supplied by the compressors running at a faster rate.

550 tons of ore is being daily extracted from the California Mine, and the mine shows well at all points.

The Yellow Jacket Mine has attained the deepest point on the lode, being 750 feet below the level of the Suto Tunnel. The mine at that depth is very hot and dry. The ledge is of great width—500 feet or more—and the material met with is birdseye porphyry, with small streaks of quartz carrying ore. In fact even the porphyry itself is not entirely barren, but some of it assays as high as \$6 to the ton, black sulphurets of silver being found sprinkled all through it.

Justice is yielding 450 tons of ore per day, keeping the mills all steadily running up to their full working capacities. The ore stopes from the 400 down to the 700-foot levels are all yielding the regular amount of paying ore. The winze below the 800-foot level continues in excellent ore. The ledge and ore on the 1,000-foot level is showing splendidly and promises a rich harvest. The east drift on the 1150-foot level has been somewhat impeded by the flow of water, but is now making steady progress.

The header of the Suto Tunnel is running in very favorable working material, which drills and blasts well. It is principally ledge matter, requiring careful timbering. Streaks of low grade ore are quite frequently met with.

Operations in the Gould & Curry Mine are being prosecuted with a great deal of energy. The bonanza people are said to have taken in a large amount of this stock recently. A recent report from the mine states that "every effort will be used to push both cross-cuts to the east vein, as we have now overcome the great difficulty in handling the water. In ten days it is my intention to start sinking the main incline to the 1000-foot level. By the time it reaches this point the lateral drifts will have been run from the winze, both north and south, and connected with the Savage Joint on the south and the proposed B. & B. joint winze on the north. When we reach the level from the main incline everything will be in readiness to cross-cut."

The 1750-Foot Level.—The San Francisco Post of the 7th inst. says with regard to the continuation of the bonanza in this level: "The double winze now being sunk in the ore vein on the 1650-foot level of the Consolidated Virginia is exciting considerable attention among stock dealers. According to the last letter from the superintendent the winze was down a distance of twelve feet, all in rich ore. At a distance of one hundred feet the new 1750-foot level will be reached, and if it is demonstrated that the same high grade ore extends to that depth we predict considerable excitement in the stock market. The new level is now being opened up from two directions. A drift is being run from the C. & C. shaft in a westerly direction to tap the bonanza, and another drift (G. & C.) is coming in laterally from the south on the same level. The C. & C. cross-cut at latest reports was in a distance of 100 feet from the shaft. It will be remembered that the crosscut on the level above (the 1650) cut the east clay of the vein at a distance of 650 feet from the shaft. As

the average dip of the clay on that level is at an angle of forty-five degrees to the east, it is estimated that the 1650-foot level crosscut will tap the ore body at a distance of 550 feet. At the present rate of progress, at least two months' time will be required until the vein is reached. Mr. Robert Graves has just returned to this city after making a careful examination of the mine. He reports it to be in excellent condition, and says that the ore stopes on the 1650 are widening out and yielding a rich character of ore, the prospects of the whole level being more favorable than at any time in which he has inspected it."

The north drift, on the 2000-ft. level of the Alpha Consolidated Mine, has penetrated to the Exchequer line, so that crosscutting the ore vein in that portion of the mine is next in order now. On the 2135-foot level of the Imperial the north drift has penetrated to the south line of the Alpha, and is now advancing in very soft favorable ground.

Sinking the south winze of the Imperial, near the Yellow Jacket line, is making the usual fair rate of progress, the bottom being in very favorable quartz and ledge matter.

The Belcher Mine yields eighty tons of ore per day, keeping the Santiago mill running, and making a reserve on which it is the intention to start up the Kelsey mill in a few days. Sinking the main incline below the 1800-foot level is making fair headway. Sinking the combination air and drain shaft is also making the best of speed.

NEW YORK MINING STOCK EXCHANGE.—The total transactions of this Board for the week amount to 23,550 shares, as against 17,910 shares reported last week.

Copper Stocks.—The sales for the week were about equally divided between the Atlantic and National Mining companies, the former at a slight advance.

Sales.					
Atlantic.....	3,600 shares	\$7 12½ @	\$6 87½		
National.....	3,300 "	25 @	..		
Closing Quotations.					
	Bid.	Asked.		Bid.	Asked.
Allouez..	2 00	5 00	Mesnard..	..	1 00
Atlantic..	6 75	7 25	National..	25	35
Cal'tHecla16900	171 00	00	Osceola..	19 00	20 00
Central..	39 25	40 50	Pewabic..	1 00	2 00
Franklin..	4 00	8 00	Quincy..	33 00	35 00
Madison..	25	50	Ridge....	2 25	3 50

INCORPORATIONS.

We note the recent organization of the following companies, in addition to the announcements in our issue of June 9:

Name of Company.	Location.	Cap. Stock.
Alta Petroleum Co.,	California,	\$5,000,000
Minniotta Belle Silver Min'g Co.,	"	10,000,000
Echo Mining Co.,	"	2,500,000
Number One Gold Mining Co.,	"	80,000
Cascade Water and "	"	99,000
Plumas National Quartz Mining Company,	"	1,000,000
Montour Gold and Silver Min'g Company,	"	96,000
Gold Hill Mining Co.,	"	5,000,000
King Mining and Smelting Co.,	Nevada,	10,000,000
Pleides Gold and Silver Mining Company,	"	1,000,000
Argent Mining Co.,	"	5,000,000
Palisades Gold and Silver Min'g Company,	"	1,000,000
Combination Mining Co.,	"	10,000,000
Rocky Mountain Mining and Reduction Co.,	Colorado,	1,000,000
Crow Silver Mining Co.,	"	500,000
Crittenden County Lead and Zinc Mining Co.,	Kentucky,	300,000

The following companies have increased their capital stock: Phil Sheridan, of Nevada, from \$2,400,000 to \$10,000,000; Star Mining Co., of Nevada, from \$2,000,000 to \$6,000,000; Akron Iron Co., of Ohio, has increased its capital by \$75,000.

Gas Stocks.

NEW YORK, FRIDAY EVENING, June 29, 1877.

The market for gas stocks is extremely inactive, and prices still tend downward.

The following list of Companies in New York and vicinity are corrected weekly by GEORGE H. PRENTISS, Broker and Dealer in Gas Stocks, No. 30 Broad st., N. Y.

Companies in New York and vicinity.	Capital Stock.	Par.	Rate per an.	Am. of last.	Date of last.	Dividends.		Quotat'ns	
						Bid.	As'd		
Mutual N. Y.	\$ 5,000,000	\$ 100	10%	2½	Apr. '77	94	95		
" Gold Bonds	90,000	1,000	7%	3½	Feb. '77	107	107		
N. York "	4,000,000	100	10%	5	May '77	125	130		
Metrop. "	2,500,000	100	10%	5	June '77	130	132½		
" Certf.	1,000,000	100	7%	3½	"	100	103		
" Bonds	500,000	1,000	7%	3½	"	102	104		
Harlem "	1,850,000	50	8%	4	Feb. '77	98	104		
Manhat. "	4,000,000	50	10%	4	July '77	188	191		
Brooklyn, B'klyn.	2,000,000	50	15%	5	July '77	150	—		
Nassau, "	1,000,000	25	10%	4	Jan. '77	—	80		
" Certf.	700,000	1,000	7%	3½	May '77	95	100		
People's, "	1,000,000	10	10%	4	Jan. '76	—	40		
" Certf.	300,000	1,000	7%	3½	Jan. '77	80	85		
" B'ds	325,000	100	7%	3	Feb. '77	90	96		
Metrop. "	1,000,000	10	5%	2½	May '77	65	70		
Wmsb'rg "	1,000,000	50	10%	3	Apr. '77	120	126		
" Certf.	1,000,000	100	7%	3½	Jan. '77	100	102		
Citizen's "	1,200,000	20	10%	4	Jan. '77	70	80		
" Certf.	300,000	1,000	7%	3½	Apr. '77	95	97		
J. C. N. J.	750,000	20	10%	5	Jan. '77	160	—		
Cent. West N. Y.	465,000	50	7%	4	Jan. '77	85	90		
Subur'n "	295,000	50	7%	3½	Apr. '77	90	100		

*Ex-Dividend.

†Paid Irregularly.

San Francisco Gas Company.—We note recent transactions of some 300 shares of the stock of this company at from \$100 1/2 to 104 per share.

People's Gas Company, of Baltimore, Md.—We note recent quotations of this stock at 12 1/2 bid, and \$14 per share asked as against \$26 per share eight months ago.

St. John, N. B., Gas Company.—The Telegraph of the 26th inst. says, with reference to the resumption of operations by this company: "At an informal meeting held yesterday afternoon, the Directors decided to go on with their works at once. They expect to have St. John supplied with gas in ten weeks from date. The step is a bold and noble one, and will do much good indirectly as well as directly. The company has ample means and fair prospects."

Montreal Gas Company.—We note recent transactions in the stock of this company at \$149 per share.

Lighting the Twenty-fourth Ward of New York.—Comptroller Kelly invites proposals for furnishing gas or any other illuminating material for lighting Riverdale (twenty-fourth ward) from July 16 to December 31, 1877.

Lighting the Camden, N. J., Streets.—The Globe Lighting Company have proposed to the Lighting Committee of the Camden City Council to light all lamps belonging to the city in which gas is not used, at the following prices: On nights when the moon does not shine and extinguish them at 1 o'clock, \$2.34 per 1,000 feet; each night until 1 o'clock, \$2.25; all night for each night during the week, \$2.

The Chicago Gas Question.—The Special Committee

of the Chicago Common Council will meet on the 30th inst to consider the question of burning oil or gasoline instead of gas in the streets.

Garden City Gas Company, of San Jose, California.—We note the recent organization of this company, with a capital stock of \$200,000.

Harlem Gas Company.—We note a recent auction sale of a small lot of the stock of this company at 100 1/2 per cent.

COUPONS AND INTEREST are due on the bonds of the following companies during the month of July: Champaign and Urbana, Ill., Gas Light Company.—Coupons.

Kankakee, Ill., Gas Company.—Coupons. Lawrence Gas, Coke, & Coal Company.—Coupons. Omaha, Neb., Gas Company.—Coupons.

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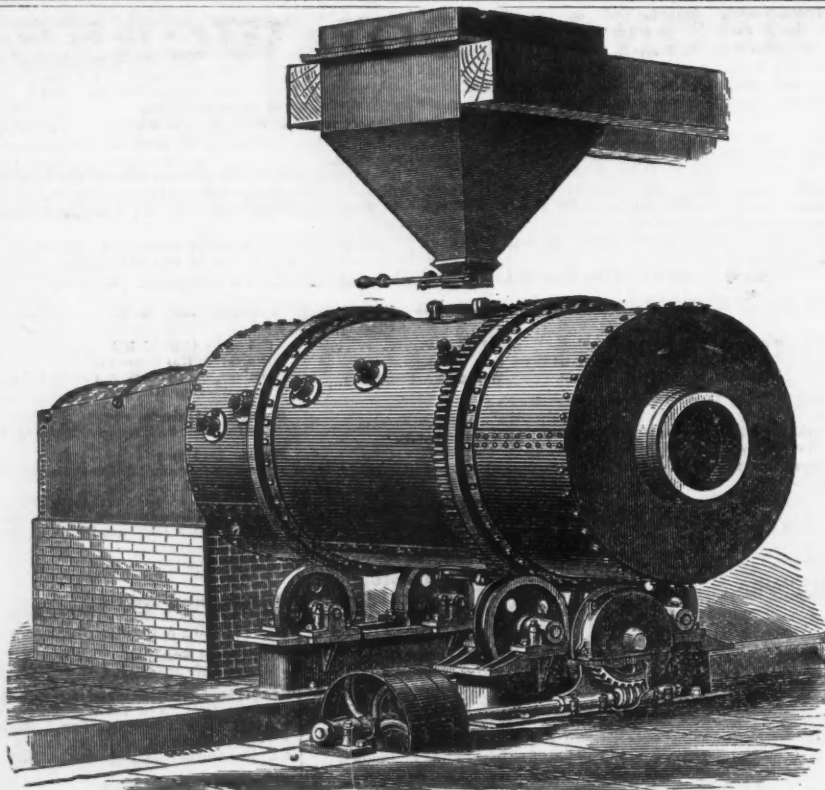
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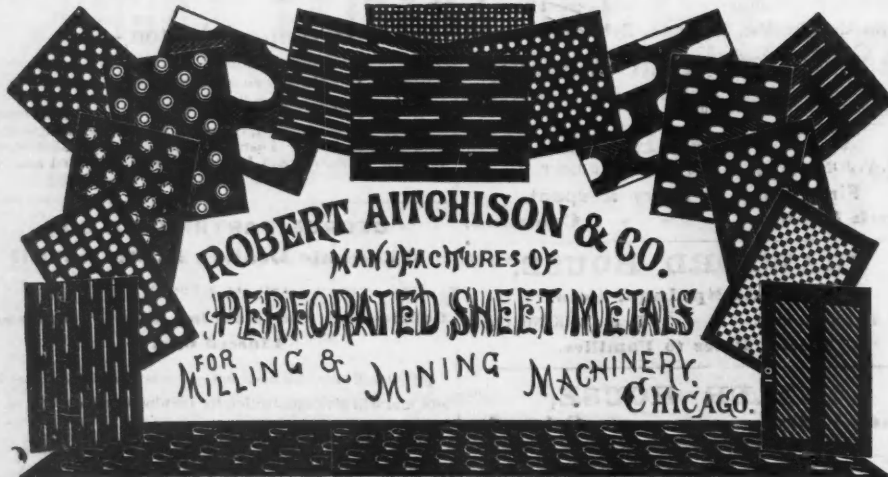


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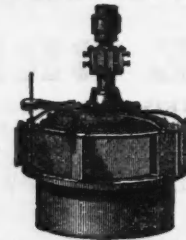
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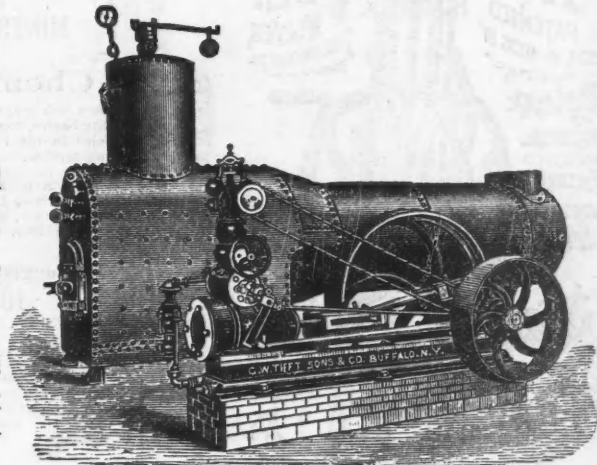
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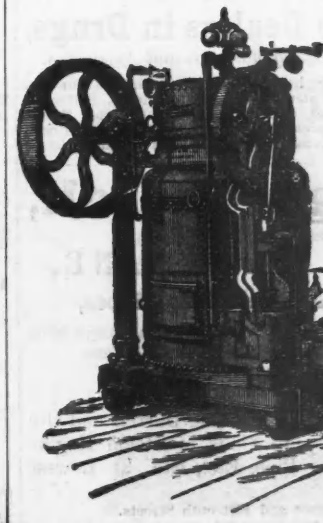
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