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THE ANTHRACITE PRODUCTION IN 1887.

Mr. JOHN H. JONES, official statistician for the anthracite companies, has issued his report giving the full shipments of anthracite coal for the past year. This table will be found in our market reports.

The shipments amount to 34,641,017 gross tons, being an increase of 2,504,655 tons, or nearly 7½ per cent over the shipments in 1886. To this amount we must add about 6 per cent for consumption and sales at the mines, in order to get the total production, which was therefore 36,626,627 gross tons.

The Lehigh Valley and New Jersey Central railroads were heavy losers, but all the other companies, and especially the Lackawanna & Western, increased rapidly. The Pennsylvania Railroad also increased until it is approaching the Delaware & Hudson in output.

The records which some of these companies have been making are going to be the chief difficulty in arriving at a basis when it again becomes necessary to restrict production.

The increase in the consumption of anthracite during 1887 was even greater than that in production, for stocks held by the producers at tide-water alone, which at the beginning of the year were 372,283 tons, were at the end but 130,977 tons, and at other points their stocks were also greatly reduced. It is, we believe, within the facts to state that stocks of anthracite throughout the country at the close of 1887 were 1,000,000 tons less than at its commencement, so that the consumption of anthracite in 1887 must have exceeded that of 1886 by fully 3,500,000 tons, or by nearly 11 per cent, a normal rate of increase being about 4 per cent. The increased consumption was especially in the West.

Had the present winter been as severe as usual, there would have been an absolute scarcity of anthracite, so that we enter the new year with the certainty of a large production and the probability of good prices to the producer for the entire year. If consumption during the present year were the same as in 1887, the replenishing of stocks would make a considerable increase in production. We expect to see this amount to 35,000,000 tons shipments, or 37,000,000 tons total production, in 1888.

Prices for anthracite in 1887 were steadier, and nominal prices better maintained, than in any previous year in the history of the trade. They close at the highest point reached in the year, and the early part of 1888 bids fair to see them maintained at a rate considerably above that of the corresponding portion of the previous year.

It requires no prophet, however, to foresee the time when the producers can turn out more coal than the market will call for, and the strife over percentages, and the sly concessions in prices, will bring back scenes of former days, unless, as indeed seems very probable, the whole anthracite trade gets into a "trust" or under other single control. This raises questions too important to be discussed in the space at our command at present; it shall, however, have full attention in due time.

THE ANTHRACITE STRIKE.

By an unimportant typographical error the amount of money invested by the employes of the Lehigh Company in building-lots during the past five years was stated last week in our report of Dr. RAYMOND's address as \$66,505. It should have been \$86,505. With this small correction we believe the figures given and the statement made are perfectly accurate and unassailable.

The address in question has been widely re-published in whole or part by our contemporaries, and in many cases where the substance of it has been given, errors due to ignorance of the circumstances have been committed. We wish to correct one or two of these, believing that nothing is so unfortunate in the discussion of such questions as those unintentional mistakes which an opponent can seize upon as misrepresentations, and use to impugn the fairness of a statement, and to complicate the issue. The corrections we shall make are in every case strictly in accordance with the statements of Dr. RAYMOND's address, and are directed merely against misunderstandings of it.

In the first place, the Lehigh strike and the Schuylkill strike are distinct and should not be confounded. There is no charge of bad faith against the Lehigh miners. The "basis" arrangement under which they had been working for so many years, expired long ago as a contract and had been continued only by mutual consent. We understand that in some cases it had been the custom of the employers to announce to their men at the beginning of each year that they proposed to continue the "basis" arrangement through that year, and that the men had in those cases tacitly or explicitly assented. Whether this constituted in such cases a contract for the year is a matter we do not propose to discuss without a knowledge of the exact facts in each instance. We think such a contract made for a year, and held binding on both parties, would be a good thing in the coal mining business, as it has proved in many others. Obviously it could be made only with men free to make it and free to keep it. And this constitutes one of the great differences between the trade unions, which are, on the whole, noted for good faith in standing to their bargains, and the Knights of Labor, who are notorious for the opposite. It is impossible for any employer or set of employers to make bargains with their employes if the latter are subject to an outside authority, which can command them at any time, for reasons not directly connected with that bargain, or even that industry, to break their promise.

But it is not claimed that the Lehigh miners, as a whole, broke any promise in their strike of last autumn. In their demand for an advance of some 15 per cent, they practically rejected the familiar basis, and reopened anew the question which it had temporarily settled. They may have thought honestly that the companies would consent to pay more rather than stand still. This course was a mistaken, probably a foolish one. When the employer says "I cannot afford to pay the wages demanded," and the employes don't believe him, there are but two courses open to the latter under our present system—arbitration or a strike. The strike is a rough appeal to facts, injurious to both par-

ties, and undoubtedly to be considered as a last resort. The practice of striking first and hearing afterward is mischievous and foolish. But the strike is not such an outrage of justice as the violation of a contract or as the boycott. The worst form of the boycott is the *boycott-strike*—that is, the strike to inflict injury upon A, B and C in order to coerce D. It defeats the only object which can justify the strike, namely, the purpose of ascertaining beyond doubt whether D can pay the wages or grant the changes demanded, for it obliterates that question entirely and sets up a new one, namely, whether A, B and C, to escape the undeserved loss visited upon them, can coerce D to accept a loss.

Now, the Lehigh strike was in the main a simple and legitimate one, though it did not spring from distress among the miners, and was part of a plan among the "labor-leaders" for a progressive conquest of all the anthracite regions, involving ultimately an advance in the price of coal to the public. The plan was foolish; the arguments by which the miners were misled were reckless, untrue, and sometimes wicked; but the first step of the Lehigh strike was neither a boycott nor (unless in special cases) a violation of contract. The Reading Railroad strike, on the contrary, was a foolish boycott, and the Schuylkill miners' strike has all the evils of bad faith besides.

Another misconception, not warranted by Dr. RAYMOND's address, is the assumption that the Schuylkill miners were receiving, before the advance of September, wages calculated on the basis described in that address, and that the advance they then received was the same as had been asked for by the Lehigh miners. Schuylkill wages were calculated on a similar, but not on the same, "basis" as those of the Lehigh region. The price of coal at New York was not the governing element. And the advance they received was only 8 per cent. That the Reading Coal and Iron Company could not afford to pay it is perfectly well known to all operators in the region. But it was only about half the advance demanded of the Lehigh companies.

The New York *Evening Post* says, in view of Dr. RAYMOND's address, that the coal mining companies ought to proceed to substitute other miners for those who refuse to work at fair wages. This is one of those theoretical suggestions that are utterly impracticable. In the first place, the proper conduct of a colliery does not permit the wholesale substitution of new and unaccustomed men. Even if skilled coal-miners could be got in sufficient numbers (as they could not), their lack of knowledge as to the peculiar conditions of each colliery would lead to much injury and loss. In the second place, the anthracite regions are peculiarly exposed to two kinds of destruction. The great "breakers" are the most inflammable of buildings; and the mines can not, like most metal mines, endure flooding. In many collieries, the coal-seams are underlaid or overlaid with beds of clay, which swell irresistibly when the water rises to them, and crush the timbering and the pillars of coal themselves. The expensive plant of the anthracite business is thus literally in peril between fire and water.

Now, so long as the mining population consider a pending dispute between themselves and their employers as a temporary affair, to be ended sooner or later by a victory or a compromise, they are directly interested in preserving the property of the companies. Burning a breaker will make work for builders, but throw miners out of work. Moreover, at one time, when the burning of breakers to "make work" had become too frequent, a company thus afflicted quietly omitted to rebuild a breaker thus burned; since which time it has been a little uncertain whether such incendiary devices will make work for anybody, and the practice has measurably ceased. On the other hand, flooding a mine may lead to its abandonment for years, forcing the mining population to move away, and destroying the value of their houses and building lots. For these reasons the protection of property during an anthracite coal-miners' strike is not very difficult. A few extra watchmen, with the general sentiment of the laboring community, on their side are quite enough to guard against the drunken and the crazy. We believe that no acts of wanton injury to mines or machinery have characterized the present strike. The half-dozen crimes of that kind which have been reported were directed against the railroad company, being attempts to wreck trains or burn bridges. The story of the "labor leaders" is that these were sham outrages devised by "Pinkerton's men," to throw odium on the cause of labor. With those who can believe this, we have no controversy. But the fact remains that neither Pinkerton's men nor anybody else have set fire to coal-breakers, if we except the burning of Coxe Brothers' breaker at Drifton, or stopped or disabled pumping engines at the idle collieries. Nor need such outrages be seriously feared, so long as the miners expect that the worst result of their strike will be a return to work at former wages, and a patient waiting till their treasury is again full for another struggle.

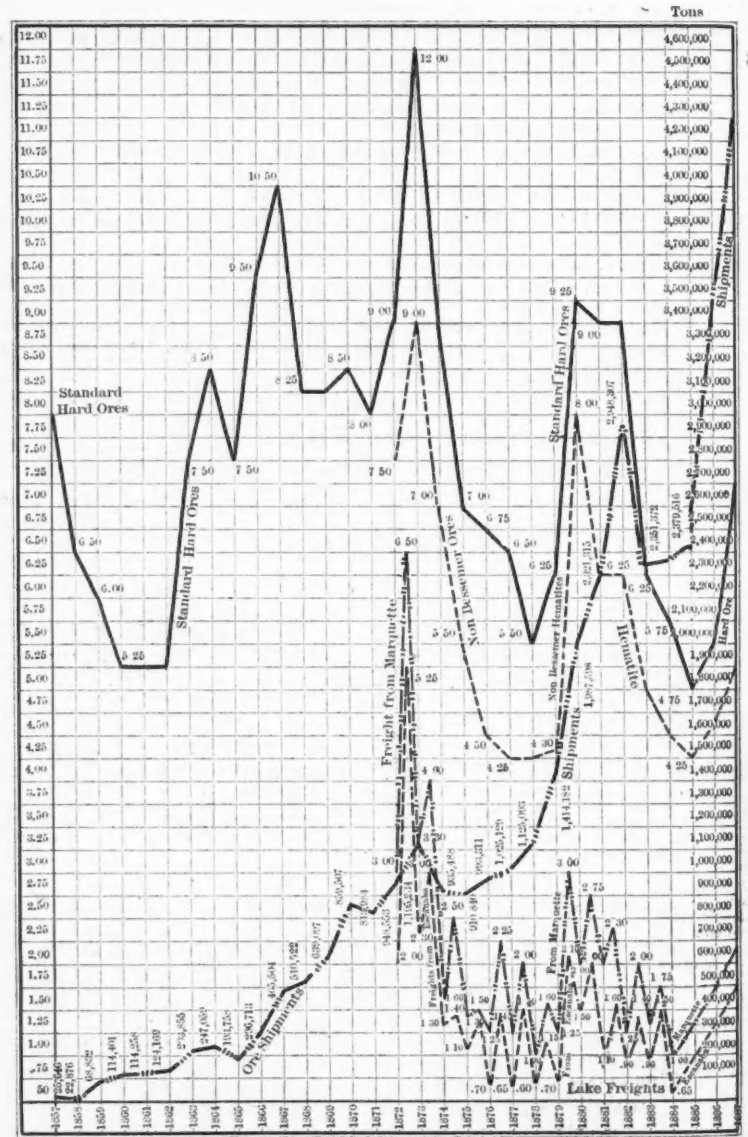
But let a movement once begin for the operation of any colliery with a new set of men, and not all the police and militia of Pennsylvania could prevent the reckless destruction of property. The community, no matter how much it may be shivering, can not compel the colliery proprietors to take this certain peril unless it is ready to pay the damage they suffer. The suggestion of the *Post* is unfortunate, because design-

ing persons have already attempted to inflame the striking miners by the story that the course it recommends is, in fact, contemplated by Lehigh employers; and its advocacy may tend to make some credulous or excited people believe the hoax. We have authority for saying that no such purpose has been, or is now, entertained.

In our judgment, the present strike in the coal regions should be firmly endured without yielding, but without irritating measures, by the companies involved; and the community should patiently take its share of the trouble, realizing that the issue is one in which all are interested, and that the result, if it should be the overthrow of a monstrous, irresponsible and reckless tyranny of so-called "organized labor," will be something in which all can rejoice.

PRODUCTION OF LAKE SUPERIOR IRON ORE IN 1887.

The Marquette *Mining Journal*, published revised and corrected tables showing the output of the Lake Superior mines for 1887, and the entire production of the mines of that region up to date. The table gives the shipments by rail and lake of the different mines, but does not include ore remaining in stock at the mines, or in cars and in the pockets of the



SHIPMENTS, PRICES AND FREIGHTS OF LAKE SUPERIOR IRON ORES, 1857 to 1887.

ore docks. The figures represent, therefore, the quantity of ore actually placed on the market and made available for consumption. The shipments were as follows:

	1885. Tons.	1886. Tons.	1887. Tons.	Total to date. Tons.
Marquette Range	1,430,416	1,636,383	1,836,953	25,183,562
Menominee Range	600,435	880,006	1,193,743	7,427,398
Gogebic Range	119,756	756,572	1,237,704	2,115,044
Vermillion Range				
Minnesota Iron Company ..	225,484	304,396	304,252	986,256
Miscellaneous	441			2,220
Grand total	2,406,532	3,577,357	4,667,652	35,714,610

The entire consumption of domestic iron ore in the United States in 1887 was about 11,000,000 gross tons, of which the Lake mines supplied about 42½ per cent of the ore, or about 55 per cent of the pig-iron produced from native ores.

The production of Lake ore in 1887 over 1886 was 1,090,295 tons, of

which nearly one half came from the Gogebic and 300,000 from the Menominee districts. We believe these regions will continue to grow rapidly, having immense bodies of ore easily obtained near the surface.

Some of the greatest of the Menominee mines yield, however, non-Bessemer ores; but on the other hand, the very low cost at which they can be produced, and their excellent quality as foundry and mill irons, will open to them very wide markets. Some of these mines can produce ore at a lower cost per unit of iron than any other mines in this country, and the advantages of water transportation to many large markets will always insure them a large output. The excellent quality of our Lake Bessemer ores is well shown in the enormous growth of this trade.

The accompanying diagram, for some of the data on which we are indebted to the *Iron Trade Review*, gives the production of the Lake regions and the prices of Bessemer and non-Bessemer ores, of Lake freights from the shipping ports to Cleveland from 1857 to the close of 1887. The production line should have been carried a little higher in 1887, otherwise this interesting table is believed to be accurate.

The fluctuations in prices will become less as the inevitable lower prices of the future are reached. Lake freights will probably never again reach the figures of 1887, and their reduction to fairly profitable rates and a slight reduction in rail rates, will reduce the cost of ore in Cleveland fully \$1 a ton. This, of course, will be felt in the price of iron; in fact, it has already been discounted in the decline in Pittsburg prices, which we have recorded for some weeks past.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested. All letters should be addressed to the MANAGING EDITOR. We do not hold ourselves responsible for the opinions expressed by correspondents.

The Price of the Ely Mine.

EDITORS ENGINEERING AND MINING JOURNAL:

SIR: Yours of January 14th contains an error in statement of price at which the Ely, Vermont, copper mines were sold at auction. The price was \$36,000, instead of \$80,000. Yours truly,
NEW YORK, Jan. 16, 1887. KEMPTON & THACHER.

Trough Lixiviation.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: It is not my intention to make any comments on Mr. Hofmann's reply to my criticism on trough lixiviation, since a subject of such slight importance has already occupied too much space in the JOURNAL. I only want to correct an error of my own. I gave credit to Mr. Hofmann as having originated the idea of trough-lixiviation. In this I am mistaken. Mr. E. H. Russell has drawn my attention to a letter he addressed to me on January 3d, 1885, from Bullionville, Nev. This letter described the method of raw lixiviation of Bullionville tailings. After stating that the tailings, together with the hyposulphite solution, are charged into a settler, and discharged from the latter into a trough ending above the lixiviation tubs, the following sentence occurs: "The silver is practically dissolved by the time the tailings reach the tubs, but the difficulty is to wash the silver solution out of a bed of tailings so fine and compact that no water will pass."

Mr. Russell further states: "The same process of dissolving the silver quickly was in use in Utah six or seven years ago. The ore was thrown into an agitator which contained the solution."

The facts stated in Mr. Russell's letter had entirely escaped my memory.
NEW YORK, January 16, 1888. C. A. STETEFELDT.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Permit me to say a few words about Mr. Ottokar Hofmann's "Trough Lixiviation." I had charge of the roasting and leaching departments at Las Yedras, while Mr. Hofmann was making his experiments there, and noted his results.

The system is not at all new, having been in use in Bullionville, Silver City and Lake Valley several years ago, and in each place it was abandoned, owing to the mechanical difficulty in separating the ore from the solution. Mr. Hofmann's experiments at Las Yedras consumed but a few hours, and the total amount of ore used did not exceed one half a ton. His tailings samples do not represent mill results, and are, therefore, of little if any practical value. Having found it impossible to remove the hyposulphite solution from the ore in the small settling tank, he disregarded it altogether, and caught samples from the end of the trough; these samples were poured into filters, and, after being thoroughly washed with boiling water to remove all traces of silver hyposulphite solution, were handed to my assistant to be assayed.

The following table shows that the trough, 150 feet long, did not extract all the chloridized silver, even though the tailings were subjected to further leaching in the assay office.

Average of 12 experiments, pitcher samples: percentage chloridized, 77.2; percentage extracted by trough leaching and subsequent treatment, 65.9; percentage not extracted by trough, leaching, etc., 11.3; average of 12 experiments pitcher samples: chloridized, 77.2 per cent; extracted, 70.0 per cent; not extracted, 7.2 per cent.

These twenty-four experiments were the only ones made by Mr. Hofmann.

Perhaps, by increasing the length of the trough, his results might approach nearer to the percentage chloridized, but the objections to using such a large volume of hyposulphite solution, and the difficulty and time required to separate the solution from the tailings, which would probably require as many if not more tanks than are used in the ordinary tank process, will, I think, prevent the practical use of this method.

SAN FRANCISCO, Dec. 31, 1887.

GEO. J. ROCKWELL.

What Hurts Mining in Arizona.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Allow me to call your attention to an article in the *Silver Belt*, dealing with a new addition to deceptions and misrepresentations practiced in "selling mines" to outsiders by unscrupulous persons, and reflecting seriously on the common-sense possessed by the victims who will pay large sums of money for so-called mines without first having a full examination made as to their existence and value, by competent men.

Before me is the prospectus "of the Oak Grove Mining Company," of St. Louis, one million capital, divided in one hundred thousand shares at \$10 each on the theoretical basis of "six full-sized claims, 600 by 1500, all being a compact body containing about 120 acres and located in the great mineral belt upon which nearly all of the rich and paying mines of Arizona are located, said mineral belt extending clear across the territory." The prospectus says there are six "full-sized claims," and the conclusion presented by the author of the same is so full of mis-statements that it seems strange that a body of business men could not have discovered the shallowness of these statements. Had they sent their representative before, instead of after the purchase, they might have saved their money, for he, as an honest man, would have advised them to pocket their loss and drop the thing.

These outrageous transactions in palming off more or less worthless properties to innocent but credulous parties was common practice, but has lost its strength by the exposures made by such journals as yours and others. Still they exist as the curse and the pest of mining countries, and the perpetrators stand a chance to be punished by the law, or without the law, sooner or later.

Globe District, which naturally is one of the most promising mining districts of Arizona, has suffered severely since its existence from such pests. Trumped up mining experts and unscrupulous speculators in human weakness have done far more harm to Globe than the fear of the neighboring Apache savages has done in the past.

As a copper producing county it has decidedly no equal in the territory. The splendid results achieved in the Globe mine by the Old Dominion Mining Company could be multiplied in a much larger scale by numbers of good copper mines around here, and it is not too much to say that instead of a few hundred tons copper monthly a few thousand could be produced, and with much larger profits, by using modern plants and improvements, and railroad connection with either of the main lines.

The silver mines of Globe are of no less importance, and some of the most famous are right around here, but idle, I regret to say, at this time. As for gold mines, there are numerous very large auriferous quartz veins in this vicinity, but none are worked, except in a lilliputian style by prospectors. In fact, while there ought to be a large and prosperous mining community here, all the work done is confined to a small scale work at the Globe mine and that of prospectors. Much of this inactivity can be traced to disappointments through incompetency or fraud in former years. Let these evils disappear and capital and competent management combine, and Globe will, with its genial climate, be one of the foremost mining camps in the Southwest. Yours truly,
GLOBE, ARIZONA, Jan. 5th, 1888. ALEX. TRIPPEL, M.E.

THE BRITISH MINING SHARE MARKET.

From our London Correspondent.

In commencing my functions as your London correspondent, permit me the luxury of the only personal word in which I shall ever indulge. It will be my object in my letters to give to your readers that information of which I conceive, from a careful reading of American papers, they have hitherto been destitute. They shall know through this column the exact direction in which the mining wind is blowing in Great Britain; the shares most in favor—those which are having their day and those whose day has passed. I shall specially seek to acquaint them with British opinion as regards American mines and the prospects of obtaining capital on this side to work them. In all my communications I "shall nothing extenuate nor set down aught in malice," but endeavor to give a faithful reflex of public feeling here on all that appertains to mining. I now proceed to the real business in hand, and for convenience of reference will divide what I have to say into paragraphs with distinct headings.

CONTINUED RISE IN METALS.

The feature of the last fortnight has been the continued rise in copper. The price of English tin has now reached £167, whereas, about two months ago, it was scarcely £100. Copper has advanced from about £39 to £85 10s., at which price it stood at the close of the year. My review of the year will have acquainted you with the operations of the syndicates that have been at work to force up the prices of these metals, and I have only now to add this information that it is currently believed that the copper syndicate will not cease until that metal is £100. An outcry is being made by the manufacturers of Birmingham and elsewhere against this unnatural inflation of a metal with which they have so largely to do, and it finds its echo in Paris, where representations on the subject are to be made to the government. Before action can be taken, it is thought that, the turn of the syndicate having been served, they will allow the market to look after itself, when a relapse may be expected, not only in the metal itself, but in the shares dependent upon it. Lead shares are quietly being picked up, for it is felt that, with English pig at only £16 per ton, there is a fair margin for at least a £4 rise. Meanwhile the effect upon the mines producing tin, copper and lead has been most marked.

BRITISH MINES.

Wheal Grenville, a tin mine worked on the cost-book system, has just declared the handsome dividend of £1 2s. 6d. per share on the 16 weeks working, and the shareholders, in the midst of their prosperity, did not forget the working miners and managers. West Godolphin appears to have made its last call. Meanwhile the Cornish share market has been firm. There has been an immense amount of business in Drake-wall's mine, thanks to its being a limited liability company. Cornish shares have not risen as they might be expected to do in the midst of such a tin boom as we have just had. The market for them is limited, as the

general public do not like the cost-book system; which in their eyes means unlimited liability.

The Van mine held its meeting on December 30th, and the chairman foreshadowed the resumption of dividends during 1888. This is a famous old mine in Wales. The £4 10s. shares were at one time worth £84. It came upon an immense deposit of lead, which advanced it to the fore front of lead mines throughout the world, but of late it has fallen upon evil times and has undergone the process of reconstruction.

AMERICAN MINES.

Some important meetings of American mines have been held within the past few days, and notably those of New Emma and Flagstaff, Kohinor and Donaldson, Hamby Mountain, Anglo-Montana and New Hoover Hill. Nothing can persuade the shareholders of New Emma and Flagstaff that they are not on the eve of striking some such ore-body as they have had before and as the Vallejo, their neighbor, is enjoying now. The Emma mine, in particular, appears to them to present most encouraging features, ore being found below the former bonanza, where it was roundly asserted that no ore existed. The sage who has been called in to bless both mines is Professor Vincent, who appears to spend his time in traveling between our side and yours on visits to the Flagstaff mine, of which he is the esteemed chairman. He is firmly persuaded that the ore-body is now near at hand, and such a discovery in either the Emma or the Flagstaff mine. I do not hesitate to say, would put an entirely new complexion upon American mines as viewed through British spectacles. Both the Emma and the Flagstaff have ample means at their disposal to carry on their works and the Emma mine has the best machinery in the Territory of Utah. Mr. Cullins, to the regret of the Emma shareholders, has resigned the active management on account of bad health, but will continue to give a general supervision to the company's affairs. Mr. Cullins was not successful, but the shareholders were always of opinion that he wrote truthful reports, and for that reason stood by him for years. The Kohinor and Donaldson mines were originally brought to this country, along with the California, by Mr. F. A. Sands, and, like the early Christians, they have all passed through great tribulation. In the case of the Kohinor and Donaldson, the debts have been reduced, but £5,000 is wanted to carry on the works. This, it is thought, can be raised by debentures. The directors propose to spend £300 or \$400 a month on the mines. Hamby Mountain has been hitherto trying to do what is impossible—develop the mine with insufficient means. Fresh financial arrangements have now been made, and it is thought a small amount of money will bring affairs to a profitable issue. The chief embarrassments of the concern have been the action of the directors in proceeding to allotment upon so small a subscribed capital and the strange conduct of the shareholders in refusing to pay their calls. Anglo-Montana has been fighting its enemies both at home and abroad, and it is a marvel that it has not been wound up. The directors, having defeated their enemies, are now devoting their attention to the development of the mine. In this effort they have been cheered by the report of the director of the Mining Bureau of the United States, who speaks of two of the lodes as worth \$30 to the ton. New Hoover Hill is carrying on merely tentative operations and bids fair to be wound up. It has no working capital, but the little gold that is obtained is devoted to prospecting the mine.

There has been a large amount of business in Alturas shares, which have rapidly advanced from about 18 shillings to £1 10s. The other mines in this market that have been in favor are the Consolidated Esmeralda, New Consolidated, Union Gold and Geld Hills.

OTHER FOREIGN MINE SHARES.

In Indian mines the market has been featureless. On the year, Mysore shares, which are the pivot upon which all the others turn, have lost £2. Queensland mine shares are almost unsaleable.

Good accounts were given at the meeting of the 30th of the operations of the Venezuelan Austin Company upon its Korina lode, which appears to be laying bare very valuable quartz. This company declares that it owns the ten Austin concessions, including the famous No. 9, from which so much gold has already been taken by other persons. Its right to the latter is disputed by the New Chili Company, and legal proceedings are pending. The latter concern claims to be working more extensively in that country than any of its English contemporaries, for El Callao itself is in reality a French company. Organos gold is undergoing reconstruction. The Frontino and Bolivia obtained gold to the amount of £27,142, but could not declare any dividend at the recent meeting. Diamond shares during the last few days have not been much sought after, and African descriptions generally have been neglected.

In Brazilian mines Don Pedro shares have advanced from par to £1 8s. on a reported improvement in the mine. The famous old mine, its neighbor, St. John Del Rey, is for the moment under a cloud.

JANUARY 3, 1888.

GOLD AND SILVER PRODUCTION IN 1887.

John J. Valentine, Vice-President and General Manager of Wells, Fargo & Company's Express, has issued his annual report of the precious metals product of the United States and Mexico. The product of these metals in the States and Territories west of the Missouri River (including British Columbia and receipts by express from the west coast States of Mexico) during 1887 aggregated: Gold, \$33,074,022; silver, \$51,578,118.

The total bullion product of California for 1887 is placed at \$13,662,923, of which \$11,886,957 was gold-dust and bullion, and \$1,825,966 was silver bullion, ores and base bullion. The product of Nevada for 1887 is given at \$10,232,453, of which \$2,590,962 was gold-dust and bullion, \$5,355,647 was silver bullion and \$2,285,844 was ores and base bullion. The product of Arizona for 1887 is given at \$5,771,550, of which \$890,545 was gold-dust and bullion, \$1,073,985 was silver bullion and \$3,817,000 was ores and base bullion. The total yield of the other States, Territories, etc., is given as follows: Oregon, \$950,000; Washington, \$160,000; Alaska, \$609,000; Idaho, \$8,240,000; Montana, \$25,483,275; Utah, \$7,637,730; Colorado, \$23,293,000; New Mexico, \$4,229,434; Dakota, \$1,058,603; west coast States of Mexico, \$762,035; British Columbia, \$556,154.

The United States production of gold and silver is given as follows:

The aggregate gold product in 1887 is placed at \$32,500,067, against \$29,561,424 in 1886, and is the largest of any year since 1860, when \$32,559,067 was produced. The total silver product is given at \$50,833,844, which with the exception of the \$52,136,851 produced in 1886, is the largest ever known in the sections named. In addition to this the value of the copper and lead production west of the Missouri is given as copper, \$10,362,476; lead, \$9,631,073, but the basis of valuation is not stated in the dispatch.

A NEW ASSAY-TON.

By E. N. Riotta.

Many years ago a worthy man tried to help assayers and ease their labors. He would make the transferring of the weight of a button to the certificate of assay very secure and simple. But, alas! he was no assayer. He brought a world of woe to some, and but little or no relief to the rest. He said, "I will take for my assay-ton weight the amount of ore which will contain one milligram of bullion, if the ton of 2000 pounds avoirdupois of such ore contains 1 ounce troy of bullion." Or, to reverse the proposition, he asked, "If a ton of ore contains 1 ounce troy of bullion, what quantity of such ore will contain 1 milligram? This quantity, easily calculated, I will call an assay-ton."

At a glance an assayer can see what confusion was imminent, and it arose. Imprimis, the beautiful American crucible assay was assailed more vigorously than ever by its old enemies the smelters, on the ground that it was now easier to assay by scorification; for clearly to the American assayer using crucible assay; to the English assayer, using the decimal grain system of weights; in fact, to us all, a new factor of trouble had arisen in the seductive

GRAMME ASSAY-TON.

Let us consider for a moment why an assay-ton is a desideratum, and what are its necessary qualifications.

1st. It must be as nearly as practicable that quantity of ore which, by the method, and the size and style of apparatus shall give the best extraction, and with the least per cent of loss in the subsequent process of cupelling, etc. For the scorifier this quantity was finally settled after experimenting by a mixed commission of French, English and German assayers at 3.75 gramme. This is still the "assay cwt." in Germany.

2d. The weight should be of such size that the unit of the weight used in weighing out the beads, or bullion product, should directly read commercial units of bullion per commercial unit of ore. The Germans and the commission above referred to accomplished this by having a special *assay weight*, related to no other, which gives per cent or per thousands, and as they compute per kilo of ore, they read directly from the scale grammes of silver.

A third desideratum might be asked of an assay-ton, that by dividing into halves, quarters, or even tenths, it be adaptable to different methods of assaying.

The milligram assay-ton evidently does not fulfill the first requirement. No apparatus now in practical use will give the best result if one assay-ton of sample is taken, and as a matter of fact, probably nobody ever took one. The crucible assayer takes a half or quarter, the scorifier one or two tenths and no assay-tons are used west of the Rocky Mountains, I believe, and east only the two-tenth assay-ton is used as a unit. Therefore, as the bullion bead weighed up must be multiplied by five, the second requirement is not attained.

I believe that the anger at the uselessness of the "assay-ton" in the West, and the use of the scorifier in the East, has prevented the adoption of the simple solution of the problem, which I now offer. If by any chance I follow, innocently, in the footsteps of a "more previous" brother, I expect to be called to task, and I now plead as excuse for my belief that I am the inventor, that two of the largest and most reputable weight and scale makers in the United States have assured me that they have never heard of the weight as proposed.

A NEW AMERICAN ASSAY-TON.

Some time ago I had an assay-ton made by Troemner & Son, of Philadelphia, which I now offer to assayers, hoping it will please them by shortening their labors, and doing away with one fertile source of mistakes. The weight is based upon the following figures:

If one ton of ore, which is equal to 29,166 ounces troy, contains one ounce troy in bullion, then 291.66 grains of the ore will contain one thousandth of ten grains. (The grain is the English and American assay unit.) Thus:

29,166 oz. troy : 1 oz. troy :: 291.66 grains : 0.001 of ten grains.

This "Grain" or "American" assay-ton weighs, therefore, 291.66 grains, which is only a trifle over 0.6 of an ounce troy. The usual weight of ore taken by English assayers and American assayers west of Colorado is 0.5 troy ounce.

The taking of 0.5 troy ounce for an assay weight was not accidental. Very extensive comparative trials on many hundred different classes and grades of ore have shown me that with the ordinary convenient size and style of smelting furnace, with the ordinary sized crucible, the ordinary muffle and cupel, the greatest yield of silver will be obtained from a quantity of ore varying from 0.45 to 0.55 ounces troy. It is possible that this was an after discovery that the 0.5 ounce assay was used before these trials were made; but it is certain that the assay quantity would have been changed to the best amount. Again it may be that our English assayers' ancestors had developed the fact that the 0.5 ounce was nearly the correct weight under given circumstances, for an assay-ton. On the other hand, the American crucible assay, as now practiced, started with us in Nevada contemporaneously with the finding of silver ores "beyond" the Comstock, and the use of the half ounce troy assay weight radiated from thence.

Any fair trial, under conditions as mentioned, of certain sized apparatus as now in use, will bear me out in the statement that a crucible assay on 0.1 ounce will give a minimum, an assay on about 0.55 ounce will give a maximum, or an assay on a larger quantity up to and beyond 1 ounce will show a steady decrease in the yield. Thus I claim for the 291.66 grain assay-ton that it is very near requirement No. 1 for an assay

ton. These new weights may be seen at the New York Metallurgical Works.

Our ordinary assay weight for gold and silver bars, or assay beads from ore, is the unit of 10 grains divided into one thousand parts. "One thousandth," therefore, of bullion, produced from the "American assay-ton," indicates a bullion value of one ounce troy per ton. The second requirement is thus perfectly fulfilled.

Finally, as to the third desideratum, the scorifier assayer can use the half assay-ton, as the quantity is so near in weight to his present 0.2 gramme assay-ton to be easily accommodated in the ordinary sized scorifier. Then the assayer, instead of multiplying his button weight by five, need only double his weight and read ounces troy direct.

If I had but eliminated one set of weights from an already overstocked office (in this case the French milligramme system is probably the best devised), I should be satisfied. Only a busy man in a busy office will appreciate this.

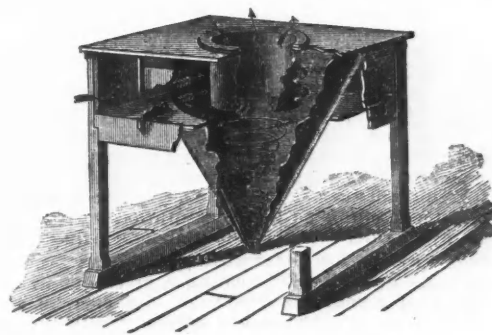
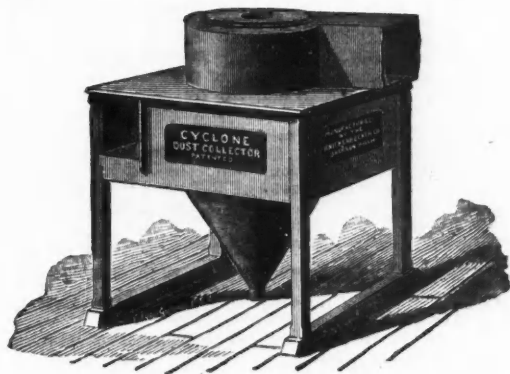
Let this be the rule. There should be in an assay office nothing but troy weights, grains and ounces, decimally divided. In the mill nothing but avoirdupois pounds and decimals thereof. This and nothing else, until such time as America and England shall know only kilos or grammes.

THE CYCLONE DUST COLLECTOR.

We illustrate herewith a very simple and, it is said, a very successful dust collector. The principle on which the machine works is that of centrifugal force, the air carrying dust is rotated in the machine, and the dust naturally is thrown out against the surface of the cone and falls to the bottom, where it can be drawn off while the air itself escapes upward through the centre pipe.

There are no moving parts in this machine. All that is required is either a pressure blower to force the dust laden air into, or better, an exhaust fan, to draw it through the collector. It seems probable that this simple contrivance could be used with excellent effect in collecting lead fumes, arsenic, zinc, antimony or other condensed metallic fumes, as well as for separating the harmful dust from uncondensed gases. It can be made from any material, and its actual cost, aside from royalty, must be very light.

Thus far the cyclone dust collector, which is made by the Knicker-



THE CYCLONE DUST COLLECTOR.

bocker Company, Jackson, Mich., has been used chiefly in flour mills, where the testimonials show it to be extremely efficient; but we anticipate for it a very much wider application in separating dust and condensed fumes from air, and possibly, also, in settling slimes or precipitates from solutions.

OCCURRENCES OF CHROME IRON ORE IN AUSTRALASIA.*

By R. W. Emerson Macivor.

As I have had occasion to examine the deposits of chrome iron ore which occur in different parts of Australasia, with the view of turning them to commercial account, perhaps the following notes may have an interest for chemists, mineralogists, and manufacturers.

The ore is found in quantity in two or three places in New Zealand, but chiefly in the neighborhood of Nelson, in the Middle Island. It exists in various forms, distributed throughout what is locally known as "the Mineral Belt," a broad band of serpentinous and olivine rocks, which can be traced for a distance of about fifty miles from D'Urville's Island, in Cook's Straits, to the mountain called Little Ben Nevis. These varieties are: (1) *Massive Crystalline*, in bands of black, highly crystalline character, which, on being fractured, show distinct planes of octahedron, and sometimes—though rarely—perfect crystals. (2) *Massive Amorphous*, having a brown-black appearance, and somewhat softer in nature than the preceding. This form is usually met with in well-defined bands, which, unlike those of the crystalline massive variety, are remarkable for length and breadth. (3) *Crystalline Disseminated*, in the condition of nodules, or spherical segregations, having a diameter of from one tenth to one half inch distributed more or less evenly through the green serpentinous rocks. This ore presents somewhat the appearance of a conglomerate, and is called "pudding stone" by the local miners. On exposure for a week or two to rain and sun the rock loses its green color and crumbles away to a soft impalpable white powder, leaving the nodules of chromite so that they can be easily and completely separated by mere washing or screening. The nodules have a fracture identical with that of the massive crystalline variety, and are very rich in chromic oxide.

In order to convey an idea of the mode of occurrence of the

several kinds of ore in the same mine, a rough sketch of an open working, made on the summit of Little Ben Nevis, is given.

The face of the working was about 150 feet wide and nearly 50 feet in height. The crystalline massive ore occurs in "patches" or "pockets," and in these in seams which approach the vertical in position, whereas the amorphous massive variety exists in lodes more or less approaching the horizontal. It may be remarked that much of the "pudding stone" consists of segregations held together by only a small proportion of rock, from which they can be readily separated, even without weathering. From 15 tons of the stone I have obtained as much as 18½ tons of chromite free from matrix, while from the same weight of a poorer sort only 3½ tons were obtained. No difference, however, existed in the quality of the nodules themselves, as they contained from 59.8 to 68.9 per cent of chromic oxide, whether obtained from rich or poor "pudding stone." The largest "pocket" of crystalline massive ore which I found at Ben Nevis contained about 68 tons of 55 to 62 per cent stone.

How far my observations concerning Ben Nevis are applicable to other parts of "the Mineral Belt" it is difficult to say, though the long experience of the late Mr. T. R. Hackett, who worked the Dun Mountain for an English company, seems to indicate that the richest ores do not occur in well-defined lodes of any length, but rather in detached "patches" or "pockets."

The average ore of the Province of Nelson could easily be maintained at 55 per cent of chromic oxide—and even 60 per cent is possible.

Chromite, as I have already hinted, is also found in other localities in Southern New Zealand, but it has not been met with in the North Island in sufficient quantity to attract attention.

The ore has been extensively exported from New Caledonia during recent years, and judging from some large cargoes which I examined in Sydney, appears to be in many respects similar to the Ben Nevis stone. The mines are situated about 20 miles from Noumea, the capital of the colony, and the abundance of cheap native labor available for conveying it to shipboard enables the exporters to do their work much more cheaply than is possible in either New Zealand or Australia.

Neither Victoria nor South Australia has yet been found to possess any very extensive deposits of chromite, though in the former colony a considerable quantity of good ore is said to exist in the shire of McIvor.

Large quantities of the mineral occur in the serpentine formations at

Jundagai and Tamworth, in New South Wales, but the cost of labor, railway carriage, and the present low price of even the best stone, will prevent the supplies from being utilized for a long time to come.

Chrome ore has been discovered in many localities in Queensland, but for the most part in places which are at present all but inaccessible. It can, however, be obtained in any quantity in and around the Pine Mountain district, near Ipswich, where there are large areas of serpentine country. The ore is of the amorphous and crystalline massive varieties, and contains from 42 to 60 per cent of chromic oxide. Mines could be opened up very cheaply, and there is ample facility for bringing the ore to Europe.

Antimony Coatings on Metals.—The Brunswick Antimony Company has recently made some very interesting, and, we believe, valuable improvements in coating metals, by dipping them in metallic solutions. We had recently an opportunity of examining several samples of these metals, colored by the new solutions prepared for this purpose. The metals treated were zinc, copper and brass. Every hue of the rainbow can be produced upon the first of these metals by the proper solution, which is worked as a simple dip at normal temperature. The colors are very stable and lasting, provided they are coated with a suitable lacquer and not roughly used. Another example of coating this metal (zinc) with copper was also shown to us, and we are informed that the coating is very adherent and is thick enough to be worked upon to some extent. It is produced by a simple immersion in the solution at the normal temperature in less than five minutes, comparing very favorably with an electro deposit obtained in the same time. On copper a beautiful black, lustrous or dead finish, is obtained by immersion in a boiling solution for 2 to 3 minutes. This finish is very handsome, and especially applicable to chandelier and antique lantern work. Copper objects can be beautifully bronzed by this solution to resemble antique black bronzes. It has produced fine effects on silver. On brass a fine lustrous electro-deposit of antimony is obtained from the same solution that is used for copper, the advantage in this process being that the deposition taking place in an alkaline solution avoids the vexatious difficulties met with in plating articles in an acid solution of antimony. There are many other beautiful applications of antimony in the coloring of metals. Full information can be obtained from the Brunswick Antimony Company, and the beauty of the products should give them wide popularity.

*Extracts from the *Chemical News*.

MODERN AMERICAN METHODS OF COPPER SMELTING.

The *American Journal of Science*, in its January number, says: The author gives here a practical and detailed description of the methods employed in this country for smelting copper, adding more than usual of minute directions and with many useful data as to the actual cost. The volume will be valuable to the student and still more to the practical worker.

The *Engineer*, of London, in a recent issue, says: This is essentially a practical man's book. The author, who has at different times been engaged both in the assay of copper minerals and in the management of some of the larger smelting establishments of the United States, has during the rare moments of leisure in a professional life prepared several papers on the different operations of copper smelting, which are now collected and published. The volume is in no sense a complete treatise on copper smelting, but deals with points of practice that have come under the author's notice, and which, as a rule, are not noticed in the more formal volumes on descriptive metallurgy.

Among the matters of special interest may be mentioned the description of a modified form of the Cornish copper assay in use on Lake Superior, and a very full account of the different forms of blast-furnaces, both round and rectangular, and with and without water-jackets, which have come into general use on the other side of the Atlantic for the various fusion furnaces in copper smelting. Prominent among these is the account of a large Raschette furnace at Oxford, New Jersey, measuring 11½ feet by 3½ feet on the hearth, and blown by fourteen mouth tuyeres, which smelts 95 tons of ore daily, with a consumption of 12½ tons of coke and four tons of small anthracite for the blowing engine. The section describing the calcination ores and regulus, and the operations of refining blister copper, also contain much interesting matter, although in these there is not much in the way of novelty to report.

Mr. Wm. Allen Smith, mining engineer, in a recent letter says: "I have read Dr. Peters's valuable work on Modern American Methods of Copper Smelting. The author has accomplished that in which many fail; he has written a comprehensive scientific monograph, admirably arranged and easy to read. The terseness and lucidity of his style are only too rare in similar treatises. The volume takes its place at once as a standard work."

Chinese Copper Mines.—A correspondent writes to *Indian Engineering*: "I am busy trying to persuade the Chinese government to adopt the Lartigue system of elevated single rail railway. I am this day forwarding nine Japanese engineers, and other experts in copper mining, to the far-off Province of Yun-nan, together with about half a ton of dynamite and other explosives for their use."

A New Method of Determining Carbonic Acid in Solution.—Leo Vignon.—The colored liquid produced by mixing 50 cc. of lime water and 10 drops of a saturated solution of pure phenol-phthalein is very rapidly decolorized by the addition of a sufficient quantity of an aqueous solution of carbonic acid free or combined with neutral calcium carbonate. Hence it results that carbonic acid in a free or a semi-combined state may be determined volumetrically by saturation with a standard solution of calcium hydroxide, using phenol-phthalein as indicator.

New Volumetric Process for Determining the Gray Zinc Powder of Vieille Montagne.—F. Weil.—On treating a given quantity of zinc powder with an excess of a neutralized solution of copper, of a known strength, the metallic zinc contained in the sample precipitates copper, equivalent for equivalent. On then titrating the excess of copper remaining in solution with stannous chloride the difference between this quantity and the total copper employed indicates the copper precipitated by the zinc. If this amount is then multiplied by 1.0236, we have the quantity of pure zinc contained in the sample.—*Revue Universelle*.

Prehistoric Human Remains in a Texan Cave.—In a cave near the summit of the Diablo Mountain, about two hundred miles east of El Paso, valuable archaeological remains have recently been found. Dr. Wortman, comparative anatomist of the Medical Museum at Washington, and H. B. McDowell, who is connected with the San Francisco *Examiner*, arrived here two days ago and have gone to investigate the find. They have recently been on the Heminway Southwest archaeological expedition, which, under the leadership of Lieut. Cushing, has been prosecuting ethnological researches among the Zuni and Pueblo Indians, of Arizona, and has discovered an ancient city buried beneath the sands of the desert. Among the objects said to have been found in the cave are the remains of a human being of giant size, bone needles six inches long, and fragments of broken pottery. The cave is in the midst of a district rich in copper and silver ore.

The Mechanical Equivalent of Heat.—Dr. Dieterici gave an account at a recent meeting of the Berlin Physical Society of his experiments on the determination of the mechanical equivalent of heat by the indirect electrical method. He made this choice of method on account of the exactness with which electrical values can now be determined in absolute units. The speaker described the general arrangement of his experiments, and gave a detailed account of the ice calorimeter which he used, as specially modified by himself. As the result of his series of measurements he obtained closely agreeing values for the mechanical equivalent of heat, namely, 424.4 and 424.2 as the mean of each series, the highest and lowest values obtained differing but little from the mean of the determinations. When making his calculations, the speaker took as the specific heat of water the mean of the determinations made between 0 degree C. and 100 degrees C. The statements which have been made respecting changes in the specific heat of water as dependent on changes of temperature differ so greatly with different observers that the mean values based on their results provide no constant factor; the speaker's determinations would have been considerably different had he taken as his basis any other value of the specific heat of water. He next compared the results of his experiments with those of earlier observers, and discussed the very marked differences in the values given for the specific heat of water at various temperatures. He thinks that the specific heat of water may best be determined by the electrical measurement of the mechanical equivalent of heat, and intends to investigate this question more fully at a later date.

Forty Thousand Lines to the Inch.—Dr. H. A. Rowland, of the Johns Hopkins University has a new engine for ruling his plates for spectrum analysis or decomposition of light. This engine was made entirely at the university under his personal supervision, and is the result of the most careful, painstaking effort. The most important part of it—the screw and its attachments for regulating the width of the lines—was carefully ground under water kept at a constant temperature, so as to avoid all error arising from expansion and contraction, and is guarded against so small an error as one-hundred-thousandth of an inch. The engine is run by water-power, and is inclosed in a glass case, and kept in a double-walled brick chamber in the basement, so as to provide as equable temperature as possible. So delicate is the machinery that while it is running the case is kept closed, as the heat from a person's body would affect it. The old machine hardly ruled more than 10,000 lines to the inch, while the new one has ruled as high as 40,000, and can be graduated to rule an almost infinite number but the metal usually crumbles, and the lines run into each other above 20,000 to the inch. The plates are highly polished, and are made of what is known as speculum metal, though glass is sometimes used for experimental purposes. The prepared plate is placed on the machine, and the screw regulated to the required distance, and when the machine starts it moves the plate the distance, say one twenty-thousandth of an inch, and a small diamond point runs across and draws the line while the plate is stationary. It is a matter of infinite care and several days are necessary for ruling a plate three or four inches in diameter. The diamond point can be so arranged as to vary every fiftieth or one hundredth line, while at the end of the engine is a small counting machine for recording the number of lines drawn. In an adjoining room is a very costly instrument for measuring the width of the lines, and so marvelously accurate is it that an error of one-hundred-thousandth part of an inch, or even less, can be detected. The rulings of this machine are the finest in the world, and have been sent to different parts of the scholarly portion of it, one of the largest and best plates being presented to Professor Helmholtz, the world-famous physicist of Berlin. If a perfect machine means one that perfectly does the work it was designed for, this is probably the most perfect one in the world.

BOOKS RECEIVED.

In sending books for notice, will publishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review in another part of the Journal.

A Text-book on Roofs and Bridges. Part I Stresses in Simple Trusses. By Mansfield Merriman, Professor of Civil Engineering in the Lehigh University, Bethlehem, Pa. Published by John Wiley & Sons, New York City, 1888. Pages 118 and Index. Illustrated. Price, \$2.50.

A Collection of Diagrams, Representing the General Plan of Twenty-six Different Water-Works. Contributed by members of the New England Water-Works Association, and compiled by a committee, consisting of W. B. Sherman, of Providence, R. I., and Walter H. Richards, of New London, Conn. Published by the *Engineering and Building Record*, New York City, 1887. Price, \$2.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

The following is a list of the patents relating to mining, metallurgy, and kindred subjects, issued by the United States Patent-Office.

PATENTS GRANTED JANUARY 17TH, 1888.

- 376,424. Coal Scoop. Frederick B. Barrows, Duluth, Minn., Assignor to himself and Dennison Billings Smith, Jr., same place.
- 376,451. Emery Grinding Machine. Charles E. Roberts, Chicago, Ill.
- 376,458. Pipe Coupling. Alfred Wilbur, Allegheny City, Pa.
- 376,472. Automatic Feed-Water Apparatus for Boilers. Milo Covel, Chicago, Ill.
- 376,473. Draft Regulator for Smoke Passages. John M. Gibbs, Park Hill, Ontario, Canada.
- 376,474. Combined Pile Driving and Well-Drilling Machine. Frank M. Gray, Milwaukee, Wis.
- 376,483. Sectional Water-Tube Boiler. Edward J. Moore, Philadelphia, Pa.
- 376,485. Tube-Expander. James B. Richards and Edward Huber, Marion, Ohio.
- 376,520. Device for Constructing Arches or Centers for Furnaces. Albin Farley, Pittsburg, Pa.
- 376,528. Differential Gear for Traction-Engines. Edward Kite, Pittsburg, Ind.
- 376,531. Device for Charging Retorts. August Lentz, Stettin, Prussia, Germany, Assignor to the Stettiner Chamoite Fabrik Actien-Gesellschaft, formerly Didier, same place.
- 376,537. Slate-Grinding or Dressing Machine. Samuel S. Marshall, Slatington, Pa.
- 376,561. Rail Loading Machine. Cyrus P. Tittle, Johnstown, Pa.
- 376,562. Electric Conduit. Robert Van Buren and James J. Powers, Brooklyn, N. Y.
- 376,579. Preventive of Incrustation of Steam Boilers. Charles J. T. Burcey, Syracuse, N. Y.
- 376,589. Air Compressor. William T. Forster, Kansas City, Mo.
- 376,598. Compressor. Harry H. Jones, Lancaster, N. H.
- 376,609. Tool for Forming Cold-Packed Pipe-Joints. Andrew N. Rankin, Jamaica, N. Y.
- 376,610. Water Motor. Elbridge F. Ranks, Lewiston, Me.
- 376,616. Cut-Off for Engines. John J. Tonkin, Oswego, N. Y.
- 376,619. Nailing-Machine. Elihu Wilder, Newton, Mass., Assignor to the Plume & Atwood Manufacturing Company, Waterbury, Conn.
- 376,632. Crucible Furnace. Craft C. Carr II, Meadville, Pa.
- 376,633. Self-Lubricating Pulley. William T. Carroll, Worcester, Mass.
- 376,636. Gas and Other Fluid Pressure Controlling Apparatus. Henry W. Cole and Albert F. Cole, Stourport, County of Worcester, England.
- 376,638. Engine-Driven Vehicle. Gottlieb Daimler, Cannstadt, Württemberg, Germany.
- 376,639. Triple Expansion Engine. Marshall D. Davidson, Brooklyn, N. Y.
- 376,644. Heat Regulator for Furnaces. Lorenzo D. Ferra, Philadelphia, Pa., Assignor of one half to Horace F. McCann, same place.
- 376,651. Automatic Electric Valve. Charles J. Hexamer, Philadelphia, Pa.
- 376,655. Hoisting Apparatus. George H. Hulet, Cleveland, Ohio.
- 376,658. Reversing Device for Engine. Daniel P. Kane, St. Louis, Mo.
- 376,659. Drift Column or Support for Rock Drills. Patrick Kelly, Poughkeepsie, Assignor to Addison C. Rand, New York, N. Y.
- 376,672. Hoisting Apparatus. Frank P. Mills, Chicago, Ill.
- 376,673. Process of Manufacturing Bolts. Frederick Mutiner, Rockford, Ill., Assignor of one half to the Rockford Bolt Works, same place.
- 376,680. Spirally Welded Tubes. John B. Root, Port Chester, N. Y., Hannah M. Root, Administratrix, and William S. Church, Administrator of said John B. Root, deceased.
- 376,681. Method of Making Spirally-Welded Tubing. John B. Root, Port Chester, N. Y., Hannah M. Root, Administratrix, and William S. Church, Administrator of said John B. Root, deceased.
- 376,683. Weighing Apparatus for Granular and Powdered Substances. Henry E. Smyser, Philadelphia, Pa.
- 376,685. Wire-Colling Machine. David F. Stambaugh, St. Louis, Mo., Assignor of one half to James T. Birch, same place.
- 376,709. Electro-Magnetic Brake. Nicholas J. Clute, Schenectady, N. Y.
- 376,719. Mining-Machine. Eugene Moreau, Philadelphia, Pa., Assignor to Richard B. Westbrook, same place.

THE METALLURGY OF STEEL.*

By Henry M. Howe.

(Continued from page 40.)

IRON AND HYDROGEN.^a

§ 175. SUMMARY.—Hydrogen is usually present in both solid and molten iron, abundantly if measured by volume, sparingly if measured by weight: commercial iron probably does not usually contain much more than 0.01%. Parry has indeed found 0.22% of hydrogen in commercial iron: but numerical relations in his results and the wide discrepancy between them and those of other observers indicate that they are erroneous. Certain facts suggest that iron cannot retain permanently more than about 0.17% or 154 volumes of this gas, but it can temporarily acquire at least .26%.

The hydrogen in iron usually and perhaps always exists in part at least as gas, and sometimes as ammonia gas: but a part at least in certain cases probably exists in some non-gaseous state. It appears to be always easily expelled, and hence is probably not in strong chemical union with the metal.

Heated in hydrogen or exposed when cold to nascent hydrogen iron absorbs a minute quantity of this gas, exposure to the nascent gas reducing the metal's flexibility surprisingly, in view of the minute quantity of gas absorbed, probably not over .01%. The flexibility is restored and at least part of the hydrogen is expelled rapidly by heating, and slowly by simple rest. It is uncertain whether the hydrogen usually present in commercial iron affects it sensibly.

Hydrogen escapes from iron when heated in vacuo, when bored under water, oil or mercury, and during solidification, in the latter case producing blowholes. It is usually accompanied by nitrogen and, except when the metal is bored under water, etc., by carbonic oxide. From fresh fractures of ingots and other castings, and sometimes even from rails, a strong smell of ammonia sometimes escapes, which unquestionably proceeds from the metal itself: and occasionally the escape of ammonia and hydrogen from the fracture is so rapid as to be distinctly audible.

§ 176. *The presence of hydrogen in iron.*

A. *Its Absorption.*—Melting cast-iron in vacuo, in order to remove the gas initially present, and then without removing it from his apparatus and while it was still hot exposing it to a known volume of hydrogen, Parry found by direct measurement that it absorbed from 13.2 to 22.4 volumes^b of this gas.

In a similar way he found that malleable iron, after more or less complete exhaustion in vacuo, reabsorbed from 10.5 to 13 volumes of hydrogen (see Table 57).

No other observer, so far as I know, has directly measured the volume of gas absorbed by iron, though Troost and Hautefeuille and Graham have estimated it by first exhausting the iron by heating in vacuo, then heating and cooling it in hydrogen, and noting the quantity emitted on again heating in vacuo: this varied from .09 to .63 volumes per volume of iron. The gas now evolved contained a larger and usually a much larger proportion of hydrogen than that originally extracted. Graham

found a low, Parry a relatively high temperature most favorable to the absorption of hydrogen.^c

B. *Hydrogen a usual constituent of commercial iron.* So far as my inquiries have gone hydrogen has always been found when properly sought in commercial iron,^d but, neglecting Parry's results for the moment, in very small quantities. The largest quantities found by each of several observers in previously untreated commercial iron are given in Table 60.

TABLE 60.—MAXIMUM HYDROGEN FOUND BY SEVERAL OBSERVERS IN SOLID IRON PREVIOUSLY UNTREATED.

	Cast-iron.		Wrought-iron.		Steel.	
	Vols. per vol. iron.	%	Vols. per vol. iron.	%	Vols. per vol. iron.	%
1. Troost and Hautefeuille	0.177	.00019	.065	.00007	.007	.00008
2. Graham	.....	.....	0.5	.0009	.....	.....
3. Zyromski	.....	.....	1.21	.0013	3.12	.0034
4. Parry	205	.223	1.08	.0012	32.15	.035
5. F. Fox	.....	.....	.....	.....	5.01a	.0055
6. Ledebur	2.6	.0028	.....	.....	1.6	.0017
7. Stead (dull drill)	3.3	.0036	.....	.....	9.76	.0106
8. Müller	.29	.003	.....	.....	.53	.0006

^a Other experiments with this same steel gave 0.1 volume of hydrogen. I have deducted for probable error as inferred from blank analyses.

The results obtained by Troost and Hautefeuille, Graham, Zyromski, Parry, Stead and Müller are further described in Tables 54 and 56.

Ledebur (Wagner's Jahresbericht, 1883, XXIX., p. 46, Stahl und Eisen, 1882, p. 501) oxidized ferro-silicon and ingot iron with dry air in a porcelain tube, first thoroughly drying the tube while the iron was in it by heating to 300° or 400° C. in a stream of dry nitrogen. The water formed by the oxidation of the hydrogen of the iron was caught and weighed. Fox (Thesis for the degree of Master of Science, Mass. Inst. Technology, 1886) in a long and careful investigation in Drown's laboratory, made some twenty determinations of the hydrogen in cast-iron and steel, by oxidizing the metal, mixed with copper oxide or chromate of lead in porcelain tubes, by means of dry oxygen, catching and weighing the water formed. When employing chromate of lead he obtained 14 volumes of hydrogen from cast-iron; but he suspected that the result was exaggerated by hydrogen evolved by this reagent, though precautions apparently sufficient were employed. That the iron was completely oxidized is inferred from the fact that the carbonic acid escaping during combustion corresponded closely to the total carbon independently determined by trustworthy methods.

The results obtained by these observers by the combustion method must be accepted reservedly. In the first place, we do not know that this method will remove the hydrogen from iron. It is possible, though indeed extremely improbable, that the hydrogen initially occluded by the iron may not become oxidized by the oxygen employed, but may remain occluded in the resulting iron oxide: for we do not know that iron oxide has not as great or even greater power for occluding hydrogen than metallic iron has. Indeed, some of Fox's results suggest that it has greater occluding power. Thus, a steel which in one combustion yielded 5 volumes of hydrogen, in another gave but 0.1 volume, or very much less than Parry, Zyromski, Graham and Stead extract in vacuo or by boring. We have in the second place the danger of leakage at the many joints or through the cracks or pores of the porcelain tubes, and of the introduction of unoxidized hydrogen or some of its volatile compounds along with the air: they might well pass the apparatus employed for drying the air, become oxidized with the iron and swell the results. Hence the air or oxygen employed should, before admission to the combustion tube, be heated with copper oxide and dried. As the weight of hydrogen found was generally and that of the water caught occasionally less than one milligramme, trifling errors would seriously vitiate the results. A similar source of error is the hydrogen initially occluded by the porcelain tubes and other portions of the apparatus and slowly evolved: how tenaciously this adheres may be inferred from the fact that when, as in Bunsen and Roscoe's photometer, it is necessary to obtain even in so non-absorptive a body as a glass vessel, an atmosphere absolutely free from oxygen and nitrogen, the vessel must be swept for several days with other gases (in this case chlorine and hydrogen. Roscoe, in Watt's Dictionary, II., p. 305).

Fox found that thoroughly dried oxygen, when swept through an otherwise empty red-hot porcelain tube, persistently yielded small quantities of water, 3.5 mmmgs. during the first hour, 0.7 mmmgs. per hour from the 12th to the 14th hour.

While the results obtained by these combustions might well be too high, it seems decidedly improbable that they should be too low.

In the combustion methods employed by Ledebur and Fox the slight changes in the weight of their phosphoric anhydride tubes, following the protracted passage of gas, might be attributed to experimental error rather than to the absorption of water actually formed by the oxidation of hydrogen escaping from the metal under treatment. Indeed, with elaborate precautions, Fox found that these tubes always gained weight, even when the combustion tubes contained no iron, though the increase of weight was invariably greater when iron was under treatment. In heating in vacuo, too, there is a chance that hydrogen should enter the apparatus through faulty joints or through the pores of the apparatus, rendered permeable by the high temperature. Had we to rely on these methods alone the usual existence of hydrogen in iron might well be questioned.

But wholly independent methods corroborate its presence. Troost and Hautefeuille observed that, when iron after tranquil fusion in hydrogen was suddenly solidified with fall of pressure, gas was visibly evolved. Müller

^c Journ. Iron and Steel Inst., 1874, I., p. 95.

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^a Tables 54 to 57 and Chapter XI. contain additional facts and further discussion concerning hydrogen and iron.

^b Throughout this work the volume of gas is supposed to be measured at 0° C. and 76 cc. barometric pressure, unless otherwise stated.

^d On heating iron wire in dry nitrogen for 20 minutes at a "bright glow," Ledebur found no weighable quantity of hydrogen: but it is doubtful if so brief a heating in nitrogen should be expected to extract a weighable quantity of his gas. (Stahl und Eisen, VII., p. 693, 1887.)

finds that the gas evolved by iron on solidifying in the air is chiefly hydrogen. This is the chief constituent of the gaseous contents of the blowholes found after solidification.

By increasing the pressure during solidification and by the addition of silicon, manganese or aluminium before solidification, the escape of this hydrogen can be prevented, and it is probable that it remains after solidification in the cold iron. The indirectly and more especially the directly measured absorption of hydrogen by solid iron and the frequent evolution of ammonia from common cold steel, so abundant as to force itself on the attention of numerous unexpectant observers, prove that solid iron can contain hydrogen: and the hydrogen always found on boring cold iron under water, oil or mercury, leaves no doubt that iron usually contains this gas.

While part of the hydrogen found on boring cold steel doubtless exists as gas in visible cavities, which indeed sometimes contain it in such quantities that, when bored from below under water, gas bubbles out from the bore hole when the point of the drill pierces the first blowholes, yet in some cases hydrogen is released on boring solid steel quite free from visible cavities. Moreover, by triturating the metal with a dull drill over 69 times as much hydrogen has been obtained as when the same metal was cut in the ordinary way with a sharp drill. (16-17, Table 54)

While the trituration may increase the evolution of hydrogen simply by laying bare innumerable microscopic but not intermolecular cavities, it seems probable that a considerable part of the hydrogen extracted by trituration exists in the iron in some non-gaseous state; and in such a state the gas which escapes from molten iron certainly exists before its escape.

Now the quantity of hydrogen which is found on boring under water and which unquestionably comes from the iron, does not differ more from that found in other specimens of iron by combustion and heating in vacuo (except Parry's results) than do the proportions of manganese or of carbon in different specimens of iron. This is no proof that the results obtained by these latter methods are correct, but it shows that they are not in themselves improbable.

The combustion method should give the total hydrogen: indeed the errors to which it is liable should exaggerate the proportion of this gas. But, if part of the hydrogen were united with the iron by some strong chemical tie, heating in vacuo and boring might not release it, and we might expect that the results thus obtained would be below those of the combustion method. The fact that they are not suggests that most and perhaps all the hydrogen is but feebly held by the metal. The fact that the marked effects apparently produced by the absorption of nascent hydrogen are removed by heating and rest, which simultaneously expel hydrogen, points in the same direction. (§ 178.)

C. Parry's Results.—In eight out of the twelve cases in which he extracts hydrogen from previously untreated iron, he recovers more, usually much more and in one case 21 times as much hydrogen as has been recovered by any other observer by any method whatsoever within my knowledge.^a In the remaining four cases the length of exposure, if stated, was comparatively short: so that the inference might be justified that, had he employed his usual prolonged exposures, he would probably in every

case have extracted much more hydrogen than any one else.

He found that, while the flow of gas from iron heated in vacuo gradually slackened at constant temperature, and could be completely checked by lowering the temperature say from whiteness to redness, yet it always started up afresh on raising the temperature, "and this continued up to the highest heat attainable." In no case was there satisfactory evidence that the metal was completely freed from hydrogen, even after seven days heating in vacuo.^b

There is little reason to doubt that he, like others, actually extracted some hydrogen from the iron itself: but the great difference between his results and those of others suggests that a large portion of his gas may have come from some source other than his iron. Shall we accept or reject his results? Shall we believe that a comparatively short heating in vacuo suffices to extract nearly all the hydrogen present, or that it extracts but a small fraction of the hydrogen, and that this gas is actually evolved by the iron at a rapid rate even after days of heating?

Against his results we have his own candid admission^c that it appears to the last degree improbable that cast-iron contains the large quantity of hydrogen shown: the fact that the iron from which he extracted these large volumes of hydrogen would reabsorb but a relatively small proportion:^d the fact that there appears to be a chance for hydrogen to enter his apparatus, which might be suspected of permeability at the high temperatures employed: and that, as just stated, when he employed a long exposure he obtained much higher results than other observers, even when they employ methods which, unlike his, would naturally be expected to extract the whole of the hydrogen present. I see but two ways of reconciling his results with theirs. These are to suppose either that he usually happened on irons very exceptionally rich in hydrogen: or that the methods employed by Fox and Ledebur recover but a fraction of the hydrogen present: and neither of these suppositions is probable. A further difficulty, that of supposing that the large quantity of carbonic oxide and hydrogen which he finds, sometimes amounting together to nearly one per cent, should be overlooked in ordinary analyses, the sum of whose results still usually very nearly equals 100%, will be referred to in § 183, B.

In favor of his results we have the following facts.

1. The nearly and often quite complete absence of nitrogen from his gases indicates that they are not of atmospheric origin: and the absence of carbonic acid argues that they do not arise from the flame used for heating the tubes, which should yield carbonic acid and nitrogen, and this carbonic acid would probably only be partially reduced by the iron under treatment. To this it may be objected that hydrogen is so diffusive that it might enter rapidly where nitrogen and carbonic acid could enter but slowly, and that the carbonic oxide which Parry finds with his hydrogen may arise from reaction within the tube.^d Moreover, the hydrogen might arise from the tubes themselves.

(TO BE CONTINUED.)

NOTE.—The publishers of the ENGINEERING AND MINING JOURNAL will thank the readers of this article if they will promptly call attention to any inaccuracies they may observe in it.

^b Journ. Iron and St. Inst., 1881, I., p. 189.

^c Idem, 1874, I., p. 100.

^d See § 188 C.

CORRECTION.—Page 488, second column, line 10, for 174 substitute 172.

^a Cf. Tables 56 and 60.

PERSONALS.

Mr. F. G. Corning, mining engineer, of this city, has gone to Dakota on professional business.

Mr. Joseph M. Wilson, engineer of the Pennsylvania Railroad, has been elected president of the Engineers' Club, of Philadelphia.

Mr. John C. Ferguson, of Toronto, Canada, has been appointed Chief Engineer at the pumping-house of the Water-Works at Toronto.

Mr. A. L. Walker, for some years connected with the company, has been appointed superintendent of the old Globe Copper Company, Globe, Arizona.

Mr. Edwin M. Mead, for many years the efficient treasurer of the Pennsylvania Coal Company, has been unanimously elected president of the company, vice George A. Hoyt, Esq., deceased.

Mr. C. C. H. Millar, of Messrs. Couper, McCarnie & Co., of London, England, has just arrived from England and gone to Canada to take over, for the Canadian Phosphate Company, the property of the company.

A petition, signed by many prominent Colorado men, has been sent to Major J. W. Powell, director of the United States Geological Survey, Washington, D. C., showing why the office of the Survey should not be removed from Denver.

Mr. John F. Acheson, who has filled the position of secretary of the coke syndicate since its organization, has resigned his position and entered the employ of J. W. Moore & Co., coke operators at Pittsburg. Mr. E. P. Bottsford, of St. Louis, has been appointed his successor.

A summer school of mining has been established at the Massachusetts Institute of Technology, Boston, Mass. Next summer the school will be located either in the anthracite regions of Pennsylvania or the iron regions of Michigan. The school will be under the charge of Professor Clark.

The Franklin Institute held its annual meeting at Philadelphia on the 18th inst. A resolution offered by Professor Haupt was adopted, requesting Congress to enact laws which will reorganize those governmental departments having control of scientific matters in such a way that the interests of the sciences may be better served.

Mr. Benjamin F. Crane, a prominent civil engineer, died at his home in this city on the 16th inst., aged seventy-one years. He was connected in a professional way with many great public enterprises, including the Croton Aqueduct, the Erie Canal, and the New York Central Railroad, and was the first superintendent of Central Park.

Mr. Franklin Osgood, who has been connected with many mining and manufacturing enterprises, died in this city on the 18th inst., at the age of sixty-two years. He became principal owner of certain zinc mines in North Carolina before the war, and he and his associates were working them with considerable profit when the outbreak of hostilities took place. After peace had been established Mr. Osgood and his partners recovered possession of their mines, and for years worked them to great advantage. But in time the vein was exhausted and the shafts had to be abandoned. Mr. Osgood, his brother William and Mr. Leonard Richardson, in 1876, combined to purchase a zinc mine in the Saucon Valley, from the Lehigh Valley Mining Company.

The American Society of Civil Engineers held its thirty-fifth annual meeting in this city this week. The report of the treasurer showed the organization to be in a highly prosperous condition. The membership now numbers 1110, which comprises many of the leading engineers of the United States and Canada. Receipts for 1887 amounted to \$30,958.81, of which \$6159.50 is for the building fund, now aggregating \$40,000. As soon as practicable the society intends to erect a fine fire-proof building for its hall, library and the safe-keeping of its archives. The following officers were elected: President, Thomas C. Keefer, of Ottawa, Canada; Vice-Presidents, J. James R. Croes, of New York, and Robert Moore, St. Louis; Secretary and Librarian, John Bogart, New York; Treasurer, George S. Greene, Jr., New York; Directors, Mendes Cohen, Baltimore; Joseph M. Wilson, Philadelphia; Stevenson Towle, New York, and Alphonse Fteley, of New York. The next annual meeting will be held in Milwaukee in January, 1889.

Mr. Charles H. Fisher, the chief engineer of the New York Central & Hudson River Railroad, died in this city on the 18th inst. He was born in Lansingburgh, in this State, in 1835. His first work in the field was on the Racine & Jamesville Railroad, in Wisconsin, when a very young man. Subsequently, he served for two or three years on the staff of the State Engineer of New York in the work of constructing the Erie Canal. He entered the employ of the New York Central & Hudson River Road in 1860, and in 1868, when he resigned, held the position of first assistant engineer. He resigned in order to take the position of chief engineer of the Lake Ontario Shore Road, running from Oswego to Suspension Bridge. This road is now a part of the Rome, Watertown & Ogdensburg route, and Mr. Fisher ran the first lines for the road.

On the 1st of January, 1869, Mr. Fisher was appointed chief engineer of the New York Central Road, and had charge of all the engineering work on that road until two years ago, when, because of ill health,

he was compelled to retire from active work. He laid out the plans for the additional tracks making the road a four-track road, drew the plans for the new stations along the line of the road, and also conducted the work of elevating the tracks of the road through Rochester.

A meeting of gentlemen, representing the coal interests was held at the office of the Lehigh Valley Coal Company, in Buffalo, on the 13th inst., for the purpose of taking some appropriate action on the death of Jas. J. Albright, of Buffalo, to whose death we referred in our last issue. There were present at this meeting: Messrs. E. L. Hedstrom, J. J. McWilliams, J. H. Horton, C. M. Underhill, R. E. McWilliams, T. Guilford Smith, Frank Snell, Henry E. Smith, Thomas Loomis, R. R. Hefford, H. W. Linderman, C. D. R. Stowitts, representing F. H. Goodyear; H. E. Parrish, W. H. Davis, Geo. S. Wilson, representing A. J. Hoole & Co., and F. A. Board, representing Thomas Hodgson. A committee, consisting of Messrs. C. M. Underhill, E. L. Hedstrom and R. E. McWilliams, reported the following memorial, which on motion, was adopted:

A most active and useful life, covering a period of nearly four score years, was closed yesterday, January 12th, by the death of Mr. Joseph J. Albright, at his home in Scranton, Pa. During more than one score of those years, it was the great privilege of many of us, as shippers of anthracite coal, to know Mr. Albright well. Happy were they who were so fortunate as to have been honored with his friendship. Conscientious in motive, wise in council, true in friendship, indomitable in energy; these certainly express most obvious traits of a noble character. All these distinguished Mr. Albright. A good man has finished his course—one who has served well his day and generation.

FURNACE, MILL, AND FACTORY.

It is rumored the Dayton Coal and Iron Co., Dayton, Tenn., contemplate putting in steel works in the spring.

The Ashland steel works, about twenty miles north of Baltimore, Md., shut down on the 16th inst. Scarcity of coal due to the Reading strike is said to be the cause of the stoppage.

The Eagle Iron-Works, Wilkesbarre, Pa., extensive manufacturers of screws and iron fences, have failed. The liabilities are said to be very large.

The Novelty Machine Works, Evansville, Ind., one of the largest of the kind in the State, made an assignment on the 18th inst. to Jacob Buchanan.

The new tube mill at McKeesport, Pa., is to be heated by electricity, and the welding of pipes and tubes is to be accomplished by the use of electric methods.

A rolling-mill and iron works are to be erected at Grapeville, Pa., by capitalists from Philadelphia and Pittsburg. The works will manufacture principally farming instruments.

A pontoon bridge, consisting of 17 sections, each 80 feet in length, has been built at Camden, Me., for L. B. Smith, the American consul at Curacao, South America, who has obtained from the Government concessions for 30 years. The bridge cost \$40,000 to \$50,000.

We understand that negotiations are now pending for the sale of the patents of the Cyclone Pulverizer (described and illustrated in THE ENGINEERING AND MINING JOURNAL of April 30th, 1887) by Erastus Wiman to English capitalists, who intend to organize a company in London.

Messrs. Cooper, Hewitt & Co., of New York, have purchased the German patents of Adolf Bleicherh & Co., of Leipzig, Gohlis, for improved elevated wire rope lines. Mr. E. G. Spilsburg, mining engineer and metallurgist, of this city, is now in Europe making investigations of the system.

A carload of machinery imported from English workshops for the new steel-forging works of the Bethlehem Iron Company, Bethlehem, Pa., has arrived there, and the work of placing it has already begun. The machinery consists of mammoth shafting bases, and its importation was necessary, as there are no factories in this country where it can be made.

The firm of Mathews & Webb, who have sampling-works at Denver, Aspen, and Idaho Springs, Colo., has been changed to James F. Mathews & Co., Mr. C. L. Webb retiring from the old firm, and Messrs. N. J. Chamberlain and F. Dillingham becoming partners in the new company. Mr. Chamberlain will have charge of the sampling-works and business of the company at Aspen.

The 1st Section of the Dispositions for the Application of the Tariff has been modified by the Mexican government by adding the following articles to the free list: Empty iron barrels and pipes. Tinned iron tubing. Posts, crossbars, clamp-nails, and insulators for telegraphs and telephones, the destination of which shall be shown by the interested parties at the custom-houses. These changes will take effect on March 1st.

It is said officially at the Navy Department that the Columbia Iron Works, of Baltimore, Md., is now paying \$25 per day penalty to complete the gunboat which they contracted to have ready for the government on Dec. 22. A strong effort is being made to prevail upon Secretary Whitney to waive the penalty

and grant the company an extension of time to complete the vessel. The department has not yet acted on the case.

The Ohio & Western Coal and Iron Company, Columbus, Ohio, is remodeling its two large Flood-wood furnaces. The stacks have been run up to 75 feet with 18-foot boshes, and large blowing engines are being placed in position. It is expected to blow in one of three large stacks about the 1st of March. Every thing about the plant is being fixed up for making a successful run of these, the largest furnaces in the Hocking Valley. They will be run on mixed native and lake ores, using West Virginia coke for fuel.

The property of Thaddeus Stevens, called the Caladonia Furnace, comprising about 12,500 acres of land in Franklin and Adams counties, Pennsylvania, has been sold to Samuel B. Diller, of Lancaster, Pa. A corporation has been organized, known as the Caladonia Mining and Manufacturing Company, to raise a large sum of money with which to mine for copper and iron, and build furnaces and smelting works. The buildings formerly used on this property were burned by Lee at his invasion of Pennsylvania.

At the iron works at Breaker Island, of the Troy Iron and Steel Company, below Troy, N. Y., the bottom of one of the large furnaces gave out and thirty tons of molten iron escaped. Instead of running into the "pigs" prepared for it, it ran into the ground, and striking a moist spot, steam was generated, and a terrific explosion followed, tearing up the ground for yards around and hurling quantities of the liquid fire about to the imminent peril of the employes. The iron now lies a solid mass deep in the earth and is being broken up with giant powder.

Upon application of the stockholders, G. B. Goodell and P. Voorhees were appointed receivers by the court for the Union Iron Company, Cheyenne, Wyoming. The assets are said to be \$2,000,000; liabilities, \$1,250,000. Losses and shrinkage in values have produced such complications that to prevent sacrifice of the property by the hasty action of some creditors it was thought best to have a friendly receiver appointed and thus protect the interests of all concerned. The president of the company says the affairs will be carried on as at present, and believes the company will very soon again resume charge of its business.

The Schenectady Locomotive Works, Schenectady, N. Y., is now building a passenger engine for the Michigan Central Railroad which is said to be the largest ever constructed. It is a 10-wheel engine, having three pairs of coupled driving wheels and a 4-wheeled truck. The drivers are 68 inches in diameter. The cylinders are 19 inches in diameter, with 24-inch stroke. The boiler, which is of Otis steel, is 58 inches in diameter and has 147 2-inch semi-steel flues. The fire-box is 8 feet long by 42 1/2 inches wide, and, like many recently built, is placed above the frames, which gives increased width. The tank is carried on two 4-wheel channel iron trucks. The capacity of the tank is 3800 gallons, and the tender has a capacity of 8 tons of coal.

The W. B. Wood Furnace Company, of Alabama, is now building a furnace which will have a capacity of 125 tons and is expected to be in blast by next November. The furnace will be 75 feet high by 18 foot bosh, 10 foot crucible and 10 foot bell. It is to be blown through seven 6 inch tuyeres, and will be equipped with three Gordon-Whitwell stoves, 65 feet high and 20 feet in diameter. The down-comer will have a diameter of 72 inches, and will be equipped with a dust catcher 14 feet in diameter and 18 feet high. The two Gordon, Strobel & Laureau engines will have 38 inch steam cylinder, 84 inch blowing cylinder, and 4 foot stroke. The twelve boilers, 34 feet long by 46 inches diameter, are of the double flue type with two 15 inch flues. The draft stack will be 100 feet high by 6 feet in diameter, and the hoist chosen is that built by the Crane Bros. The furnace has been built from the designs of the Manager Mr. J. M. W. Norton.

The great steel gun which was cast at the Pittsburg Steel Casting Company's works, Pittsburg, Pa., on the 11th inst., as mentioned in our last issue, was taken from the mold on the 16th inst. and found to be perfect. The casting is pronounced a complete success by Superintendent Hainsworth and officers of the United States navy, who made a close inspection and applied such tests as were possible in its present stage. When the gun is bored it will be shipped to Washington, where it will be rifled and finished at the Navy Yard. From Washington it will be taken to Annapolis, where it will be loaded with a heavy charge of gunpowder, and a shot weighing not less than one hundred pounds. This will be fired, and, if the gun stands it, ten discharges will be made. As soon as the gun is cool enough, experts will examine it with microscopical minuteness. Should it show no weakness from the test, it will be received by the government.

The Barbed Wire Manufacturers' Association, at a meeting held at Chicago, Ill., on the 19th inst., resolved to advance the price of their product to \$3.40 a hundred, to take effect at once. This is a raise of 25 cents. The association practically controls the price of barbed wire throughout the United States. There are 25 members in the organization. The reason they give for their action is "the advance in the price of wire rods caused by the combination of foreign rod mill owners supplying the American market and the advance made in spelter." R. E. Sears, of Marshalltown, Iowa, president of the association, said: "We import from 120,000 to 160,000 tons of iron rods annually. There is a duty of \$12 a ton on iron rods. The United

States is the chief foreign market for English and German manufacturers. Competition among them has kept down the price until the last three or four months, when eighteen of the principal mill owners have combined and prices have advanced 18 or 20 shillings per ton. The association decided not to take advantage of the recent decision of Judge Shiras, of Dubuque, declaring the Washburn & Moen patent void. The members will keep on paying license fees until the matter is passed upon by the United States Supreme Court.

CONTRACTING NOTES.

Contracts open will be found on page xix. New contracts this week: No. 729, Iron and Steel Bridge; No. 730, Steel Torpedo Boat; No. 731, Sewer System; No. 732, Sewers; No. 733, Cast-Iron Water Pipe; No. 734, Water-Works; No. 735, Two Bridges; No. 736, Street Lighting; No. 737, Pumping Engine; 738, Electric Lighting.

Mr. J. F. Tarwater, Rockwood, Tenn., will shortly be on the market for mining machinery.

The Clarksburg Electric Light Company, Clarksburg, W. Va., is about making contracts for machinery for its plant.

LABOR AND WAGES.

The Cambria Iron Company at Johnstown, Pa., has given notice of a ten per cent reduction in wages.

The Detroit Copper Company of Clifton, Ariz., has restored the wages paid prior to January, 1885, an advance of 10 per cent over recent prices.

The situation of the Philadelphia & Reading Railroad Company and its striking employes remains unchanged, and in consequence of a scarcity of coal occasioned by the strike a number of furnaces have been banked.

The employes of the Troy Steel and Iron Company in Troy, N. Y., have refused to accept the reduction of 10 per cent proposed by the company and all the works will be closed. The officers of the company say they have accepted a reduction in their salaries greater in proportion than asked of the men.

The Joint National Convention of Miners and Operators is to be held in Pittsburg, Pa., on the 7th prox. The convention will be the largest gathering of coal operators and miners ever held in this region. It is expected that several hundred representatives of the mining interests of Pennsylvania, Ohio, Indiana, Illinois and Missouri will be present.

Applications for work are daily made to the management of the Old Globe mine, Globe, Ariz., by men who have induced to come here, as alleged, through the misrepresentations of territorial newspapers that a large number of miners was wanted. The *Globe Silver Belt* has been requested to announce that the force employed is sufficient for present demands, and there are more than enough men now in that camp to meet the requirements of the company.

GENERAL MINING NEWS.

An order was issued on the 16th inst. from the Interior Department of restoration of the lands within the indemnity limits of the following named railroads: The Alabama & Florida, the Selma, Rome & Dalton, the South & North Alabama, the Florida, Atlantic & Gulf Central, and the Pensacola & Georgia, and the Florida & Alabama. About twelve thousand acres are involved.

The case of Carr vs. Risher, which has been on trial in the Supreme Court before Judge Paterson and a jury, in this city, terminated in a verdict for the plaintiff for \$25,000, the full amount claimed. In 1865 John C. Risher, a wealthy Pittsburg iron manufacturer, came to this city and organized a stock company called the Pittsburg & Martinez Silver Mining Company, with an authorized capital of \$4,000,000. This large amount was all issued for mining property worth, it was alleged, not over \$100,000.

John F. Carr, the lumber merchant, of West Twenty-third street, purchased in 1867 twelve of the company's bonds. Shortly after the company's organization Risher is said to have seized the books and other records of the company in this State and taken them to Pittsburg. It was found possible to serve a summons on him only a short time ago.

The verdict is believed to be the largest ever rendered in an action against a trustee for failure to file an annual report.

LEHIGH VALLEY RAILROAD.—The annual meeting of this company was held at Philadelphia on the 17th inst. The report presented shows that the total coal tonnage for the fiscal year ending November 30th had been 6,883,957 tons, against 6,701,736 tons for 1886. Of the entire amount, 6,824,321 tons were anthracite and 59,636 tons were bituminous. The coal tonnage exceeded that of any previous year, notwithstanding the fact that a strike of miners existed for about three months in the Lehigh regions. The gross revenue for the year was \$11,197,167, the operating expenses \$6,142,396, and the net operating earnings \$5,054,771. After the payment of interest on bonds, dividends, general expenses, loss on Morris Canal, etc., there was a balance to the credit of profit and loss amounting to \$410,771, to which is added \$114,700 premium realized from the sale of bonds.

ALABAMA.

SHEFFIELD & BESSEMER MINING COMPANY.—This company has been organized with a capital stock of \$200,000, by H. F. De Bardeleben, Jacob G. Chamberlin, of Jasper; David Roberts, Charleston, S. C., and Henry B. Tompkins, of Atlanta, Ga., to mine coal, iron ore and limestone and manufacture coke.

THE TENNESSEE COAL, IRON AND RAILROAD COMPANY has leased the State convicts and will increase the output of the Pratt mines from 3200 to 4500 tons daily within six months.

DE KALB COUNTY.

COLLINSVILLE MINING AND MANUFACTURING COMPANY.—This company proposes to commence work, as soon as the weather will permit, opening its iron mines at Collinsville, on the Alabama Great Southern Railroad.

WALKER COUNTY.

Six Koerner coke-ovens are being built at Jasper, by the Penn Mobile Coal Company and other companies, for the purpose of testing this kind of oven.

ARIZONA.

COCHISE COUNTY.

ARIZONA PRINCE COPPER COMPANY.—Mr. Louis Windmuller, of New York City, has given notice that he intends to resign as trustee under the first mortgage securing the bonds of this company, dated October 1st, 1883, and be discharged of the trusts created thereby.

BRITISH COLUMBIA.

The government has decided to appeal to the Judicial Committee of the Privy Council against the adverse decision recently given at Ottawa regarding the ownership of the mineral lands lying in the railway belt in this province.

CALIFORNIA.

YUBA COUNTY.

SIERRA UNION WATER AND MINING COMPANY.—The Superior Court at Marysville has imposed a fine of \$250 on this company for contempt of court in violating the anti-débris injunction in the suit brought by Yuba County. This is said to be the first conviction of the violation of the injunction.

CANADA.

PROVINCE OF NOVA SCOTIA.

The Albion coal mines at Stellarton, on the 14th inst., were again wrecked by explosions, and are on fire. These mines were scene of a great explosion in 1880, when forty-five lives were lost. This time fortunately no lives were lost, but four men were badly injured, and fifteen men working in the Halifax pit when the fire was discovered had a hair-breadth escape. The mine is still on fire. It is supposed to have been communicated from the cage pit, which has been on fire since the great disaster eight years ago. As mentioned in our issue of December 10th, several weeks ago efforts were made to re-open the cage pit, but it was found then to be still on fire.

The following statement, published by the *Stellarton Trades Journal*, gives the shipment of coal made from the different collieries in 1887:

	1886. Tons.	1887. Tons.
Spring Hill	389,476	442,000
Chignecto	7,527	12,742
Joggins	18,797	14,000
Other collieries	.....	500
Total, Cumberland County	416,000	469,000
Drummond	121,779	143,530
Acaola	94,532	87,270
Halifax	60,561	67,230
Vale	95,130	38,520
Mar's mine	.....	2,500
Total, Pictou County	369,000	338,000
Bridgeport	12,000	est. 12,000
Block House	3,000	" 5,000
Cal-donia	73,000	172,000
Gowrie	89,000	118,000
Glance Bay	29,000	76,000
Intercolonial	105,000	103,000
Ontario	8,000	est. 8,000
Reserve	43,500	est. 43,500
S. Mines	120,000	147,000
Victoria	46,750	65,000
Total, Cape Breton	588,000	717,000
Graud total	1,373,000	1,524,000

There were 9000 tons of coke made and sold at the Albion mines.

COLORADO.

ARAPAHOE COUNTY.

DENVER SMELTING AND REFINING COMPANY.—This company has been organized by E. R. Holden, Richard Cline, Meyer Guggenheim, David Guggenheim and Ben Guggenheim, with a capital stock of \$500,000. The prime mover in this company is Mr. E. R. Holden, who organized the Holden Smelting Company, and in whose honor that plant was named. He has retired from the active management, being succeeded by Mr. Dennis Sheedy, president of the company. The new company has an abundance of capital, and the Messrs. Guggenheim are half owners of two of Leadville's bonanza mines, the Minnie and A. Y. Work is to be commenced at once on the new plant, and Mr. Holden is reported to have said that it would be the most complete establishment of the kind ever built in the United States. It will have six stacks, each one of which will be of the largest possible make, and the entire plant will be able to treat fully 400 tons of ore for every working day of the year. In addition to this, refining

works will be built. The plant will probably cost about \$200,000, and will be constructed of firebrick and iron from top to bottom.

CLEAR CREEK COUNTY.

FREELAND MINING COMPANY.—The production for 1887 amounted to: Gold, \$86,694.50; silver, \$15,329.14; copper, \$7.36. Total, \$102,031.

PAY ROCK CONSOLIDATED MINING COMPANY.—During 1887 the company shipped about \$10,000 worth of ore direct to the smelters. The remainder of the production was sold to the Georgetown markets.

PLUTUS MINING AND SMELTING COMPANY.—The production for 1887 amounted to: Gold, \$57,188.19; silver, \$45,000.76; copper, \$2,156.80. Total, \$104,345.75.

MENDOTA.—Two cars of zinc blende from this mine have been shipped to the Denver zinc company. This is said to be the first shipment of zinc ore that has been made in this county. The production of this mine in 1887 amounted to \$41,695 91.

GARFIELD COUNTY.

The Colorado Midland Railroad Company has begun shipping coal from Jerome Park, and 200 tons are being sent daily to Leadville and a small quantity to Colorado Springs.

GRAND RIVER COAL AND COKE COMPANY.—This company, whose property is situated at Cardiff, four miles from Gienwood Springs, has fifty coke-ovens in blast and will increase the number so that by spring 150 tons of coke per day will be produced for shipment.

LAKE COUNTY.

We take the following from the *Leadville Herald Democrat*:

The market for argentiferous iron is very dull at present, and many mines are having difficulty in disposing of their output. An important cause in regard to the matter is the uncertain plans of the smelting works of Leadville at the present day. For some time the smelters have been refusing to make contracts either for ore or iron.

DINERO MINING AND MILLING COMPANY.—The mine is producing about 100 tons of ore per month. The ore is of very good grade. The present rate of production is, however, considerably under the average, as in the first part of the last year shipments were regularly made at the rate of 200 per month. The work of sinking the shaft deeper has not yet been commenced. This is one of the most important prospecting enterprises that could be undertaken by the company. As yet only the top of the vein has been worked in.

DUNKIN MINING COMPANY.—After paying the last dividend the company had a balance on hand of \$35,000, including \$5000 on the way East from Leadville. Late advices from the mine continue favorable.

ENTERPRISE MINING COMPANY.—It is probable that operations will shortly be resumed on the Forepaugh mine. All litigation has been adjusted and claims settled. When work was suspended, an area of about one hundred square feet had been worked, and considerable ore was left standing. The suspension of work was owing to the failure of an attempt to sink the shaft to a greater depth, and then by means of a drift catch the ore on its eastward dip.

IDEAL MINING AND MILLING COMPANY.—A movement is now on foot in St. Louis to reorganize this now practically defunct company. It is proposed to get 30 men to put up \$500 each, for the purpose of redeeming the property. The right of redemption expires early in February. The *St. Louis Mining News* says: Our advice to the deluded investors is to profit by their former experience and let the whole thing severely alone, unless they can secure the property themselves and operate it upon business principles. The whole Ideal affair was one of the worst specimens of "tin horn gambling" ever performed with a mining property in Leadville since the St. Louis people became largely interested here, and injured every legitimate mining enterprise in which the St. Louis people were engaged in in Leadville.

LILIAN MINING COMPANY.—Active work at the mines has been delayed on account of the changes in the old mill and the erection of the additional twenty stamps, which will be completed in about a month, when operations will begin on a large scale.

PITKIN COUNTY.

In the United States Circuit Court at Denver, on the 13th inst., before Judge Brewer, the case of Hyman vs. Wheeler et al., bill for an injunction, etc., the demurrer of the defendants was overruled with leave to file answer by March rule day. This ruling permits consolidation of the side-line cases of the celebrated Aspen "side-line" Durant mining suit into one hearing, which is set for May 3d.

DAKOTA.

LAWRENCE COUNTY.

UNCLE SAM MINING COMPANY.—Work has been resumed, after an idleness of seven months. The mill will be thoroughly overhauled, and the entire plant placed in a good condition. Nothing can be done in the mine until the new pump is in position.

IDAHO.

ALTURAS COUNTY.

BANNOCK GOLD AND SILVER MINING COMPANY.—The several assessments levied by this company have not been paid by many of the stockholders, and the company has now some 84,000 shares which went delinquent and passed into the treasury. The company

was organized in Salt Lake City about two years ago, with a capital stock of \$10,000,000 and shares \$100 each. This stock was all taken at 50 cents a share by the promoters, and it sold at one time as high as \$5.50. After the stock had been divided up in 1886, two assessments were levied for the purpose of building the twenty-stamp mill at Era and doing development work. In August, 1887, there came another assessment of 50 cents per share to pay indebtedness. In October last there was another assessment of 25 cents. At the time the mill was contracted for and erected there was an immense slide covering the side of the hill, in which there was much rich ore; so much that it was thought the mill would be kept running continuously so long as to give ample time to open the ledge by shafts and develop a big mine. But the amount of ore in the slide was not so large as it was supposed, and the company has failed to find the ledge. Hoisting works were erected and a shaft sunk between 200 and 300 feet the past year, and a cross-cut run for the ledge, only to find the ground broken and barren. In the meantime, the company purchased the Last Chance, an extension of the Horn Silver, on which they had been working, and got ore enough from it to keep the mill running for several months. The Last Chance is a good ledge, running towards the Horn Silver, and if followed up may open the latter, but it needed capital and time to do this. When the last assessment was made the load had become too heavy for most of the stockholders to carry any longer, and they were forced to let loose. At present the stock has no market value. The mines, mill, and all other real property were sold in Hailey on the 6th, under an execution, in favor of McCornick & Co., of Salt Lake City, for \$29,000. The eighty odd thousand shares of stock in the treasury will be distributed among the stockholders in the proportion of four to one, which will still leave between 12,000 and 15,000 shares in the company for contingencies.

CAMAS NO. 2.—The sale of this mine for \$300,000 to Geo. W. Taylor, of Hailey, has been reported.

ILLINOIS.

COOK COUNTY.

Another strike of natural gas is reported from Chicago. The well is about a block south of the Leland well, to which we referred in our last issue. This well is 26 feet deeper than the Leland, its depth being 125 feet. It was bored about fifteen months ago, and the rock found at a depth of 92 feet.

COOKE NATURAL GAS COMPANY.—This company has been organized for the purpose of exploring for natural gas and supplying the same to the people of Chicago. The capital stock of the company is placed at \$1,000,000 and the incorporators are John S. Cooke, Chas. F. Cooke and John Sweeney. The first effort of the new company will be to utilize gas to run the machinery in the Cooke Brewery. In our issue of December 31st we referred to the strike of natural gas at this brewery.

COLES COUNTY.

MATTOON MINING COMPANY.—The movable property of the Mattoon Mining Company at Mattoon was sold at the foreclosure sale on the 14th inst. for \$3000. The banks, which held claims amounting almost to that sum, being the purchasers. A strong local company is being formed with a view to completing the section 1 shaft, now down 350 feet, at the earliest possible date, and continuing the work of mining the fine coal found at Mattoon.

MARION COUNTY.

HOWE NATURAL GAS COMPANY.—The Common Council of Wabash has granted this company of Indianapolis the franchise for supplying the inhabitants of Wabash with natural gas. Work on the wells will be begun at once, and the company binds itself to have gas in by the 1st of October next. The rates fixed are a little higher than those at Muncie and Kokomo, and manufacturers are supplied at the rate of 5 cents per 1000 feet.

INDIANA.

According to reports Fort Wayne capitalists are preparing to build a natural gas tank line from Montpelier to Fort Wayne. The proposed plan is to fill large reservoirs from the wells at Montpelier and convey the gas by rail to Fort Wayne. So far cities outside the gas belt have been supplied by piping. The plan to be experimented with in this field is entirely new.

GRANT COUNTY.

Pittsburg capitalists have purchased the natural gas plant of the Mississinew Mining Company, of Marion, for \$120,000, and the plant of the Marion Coal Gas Company, of Marion, for \$20,000. It is said to be the purpose of the purchasers to build a pipe line to Wabash, and probably to a number of other towns outside of the gas belt.

MEXICO.

A contract has been entered into between the Department of Public Work and Messrs. Carlos Maillard and Emilio Velasco for the exploration and working of mines of all kinds in the Tenencia de Charo, State of Michoacan. The territory embraced in the concession is 20 kilometers long by 15 wide.

IRON MOUNTAIN COMPANY.—This company, of Durango, is getting ready to manufacture iron on a large scale. The completion of the International Railway to Durango city is talked of.

LA NORIA MINING COMPANY.—The prospects of this company's property, situated in the State of Zacatecas, are said to be good. The mill will probably be in full operation by the 1st of January.

MICHIGAN.

IRON MINES.

ANVIL IRON MINING COMPANY.—This company

was to be reorganized on the 20th inst., and the stock made assessable.

IRON KING MINING COMPANY.—No. 3 shaft, formerly known as No. 2, is now down to its fourth level, 350 feet deep. Drifts east and west will be started as soon as the pump is in position. On the third level, 90 feet above, the drift has been carried 400 feet to the eastward, all in ore; the cross-cut to the north out of this drift at a distance of 200 feet east from the shaft shows 125 feet of high-grade ore and no hanging-wall yet reached. There is not a pound of rock or low-grade ore in the entire cross-cut. The new shaft, No. 4, will be a large producer this season, for the ground is being opened up at a depth of 250 feet by drifts run from No. 3 shaft. Four hundred feet south of this work is the regular south vein foot-wall of quartzite in which the south vein shaft is being put down. The vein here showed a width of 75 feet on the level worked last season. Thus the north and south veins combined show at this point 200 feet of clean shipping ore. No. 1 and 2 shafts are sinking, No. 1 being now 50 feet deep.

MISSISSIPPI.

MONTGOMERY COUNTY.

MISSISSIPPI IRON AND MANUFACTURING COMPANY.—This company has shipped a car-load of ore from its mines at Duck Hill to Birmingham, Ala., for furnace test.

MISSOURI.

JASPER COUNTY.

NORWICH MINING COMPANY.—The company has sold a tract of 63 acres of mining land at Empire City to an Indianapolis syndicate composed of Alex. M. Robertson, Gabriel Schmuck, James E. Robertson, John C. Shoemaker and John W. Minor. The consideration was \$13,000. The ground has been partially developed and is understood to be a valuable piece of property. The purchasers will organize a company and let lots to miners on the usual terms.

MONTANA.

The Interior Department has submitted to Congress, for incorporation in the Indian appropriation bill, an estimate of \$3000 to defray the expenses of opening the coal-fields in the vicinity of Fort Custer, Montana, on the Crow Reservation. It is anticipated that the development of the vein will afford an abundant supply of excellent fuel for all parties at a less cost than wood, and be a saving to the government in many respects.

CHOTEAU COUNTY.

MONTANA SMELTING COMPANY.—This company has been organized by Walter S. Gurnee, Augustus C. Gurnee, and Anton Eilers, of New York, who, in conjunction with Edward Cooper, New York, and Harry W. Child, Helena, are also trustees. The capital stock of the association is placed at \$1,500,000, divided into 15,000 shares of a par value of \$100 each; 5000 shares of stock at a par value of \$100 each, to be known as special stock, which may be increased to 6000 shares, if desired; the remainder of the capital stock to be known as ordinary stock. The object of the organization is the erection of reducing, refining, and smelting works at Great Falls, which place is also designated the place of operations.

VENANGO UNION OIL COMPANY.—It was decided at a special meeting of stockholders, held at Pittsburg last week, to dissolve this corporation. The details of the transactions and operations of the company since its organization, in 1865, were overhauled. The treasurer rendered his accounts, and after all debts and credits were set out it was ascertained that about \$5000, with interest from 1885, remained on hand. The little indebtedness of the company was ordered paid and the residue to be distributed among the stockholders, and its affairs wound up. The settlement of the company's business became necessary in order to permit the executor of the estate of the late Charles Kirkpatrick to file an account according to law.

JEFFERSON COUNTY.

INDIANA CREEK MINING COMPANY.—This company has been organized by A. W. Ide, Frank E. Beck and Adelbert A. Lathrop. The capital stock is \$1,000,000, shares \$5 each. The object is to purchase and operate the Hopeful, J. I. C., and Jenny Lind mines in Mountain mining district. The company will begin operations at once.

LEWIS & CLARKE COUNTY.

MONTANA COMPANY (LIMITED).—Official advices to us report that the production for December amounted to \$100,000, and the working expenses to \$55,000. A circular issued by the company says: "In reference to the return for December being less by \$10,000 than the estimate previously given in the circulars to the shareholders of the 6th and 24th ult. (published in THE ENGINEERING AND MINING JOURNAL of December 17th and January 7th), the directors are in no way disturbed by this, as the actual run provides all the funds required to meet the dividend payable on the 14th inst., and they know that the returns for January to March inclusive, on average, will show an increase of from \$20,000 to \$30,000 per month over that for December. The present value of the ore in reserve will permit of this being done without putting any undue strain upon the mine."

MISSOULA COUNTY.

BELL MINING COMPANY.—This company has leased the Bell mine, situated near Thompson Falls, for five years to the Butte Reduction Works, the Bell Mining Company to get \$7.50 a ton for all the ore shipped from the mine as long as copper is worth 12 cents a pound, and \$6 a ton when it is worth less. It is the

intention to ship by the 1st of April two carloads of ore a week, and the income to the Bell Mining Company, it is thought, at that rate will be about \$275 a week.

SILVER BOW COUNTY.

ANACONDA COPPER COMPANY.—The company is now stopping on the 400, 500, 700 and 900 foot levels.

LEXINGTON MINING COMPANY.—Official advices to us report the production for December to have been in gold \$7064.83, and in silver \$65,384.17, making a total for the month of \$72,449, and for the year 1887, in gold, \$109,826; in silver, \$871,720, a total of \$981,546.

PARROTT SILVER AND COPPER COMPANY.—This company has taken possession of the Champion, a copper and silver mine at Burlington recently purchased.

NEVADA.

ELKO COUNTY.

FOUND TREASURE MINING COMPANY.—The old works have been cleared of water, and the timbers in them found in good condition, though considerable dirt has run into the cross-cut on the 150-foot level.

STOREY COUNTY—COMSTOCK LODGE.

We take the following from the Virginia City Chronicle:

CONSOLIDATED CALIFORNIA & VIRGINIA MINING COMPANY.—During the week ended the 7th inst., 951 tons of ore were shipped to the Morgan mill, and 1342 tons to the Eureka mill, and 1100 tons to the California mill. The average assay value of all the ore worked at the above mills during the week, according to battery samples, was \$34.70. The total product from the mine for December was \$409,000. This is the largest bullion output from the mine recorded in any single month since a consolidation of the California & Consolidated Virginia was effected. It is estimated by those familiar with the ore resources of the mine and the intentions of the management that the bullion output this year will exceed \$5,000,000.

HALE & NORCROSS MINING COMPANY.—The daily shipments average about 50 tons, which is all the Vivian mill can crush. The average value of the pulp assays continues at about \$50 per ton. A shipment of \$45,000 to San Francisco was recently made.

KOHINOOR.—This location southeast of and adjoining the Scorpion ground is to be incorporated and listed at the San Francisco Stock Exchange. E. J. Baldwin and other prominent San Francisco capitalists are among the incorporators. The Kohinoor was listed as the Mackay during the Sierra Nevada deal in 1878. Major Gearing is the original locator and present owner of the property. Colonel S. T. Curtis will superintend the work of development under the new management.

POTOSI MINING COMPANY.—A daily average of 70 tons of ore extracted from the 250 and 350 stopes is crushed at the new mill, the pulp assays of which show an average value above \$20 per ton. Thirty thousand dollars has been shipped to San Francisco, representing the product of the Chollar and Potosi mines during December. The mill has been running steadily so far the current month, crushing a daily average of about 65 tons of ore. The average value of the pulp assays is a little above \$20 per ton. The bullion output from the Chollar and Potosi this month will be about \$40,000.

NEW MEXICO.

DONA ANA COUNTY.

BENNETT.—Mr. Fitzgerald, the owner of the International smelting works now being erected at El Paso, Texas, has purchased the lease of this mine for \$20,000, and a half interest for \$30,000. The mine is situated 40 miles north of El Paso, and 12 miles east of Las Cruces. We are officially advised that a force of 50 men are now at work straightening up things and breaking out 50 tons of ore per day. Fifty-eight tons of ore smelted gives \$55.87 per ton, silver and lead. It is a carbonate ore, and the lode is 7 feet wide; works are 180 feet below grass, and interrupted by a tunnel 200 feet from the slope of the hill, which is 500 feet above the plains. A tunnel 400 feet is being driven from the base to cut the lode, and when completed will enable the owners to take out 100 tons daily. The lode has been tested by means of a cave caused by decomposition of the calcareous mass, giving access to the proposed intersection of lower tunnel, which is now 160 feet in the hill.

GRANT COUNTY.

SHERIDAN MINING COMPANY.—The report recently made for the stockholders by John B. Farish, mining engineer, is said to be very unfavorable, and that money spent for further development would be wasted. The highest average of the ore is reported to be \$14, and the lowest \$2. In our issue of February 12th, 1887, we referred to the collapse of this company.

PENNSYLVANIA.

COAL.

The fire which was started two weeks ago by unknown parties in the abandoned coal pit on the Dilworth property, Mount Washington, and to which we referred in our last issue, is still burning. It is feared that this fire will cause much trouble before it can be extinguished.

NATURAL GAS.

The annual meeting of this company was held in Pittsburg on the 17th inst. The reports presented showed the outlook to be a promising one.

BADEN GAS COMPANY.—The court has authorized W. B. Rogers, Esq., Receiver of the company, to

exposed the same at public sale in the court-house, at Pittsburg, on the 26th inst. The sale is subject to a mortgage of \$200,000 to the Safe Deposit Company, and also \$198,000 in outstanding bonds and accrued interest.

OIL.
Exports of refined, crude, and naphtha from the following ports, from January 1st to January 14th:

	1888.	1887.
	Gallons.	Gallons.
From Boston	9,744	5,920
Philadelphia	2,826,476	4,178,186
Baltimore		393,993
Perth Amboy	1,014,430	765,311
New York	12,103,289	13,582,370
Total exports ..	15,953,938	18,925,780

RHODE ISLAND.

PROVIDENCE COUNTY.

The engine house and breaker of the coal mine at Cranston, owned by John Moore, were burned on the 14th inst. Loss, \$2,000.

TEXAS.

INTERNATIONAL SMELTING WORKS.—We are officially advised that the works now being erected at El Paso, under the management of C. C. Fitz Gerald, will blow in the first 50-ton furnace the beginning of February. The works have a large supply of ores from new and old Mexico.

UTAH.

BEAVER COUNTY.

HORN-SILVER MINING COMPANY.—A suit for \$550,000 was begun in the Superior Court at Chicago, on the 6th inst. by the company against one of its directors, Augustus D. Byram, who lives in that city. This is one of the suits brought against the directors to make the company directory responsible for the defalcation of \$450,000 by Charles G. Francklyn, the President of the company, and T. G. Brown, ex-Vice-President. We referred to one suit brought in New York in our issue of October 29th.

We are officially informed that the annual report of the company will be published about February 1st.

SUMMIT COUNTY.

DALY MINING COMPANY.—The production for 1887 amounted to 724,652.39 fine ounces of silver and \$256,622.02 received for ore sales, an approximate total of \$981,274.41.

ONTARIO SILVER MINING COMPANY.—The production for 1887 amounted to 1,063,465.73 fine ounces of silver and \$766,998.81 received for ore sales, an approximate total of \$1,830,464.54.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Jan. 20.

Statistics.

Production Anthracite Coal for week ended January 14th, and year from January 1st:

P. Tons of 2240 lbs.	1888.		1887.	
	Week.	Year.	Week.	Year.
P. & Read. RR. Co.	175,491	30,604	175,491	226,492
Cent. R. R. of N. J. 83,392	152,474		152,474	
L. V. RR. Co.	325,981		325,981	217,904
D., L. & W. RR. Co. 157,166	301,710		301,710	160,726
D. & H. Canal Co. 97,734	172,345		172,345	181,483
Penna. RR.	74,629	121,427	74,629	98,847
Penna. Coal Co.	36,593	69,387	36,593	34,212
Total	625,005	1,173,928	625,005	919,664
Increase	155,536	252,264		
Decrease				

* Included in tonnage of Philadelphia & Reading RR.

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

Production for corresponding period:

1883	1,441,938	1885	955,001
1884	1,012,351	1886	943,335

Production Bituminous Coal for week ended January 14th, and year from January 1st:

Tons of 2000 pounds, unless otherwise designated.

P. Tons of 2240 lbs.	1888.		1887.	
	Week.	Year.	Week.	Year.
Phila. & Erie RR.	570	1,210	570	1,210
*Cumberland, Md.	72,687	134,726	72,687	101,368
Barclay, Pa.	†	†	†	6,108
Broad Top, Pa.				
H. & Broad Top. RR. 6,916		14,017		17,900
Clearfield Region, Pa.				
Snow Shoe	3,230	6,041	3,230	6,737
Karhuus (Keating) ..	5,752	9,485	5,752	7,674
Tyrene & Clearfield ..	70,412	137,329	70,412	121,441
Tipton	685	904	685	
Alleghany Region, Pa.				
Gallatin & Mountain ..	18,649	39,349	18,649	30,255
Pocahontas Flat Top Coal				
Norfolk & West. RR.	23,936	63,350	23,936	37,772
Kanawha Region, W. Va.				
Ches. & Ohio RR.	135,000	72,515	135,000	49,346
Total	248,567	478,928	248,567	378,601

* Tons of 2240 lbs. † Reports discontinued. ‡ Estimated.

WESTERN SHIPMENTS.

Pittsburg Region, Pa.		
West Penn RR.	8,599	12,582
Southwest Penn. RR.	2,371	6,610
Pennsylvania RR.	5,076	9,918
Westmoreland Region, Pa.		
Pennsylvania RR.	33,819	61,981
Monongahela Region, Pa.		
Pennsylvania RR.	10,378	13,489
Total	60,243	104,580
Grand total	308,810	483,181

Anthracite.

This market is quiet and appears to be not the least excited concerning the future supply of coal, notwithstanding all that is said about the Reading strike and probability of its continuance. Prices are nominally as we have quoted for some time past, but the companies have nothing to sell, except to their old customers, and middlemen charge considerably higher prices.

Fair quotations for Lehigh f.o.b. would be for Broken Egg, \$5; for Stove and Chestnut, \$5 to \$5.25; for Pea Coal, \$3.75, and Buckwheat, \$2.85. Free burning coals are about the same price. For Stove and Chestnut, \$5 to \$5.25; about \$4.30 for Broken and Egg.

This market has not at any time been excited over the question of supply. The scare in Philadelphia, by which the local dealers profited for a few days on the commencement of the Reading strike, brought a perfect deluge of coal from all sides, until the railroads had to give positive orders to receive no more for that market. It is said most of the sidings were filled with coal sent in from all sides. The prices, of course, quickly tumbled and remain at an equivalent to New York figures.

The question of the probable continuance of the strike is the most important one in the trade. There are no indications on the surface at least which foretell its early collapse in the Schuylkill, but it seems probable that the Lehigh men will go to work before very long, their resources being pretty well exhausted and the statement which we published last week of their actual earnings having brought reason to some of them. The output in the Lehigh region is slowly increasing, notwithstanding the strike.

The Reading Company, like all the others which have been working under high pressure during the Lehigh strike, has need of time for doing dead work and making repairs, so that even should the strike continue for another month the company would still be able to produce during the balance of the year its fair share of the total output. The Wyoming and Lackawanna companies are still forcing production. Should the Lehigh and Schuylkill go to work the others would probably greatly reduce output while making repairs and pushing forward long neglected dead work.

The furnaces have been suffering somewhat for want of coal, but as the iron market would be benefited by reduction in output, the banking of a dozen or more of the furnaces would be no serious loss to the trade.

Mr. John H. Jones, official accountant, has sent us the following statement of the anthracite coal tonnage for the month of December, 1887, compared with the same period last year. This statement includes the entire production of anthracite coal, excepting that consumed by employes, and for steam and heating purposes about the mines:

COMPANIES.	December 1887.	December, 1886.	Difference.
Phila. & Reading RR.	618,305	544,675	Inc. 73,630
Central RR. of N. J.	382,447	458,355	Dec. 75,908
Lehigh Valley RR.	356,647	596,919	Dec. 240,272
Del. Lack. & West. RR.	725,685	477,634	Inc. 248,051
Del. & Hud. Canal Co.	417,701	263,333	Inc. 153,868
Pennsylvania RR.	351,213	284,560	Inc. 62,653
Pennsylvania Coal Co.	151,734	110,975	Inc. 40,759
N. Y., L. E. & W. RR.	64,347	70,400	Dec. 6,052
Total	3,068,079	2,811,351	Inc. 256,728

COMPANIES.	For year, 1887.	For year, 1886.	Difference.
Phila. & Reading RR.	7,555,252	6,695,732	Inc. 859,520
Central RR. of N. J.	4,852,859	4,994,752	Dec. 141,893
Lehigh Valley RR.	5,784,451	6,184,456	Dec. 400,005
Del. Lack. & West. RR.	6,229,793	5,172,023	Inc. 1,048,770
Del. & Hud. Canal Co.	4,048,230	3,480,687	Inc. 567,543
Pennsylvania RR.	3,816,143	3,478,885	Inc. 337,258
Pennsylvania Coal Co.	1,603,456	1,398,179	Inc. 205,277
N. Y., L. E. & W. RR.	759,835	731,650	Inc. 28,185
Total	34,641,019	32,136,364	Inc. 2,504,655

The stock of coal on hand at tide-water shipping points, December 31st, 1887, was 130,977 tons; on November 30th, 1887, 112,103 tons; increase, 18,874 tons. The amount on hand December 31st, 1886, was 372,282 tons.

Of the total production in 1887, 19,684,929 tons, or 56.82 per cent, was from the Wyoming region; 4,347,061 tons, or 12.55 per cent from Lehigh region, and 10,609,028 tons, or 30.63 per cent from Schuylkill region.

Eastern competitive tonnage, including all coal which for final consumption or in transit, reaches any point on Hudson River or the Bay of New York, or which passes out of the capes of the Delaware:

1887	12,081,826 tons
1886	12,042,480 "

Bituminous.

There is but little new to report in this department of trade. The market is active, and promptly takes all that can be sent to it; in fact, the consumption of bituminous coal has increased even more rapidly than that of anthracite. A good many steam boilers and steamers in this harbor are now using it where early in the season they burned anthracite, and it is even said that some of the large sugar refineries are contemplating making this change.

While bituminous coal sells at \$3.50@3.70 along-

side, and anthracite is at its present figures, there are likely to be many more changes in favor of the soft coal. Some anthracite dealers anticipate a reduction in consumption of anthracite here from this cause. Should prices be maintained at their present or any where near their present standard, there is every probability that the soft coal will command a somewhat higher price next season, possibly \$3.75 per ton; but even at this price it will replace a good deal of anthracite.

Boston.

Jan. 18.

[From our Special Correspondent.]

There is a hardening tendency to note in the anthracite coal market at this port, but nothing of importance is being done in the way of sales. The amount of coal furnished retailers in this city by the Reading Company is very large, and the strike is beginning to pinch some of the dealers (and there are several of them) who sell hardly anything but Reading coal. The New York companies might do a good business if they wished, but they are practically out of the market. Prices are as the buyer happens to find them, and are not easily quoted here. Egg and Broken are nominally \$4.50@4.75 f.o.b., and Stove coal \$5 f.o.b., at New York, but higher prices have been reported in some instances. As far as local developments go, there is nothing to show that the deadlock in the mining regions is in the least altered.

There is an absence of the contract gossip, which one begins to hear in the bituminous coal line at this time of the year. There is a fair movement on small orders, but it is claimed that there will be no contract business for 60 days or more. Freights at Baltimore and Hampton Roads have been a little more in favor of shippers lately. We quote: \$2.50@2.60 f.o.b.

Every craft coming into Boston from the south has to pass Highland Light, and the keeper there, who keeps a record of passing vessels, states that 398 coal barges passed the light in 1887. Assuming this to mean 200 round trips, averaging 1500 tons, and it appears that about 300,000 tons of coal were brought to Boston in barges in 1887—an estimate which bears out the facts, I think. This shows how this business is developing.

New York freight rates are high as ever. We quote, exclusive of discharging: New York, \$1.40@1.50; Philadelphia, \$1.60@1.75; Baltimore, \$1.60@1.65; Hampton Roads, \$1.55@1.60.

There is a fair retail movement. The predicted advance has been made—50 cents per ton all round—and delivered prices now are: Stove, \$7.75; Egg, \$7.50; Broken, \$7.25; Franklin, \$9; Lehigh Egg, \$7.75; Broken, \$7.50.

Pittsburg.

Jan. 19.

[From our Special Correspondent.]

COAL.—The market remains without change. The Ohio River being in good navigable condition, the coal shipments have been liberal. The exports since the first of January exceed thirteen million bushels, a large amount intended for the Southern markets. A single boat, the W. W. O'Neil, left Louisville for New Orleans on Thursday, January 19th, with 600,000 bushels. The rates are:

PRICE OF COAL PER 100 BUSHELS.			
First pool	\$4.75	Fourth pool	\$3.25
Second pool	4.25	Railroad coal	\$5.00@5.25
Third pool	3.75		

CONNELLSVILLE COKE.—For a long time there was a scarcity of both coke and cars. The situations are reversed. There are now plenty of both cars and coke, and what is wanted is buyers, which are not plenty, with a very light demand. Blast furnace, \$1.75; to dealers, \$1.85. Foundry, \$2. Crushed, \$2.50, f.o.b. at ovens.

FREIGHTS.

Ore and Bullion Freight Rates in Colorado.—The plea of the Leadville shippers for lower freight rates has been granted in part by the Denver & Rio Grande, Union Pacific, and Colorado Midland railroads. The following circular has been issued:

Changes in ore and bullion rates from Leadville to Denver, Colorado Springs or Pueblo, effective January 20th, 1888:

Ore.—Carloads, \$100 per ton valuation or less, Leadville to Denver, Colorado Springs, Pueblo, \$4.70 per ton.

Bullion.—Carloads, \$100 per ton valuation or less, Leadville to Denver, Colorado Springs, Pueblo, \$10 per ton.

Coke, delivered, price in Leadville in carloads, \$10. The above rates are a reduction of 30 cents per ton on ore, and \$2 per ton on bullion.

This reduction is the result of the recent conference in Omaha between Vice-President Potter, of the Union Pacific, Superintendent Choate, of the Union Pacific, President Hagerman, of the Colorado Midland, and Traffic Manager Hughes, of the Rio Grande. The conference was held in response to the earnest request of the Leadville shippers. All the requests they made were, however, not complied with.

Freight Rates on Ore for 1888.—A meeting of the representatives of the ore-carrying roads was recently held in Milwaukee to consider the question of ore rates for the coming season. The meeting was held at the offices of the Milwaukee, Lake Shore & Western, representatives of the Chicago & Northwestern and Duluth, South Shore & Atlantic roads being present. Owing to the absence of any representative of the Wisconsin Central no decisive action was taken in regard to the ore rates for the season of 1888 further than that it was decided that no advance would be made over the rates for 1887. The matter will be finally acted upon at an adjourned meeting of the representatives of the four companies named, to be held at Chicago on the 24th inst.

Freight Rates from Pittsburg.—The Chicago & Northwestern Railroad has made a large reduction in freight rates to points between Chicago or Milwaukee and Duluth, Minn., North Pacific Junction, Minn., Superior and West Superior, Wis. The new figures are from Pittsburg: First-class, \$1.05½; second, 88½; third, 65½; fourth, 46½; fifth, 35 cents. They formerly \$1.22½, \$1.07½, 75½, 53 and 40 cents. The new special rates on iron and steel are in carloads 31 and less than carloads 42 cents per 100 pounds.

The latest actual charters to January 19th, per ton of 2240 pounds:

From Philadelphia.—No shipments on account of the strike of the Philadelphia & Reading Coal and Iron Company.

From New York to:—Bath, Me., 1.50*; Beverly 1.50*; Boston, 1.50*; Bridgeport, Conn., .65; Cambridgeport, Mass., 1.50*3c.; Chelsea, 1.50*; Com. Pt., Mass., 1.50*; E. Boston, 1.50*; Fall River, 1.00; New Bedford, 1.05; New Haven, .65; New London, .80; Norwich, 1.00; Portsmouth, N. H., 1.60*; Providence, 1.00; Salem, 1.00*.

From Baltimore to:—Bangor, 1.50; Bath, 1.50@1.60; Boston, 1.50; Bristol, 1.40@1.50; Bridgeport, Conn., 1.25; Charleston, 90@1.00; Fall River, 1.25; Galveston, 3.00; New Bedford, 1.25; New Haven, 1.25; Newburyport, 1.55; New London, 1.25; New York, 1.40; Portland, 1.25; Portsmouth, N. H., 1.60; Providence, 1.25; Savannah, 1.30@1.40.

* And discharging. † And discharging and towing. 3c. per bridge extra. ‡ Alongside. † And towing up and down. ‡ And towing. †† Pilotage. ** Below bridge. * Old B. I.

MARKETS.

NEW YORK, Friday Evening, Jan. 20.

Prices of Silver per ounce troy.

Jan.	Sterling exchange	London Pence.	N. Y. Cents.	Jan.	Sterling exchange	London Pence.	N. Y. Cts.
14	4.86	44½	96½	18	4.86	44 5-16	96¾
16	4.86	44 7-16	96¾	19	4.86	44 7-16	96¾
17	4.86	44 7-16	96¾	20	4.86	44 7-16	96¾

*44 7-16@½. †96¾@½.

Market has been quiet but firm, and the fluctuations have been within a small compass.

The first issue of nickel silver coinage in France may be expected shortly. It will include 20-centime (4-cent) pieces to the value of 10,000,000 francs (\$2,000,000), 10 centime pieces representing 35,000,000 francs (7,000,000), and sous to the value of 25,000,000 francs (\$5,000,000). The issue will be made gradually.

Foreign Bank Statements.—The governors of the Bank of England at their weekly meeting reduced its rate for discount from 3½ to 3 per cent. During the week, the bank gained £266,000 and the proportion of its reserve to its liabilities was raised from 40.16 to 41.35 per cent, against an advance from 38 to 41.73 per cent in the same week of last year. The weekly statement of the Bank of France shows an increase of 625,000 francs gold and a gain of 3,250,000 francs silver.

Gold and silver Bullion.—Senator Stewart, on the 13th inst., offered an amendment to the bill providing for the investment of certain funds in the Treasury. It provides that any person may deposit at any mint or assay office gold or silver bullion and receive certificates therefor. The price to be paid for gold bullion is fixed at \$1 for 25 and ⅔ grains, and ⅔ fine, while the price for silver is to be fixed by the Secretary of the Treasury on the 1st and 15th of each month at average price of silver in New York market during the preceding fifteen days; provided, that the price shall not exceed an ounce of gold for sixteen ounces of the same fineness. The certificates are to be in denominations of not less than \$2 nor more than \$1000, and are to be legal tenders, redeemable at any treasury or sub-treasury. The bullion received is to be melted bars. No more gold or silver certificates are to be issued, and those coming into the Treasury are to be canceled. No gold or silver is to be coined, except to meet obligations expressly made payable in coin, and to meet the actual wants for silver currency among the people. The silver coinage act is repealed.

Copper.—The past week has again been rather an interesting and excited one in the copper market. Influenced by the lower quotations for Chili bars in London, our market gave way from day to day until Thursday morning, when the lowest price was touched, and spot copper came down to 15.80@15.85, with February copper selling as low as 15.90@15.95. It then became known that some negotiations were pending with some of the Lake companies regarding their entire output over the next three years, and this produced a complete change in the tendency of the market. Mining shares sprang up a good deal in price (and this is reported on in another portion of our issue), but, whilst nothing is as yet officially known, it appears that the Tamarack Company have made a sale (to the French syndicate) extending over the next three years. We are at present unable to say whether any of the other companies have entered into similar arrangements, but from what we can learn it is not at all likely that the Calumet & Hecla Company will sacrifice their old customers and put themselves into the hands of the foreign chique.

Consumers seem more disposed to come into the market now, and although they have really not done very much lately, there are indications that they can not hold off much longer. Casting copper is pretty scarce and we must quote some 15@15½, according to brand and time of delivery. Transactions in

Lake copper have been very heavy during the week and the closing prices are: Spot, 16.20; February, 16.30 to 16.35; March, 16.50; April, 16.75. It is understood that several sales of copper have been made for export. In London, Chili Bars are quoted during the week as low as £74 10s. to £74 15s., and the price has been fluctuating considerably. This morning the opening price was £76, but later on £75 5s. was accepted, and the closing price is £75 10s.

The air is full of rumors, some plausible, some impossible. It may interest some of our readers to hear them.

The much talked of French syndicate, which was doing wonderful things abroad and here, appears to have "effaced itself" officially. It is said that an old law has been found which imposes very severe penalties for artificially raising the price of any commodity in general use, and when this was brought to the notice of several bankers who are supposed to constitute the "syndicate," they promptly disavowed any syndicate action; they had merely advanced money to clients who they thought may have been investing in copper in England, but no one was found who was a part of the syndicate.

It is very strenuously maintained that the purchases made some time ago on the Metal Exchange, it was supposed for this syndicate, were in reality made for account of a few gentlemen here, who, having accumulated a large amount of copper, sold it in a lot to the Société des Mineraux. And it is also intimated in some well-informed quarters that the contract for the purchase of Tamarack copper, referred to below, was made by a sub-syndicate here which was able to give guarantees for the taking of the copper. Three years' output of the mine, say 50,000,000 pounds, at 13 cents plus half the advance over that figure that may be realized.

There is a good deal of mystery—though much shouting—about the transaction and the rights of directors to sell ahead so far. And there may be more regarding the personnel of the sub-syndicate, if some of the rumors be true. As already stated, there is not the least prospect of either the Calumet & Hecla, the Quincy, or of several of the other coke companies making any long time contracts or contracts of any kind with the mythical French syndicate.

There appears on the whole much more noise than business in the copper market. The sales in the Anaconda output for 1888, that of the Boston & Montana, the Arizona Copper Company, the Tamarack, and some odd lots of copper outside of these, are the only transactions that appear substantial.

A considerable amount of copper that was in weak hands here has changed to stronger hands, and is now no danger to the market. The reports from the Calumet & Hecla fire are rather unfavorable.

The Calumet and Red Jacket News under date of January 13th says of the Calumet fire: "We are sorry, but we can not bring ourselves to believe either that the surface indications are good or that the fire is in any way under control."

Another report says: "More timbers, some 80 feet long by 3 feet through, have been placed over the mouths of the shafts. Indeed, the whole of the surface in the vicinity of No. 1 and the man engine shaft is covered by a network of timbers and planks, which show the management consider a settlement at this spot more than probable."

On the other hand, the company reports things going on favorably, though no time is set for reopening the mine. The prospects are that not much ore will be taken out of the main Calumet & Hecla mine during the next four months.

A report says: "The company is pushing the South Hecla for all it is worth. Nothing but the best is being taken out and to do that men are changed from one place to another many times a month. Little or no timber is put in and the hanging wall is left to take care of itself. Product for last week I am told was 335 tons." Four more drilling machines have been put in the levels north of No. 10 shaft at the South Hecla part of the mine, and another set of trammers has been put on. Saturday a new rock crusher was placed in No. 12 shaft house, which will crush 120 cars of rock per day. One day lately the Black Hills, or South Hecla part of the mine, got out 500 cars of stamp rock. Evidently the January product of mineral will show a considerable improvement over December figures. Copper is coming forward by rail as fast as it is produced.

Messrs. Henry Bath & Sons report, January 3d: The charters for the first half of December were advised on the 16th ultimo as 1400 tons fine, with exchange 27½d. and price \$80 per quintal. Those for the second half of the month are cabled at 900 tons, with exchange 26½d. and price \$32.10.

Since our last report, dated 16th ultimo, Chili Bars have improved £4 10s. a ton. We close with a good inquiry for cash Bars at £85, but within the last few days forwarded bars have failed to fetch their proportionate value, indeed we have heard of sales at 10s. under cash prices, and at the moment price is quite nominal, operators continuing their attention to short prompts.

Chili producers have sold their production ahead pretty freely, but now show more disposition to accept the advance as *un fait accompli*.

Very heavy transactions took place here at the commencement of the fortnight. Latterly business has been more restricted, though price has remained firm, the fact being that the quantity of copper available outside of the syndicate is becoming limited, and this feature must become accentuated as their forward purchases fall in. A certain portion of the public appear to have the idea that the copper movement is likely to collapse in the course of a few months. This is not by

any means the opinion of the best informed people in the trade.

The composition of the syndicate is not known, but it is generally understood to be a very powerful organization, and its operations promise to be on a larger scale than the public consider at all likely. We think it is now probable that the abstention of the Anaconda Company from making sales of their matte may be connected with the movement, it having been announced by the daily papers that the syndicate also had control of the produce of the mines working with it.

The attention of the public has been so taken up with the operations of the syndicate that insufficient notice has been taken of the position now existing owing to the series of calamities which have overtaken the Calumet & Hecla Company. Reports as to condition of the mines vary from total ruin to stoppage of half of the usual production for a month or two. The condition is no doubt very serious, and it has been reported that flooding has been resorted to to extinguish the fire. It is needless to say what havoc this would play with the property.

The advance in Chili Bars has again been too rapid for other descriptions of copper, and Best Select can be bought out of second hands at from £3 to £4 below current price of Bars.

Present prices have brought out a great quantity of old metals, which have been obtainable at very moderate prices, and have been the salvation of some of our consumers who had set their faces against the rise. It is getting gradually absorbed, and as there are now large inquiries for Best Select at the reduced price, a healthier state of things should soon result.

Imports of American copper into England have been 876 tons, and into France 100 tons, or 976 tons against 67 tons last year.

Total deliveries for the fortnight are 5753 tons against 4309 tons imports, thus reducing stocks by 1444 tons. Total visible supply shows 42,101 against 43,565 tons last fortnight.

Transactions in furnace material have been limited. They comprise 150 tons Portuguese ore, low quality, at 13s.; and 400 tons Spanish at 14s.; 400 tons American matte at 14s. 6d. to 15s.; and a small quantity of precipitate at 15s. 3d. per unit.

The exports of copper during the week were as follows:

To	Matte.	Lbs.
To Liverpool—		
By S.S. Italy—Sacks.....	9,810	1,176,680 \$80,030
Copper.		
" Republic—Casks.....	172	225,000 26,625
" Greece ".....	180	225,000 40,500
" Italy ".....	40	50,000 8,278
" City of Richmond—Casks	198	256,250 39,785
" " " "—Wire		
" bars.....	67	9,066 1,351
" Adriatic—Casks.....	136	200,000 30,000
Old copper.		
" Durham City, Newcastle	7	3,884 889 1. t.
"—Casks.....		
Old brass.		
" Durham City, New Castle	20	22,486 2,159 "
"—Casks.....		
" Durham City, Lake Ontario—Casks.....	45	35,143 2,700
Old sheating.		
" City of Richmond.....		10,554 897
To Havre—		
By S.S. La Normandie—Casks...	260	325,000 62,500
" " "—Pigs.....	335	87,148 13,239
Old brass.		
To Hamburg—		
By S.S. Polaria—Pigs.....	45	30,475 2,500
To Leghorn—		
By S.S. Bolivia—Sacks.....	12,803	1,532,496 78,000

Tin.—This metal is rather weaker, and the prices are: Spot, 36½; February, 35½; March, 34½; April, 33½, but very little business is doing.

Elsewhere will be found an advertisement for the sale of five adjoining tin claims in Dakota. It is refreshing to hear of any one wanting to sell a tin prospect, not claiming that it is any thing more.

The first regular shipment of tin ore has arrived at Minneapolis from the Black Hills country via the Chicago & Northwestern Railroad. A steady freighting business from the mines is promised from this date.

Lead has been rather demoralized. A sale was reported at 4.50c., and afterward 4.65 was paid, but the closing prices to-day are better again, and this afternoon March lead was sold at 4.85. The foreign market is dull, Spanish lead selling in London at £14 10s., and English at £14 15s.

A usually courteous contemporary refers, without crediting us, to our statistics of lead production, thus "an estimate put forward makes the total lead product of the United States last year as 160,000 net tons;" "this compilation shows on its face its utter untrustworthiness;" "the estimate of 160,000 tons is utterly unreliable."

We can make large allowance for pique, but the language and statements it induced in this case are presumptuous as well as discourteous.

Our direct returns from 19 works producing either refined or soft lead state specifically their production figures (estimated only for a week or two of December), and these returns aggregate almost exactly 157,000 tons or 99 per cent of the total production given by us. The balance being chiefly the output of a small number of scattered producers of soft lead whose returns did not reach us, was carefully estimated by well-informed sources, and is believed to be very nearly correct.

It requires a great amount of presumption, to say

the least, for one who has not any of the official returns to question the correctness of those made to us. For our part we have the utmost confidence in the truthfulness of these returns. A possible error in one case only may have been made in the return of a works which refines a portion of its production, and, if error there be, in that case it was, we are sure, unintentional on the part of our informant, and could not greatly affect the total figures given.

We have not undertaken this year to credit each State with the amount of lead produced from its ores wherever smelted. We simply in the case of Colorado and Utah gave the amounts claimed by local authorities, and they represent in the case of Colorado the amount of lead smelted in the State. The important figure is that of the total production of the country, and as we have shown that is substantially correct, our polite contemporary to the contrary notwithstanding.

Messrs. John Wahl & Co., of St. Louis, telegraph to-day as follows:

The situation remains substantially unchanged, the trade of the past week being very much like that of its predecessors, remarkable only for its dullness. Negotiations are pending, but it seems as though buyers and sellers can not agree. Argentiferous lead is offered at 4.55@4.60, and Common is held at 4.42½@4.44½, with 4.37½@4.40 bid.

Messrs. Everett & Post, of Chicago, telegraph to-day as follows: The market declined slowly after our last report, but under sales of Common Missouri lead at 4.50 to-day, refiners decline all business, and consequently the market is rising, excited and unsteady, making it difficult to give exact quotations. The demand for consumption is suddenly large.

LATER.—Market firm, sales of Argentiferous lead at 4.70.

Spelter continues in good request. Common domestic has been sold at 5¼-¾, whilst Silesian is obtainable at 6.30. In London the market remains unaltered at £21 for common and £21 5s. to £21 7s. 6d. for specials. Sheet zinc is in good request at 6¼ to 7c.

The Edes, Mixer & Heald Zinc Company, of Knoxville, Tenn., expect to erect two more spelter furnaces during the year 1888.

Mr. David P. Hunt, of Joplin, an extensive miner of zinc, is reported to have said: "Never in peaceable times has there been such a demand for lead and zinc as at present. During the last four months it has been phenomenal, and mines can not keep up with their contracts. Zinc is even in greater demand than lead. Agents of the French government have purchased nearly the entire American output to have it on hand for the manufacture of brass field-pieces."

Antimony.—There has been more inquiry for Cookson's at 15c. and Hallett's at 11¼@½c. The English market remains very firm with nothing obtainable under £50.

Chemicals.—There are no new features in the heavy chemical market, inquiry for small quantities being the rule.

The various brands of soda ash remain quiet. We quote Caustic Soda Ash, 48 per cent, 1.32½@1.35; Newcastle Soda Ash, 48 per cent, 1.25@1.35; Carbonated Soda Ash, 48 per cent, is not obtainable on the spot. We quote 1.25@1.27 for future shipments.

In caustic soda little is done. The market is a shade weaker since our last, owing to the low prices prevailing in Liverpool. We quote 60 per cent 2.55@2.65; 70 per cent, 2.30; 72½ per cent, 2.27½.

Planching powder is very quiet. At present prices holders are not anxious to sell. We quote 1.90@1.95 for 35 per cent or over.

Acetic acid is still rather unsteady. Owing to the continued competition between manufacturers, the market is rather dull. We continue to quote our prices of last week.

Sulphuric acid, 60 degrees, is in good demand in a jobbing way, the quotations remaining unchanged since our last.

Chamber acid continues active at 85@90c. The brimstone market is very quiet, \$25 per ton being asked for spot lots. There are no buyers at the above figure.

There has been considerable business done in nitrate of soda. The price declined somewhat early in the week, but has since stiffened up, prices ex vessel being 2.05c.; ex store, 2.10@2.12½c. Kainit is very firm, owing to the demand by Southern manufacturers. We continue our quotations of last week.

Muriate of potash also continues firm, with noticable change in prices.

Quicksilver is dull, and has declined in price to 65c. per lb.

The price in London has also declined to £9 2s. 6d. per flask of 75 lbs.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Jan. 20.

The Bulletin of the Iron and Steel Association publishes complete statistics of the production of pig-iron in the United States in 1887. We have space this week only for the totals, which are as follows:

	Production.	Unsold stocks.
Charcoal.....	578,182	95,532
Bituminous.....	4,270,635	127,978
Anthracite.....	2,338,380	114,107
Total tons of 2000 lbs.....	7,187,206	337,617

Next week we shall present the figures in detail, and comparisons with 1886.

The situation in American pig-iron is unchanged.

The prolonged strikes in the Lehigh region, which have lasted now four and one half months, in connection with the present strikes in the Schuylkill region, seriously embarrassed all the Eastern blast-furnaces. If the situation is prolonged there must be, as we frequently pointed out, a stiffening of prices. At present, however, there is no such indication. Prices for standard of foundry iron, which, however, are very scarce, remain nominally unchanged. Forge irons show rather more strength, and we note the sale by the Thomas Iron Company of 25,000 tons at \$17, sold to pipe foundries.

Discussion continues in the daily papers about the reduction of prices at Pittsburg of pig-iron by the Carnegies.

No definite conclusion appears to have been reached by the other makers, except that something must be done to enable them to meet the competition, while statements that prices of pig-iron at Pittsburg had been lowered \$4 a ton are entirely unfounded. The truth appears to be that the Carnegies, having extra stock of pig iron to sell, went into the market and sold it for what they could get, which was from 50 cents to one dollar per ton below prices.

Scotch irons are nominally unchanged, with fair demand.

Bessemer pig is without interest, with domestic quotations a trifle lower.

The steel blooms and billets are lifeless, no business being reported and quotations purely nominal.

There is some inquiry for steel wire, imported being quoted \$40½ to \$41, which prices are higher than those of American mills.

There is but little new business in steel rails, the trunk railroads not yet having come into the market with their orders. It is, however, believed that large orders will be placed by the American roads before many weeks.

The total shipments in 1887 of steel rails by the fourteen mills embraced in the Association of Bessemer Steel Rail Manufacturers amounted to 1,833,649 tons. There were sold for 1887 delivery 1,875,249 tons, leaving a balance to be carried over to 1888 of 41,600 tons.

The allotments for 1888 delivery up to January 1st, 1888, amounted to 848,032. Up to that time there had been sold for 1888 delivery 253,687 tons, leaving 594,345 tons allotted for 1888 and unsold at January 1st.

Quotations for steel rails are unchanged; \$32 to \$33 at Eastern mill. Sales during the week aggregate about 20,000 tons from Eastern mills, and one sale of 20,000 tons to a Western road has been placed in Western mills.

The demand for structural iron and steel continues excellent, and the mills are all busy with work ahead.

No business is reported in scrap iron, although there is a little more inquiry.

Old rails continue in their usual unsatisfactory condition, with quotations nominally unchanged. Holders are strong and no lots of size are offered under \$22 to \$22½, with \$21 to \$21½ bid. About 1000 tons arrived this week and went into bond. The total imports of old rails in 1887 will not fall short of 150,000 tons.

The Philadelphia Rolling Mill Association, at their meeting, 18th inst., agreed on 2 cents for bar iron as the basis for labor, to commence first Monday in February.

This amounts to a reduction of nearly 10 per cent, and will affect about 1,200 workmen.

Louisville. Jan. 16.

[Reported by GEO. H. HULL & Co.]

There has been very little buying during the week, purchases being confined to small lots of 50 and 100 tons. The action of certain furnaces in selling their iron regardless of the general market, demoralizes the buyers who had been quite willing to pay prices generally asked until brokers made offers at such low figures to induce them to buy in large quantities. They became demoralized and are now waiting to see in what way the market tends. Old rails and wheels are in better demand, and we think the feeling of the market is gradually becoming steadier in sympathy with reports from New York. Mill irons in the south have generally been bought for the coming year, so that rolling mills and smaller consumers of mill grades will now have some difficulty in obtaining favorite brands. Quotations will be found in the weekly register of prices.

Philadelphia. Jan. 21.

[From our Special Correspondent.]

The coal situation, which for the time being is practically the iron situation, is apparently unchanged. A few large industrial establishments have already closed down and the announcement is made to-day that a few more will close down on Saturday. Blast-furnaces are still obtaining a sufficient supply of fuel to run where their managers want to run. In several instances furnaces have been banked up because there is no inducement at present prices to make iron. Business continues unsatisfactory throughout every branch of the iron trade. The trouble is not over business this week or next, but what it may be in the event of a continuance of the strike for several weeks. The Reading officials have taken a stand against arbitration or conciliation of any kind, and a public meeting has been called in Philadelphia to endeavor to bring about some change. The large supply of coal from the Wyoming region has been quite a surprise to manufacturers and furnace men depending upon it, and they are beginning to have a little more hope, but it is the cost that is against them. Furnace interests are unwilling to book large orders at current prices on account of the increase in cost of anthracite. The demand for muck bars is light and only a few small

orders have been booked at \$31. No. 1 Foundry iron is still sold at \$21.50, with \$22 asked for a few of the better brands. The bar mills are all fairly busy and running with a moderate supply of coal. The wider demands for bituminous coal are restricting the usual supply somewhat, and bar iron and iron and steel makers of all kinds are beginning to feel more or less apprehensive in regard to supplies. There is not the same uneasiness felt in iron trade circles now that there was a week or two ago. Supplies of coal are springing up from unexpected quarters. A good deal of coal is arriving in this city for domestic requirements, and the people feel much easier. A shutting down of furnaces will naturally follow unless there is a solution of the trouble, not for want of coal, but inability to obtain the higher prices. This means some Southern and more Western iron. There is no change in card rates on bars, sheets, or plates, nor can it be said there is an upward tendency, although consumers are not willing to risk buying in a large way at this time lest manufacturers should be induced to put up prices. There is nothing of importance in the plate iron branch or in structural iron. The mills are running and there are fair indications of an increase in the number of winter orders. Steel rail quotations remain unchanged, and as far as makers are inclined to speak, there seems to be no change in the situation, but a number of offers have been made for spring supplies. Old material is more active just now than usual, although the spot stocks are light. Selected scrap and scrap of all kinds is not as easily obtained from country towns as usual.

Prices current will be found in the weekly register of prices on another page.

Pittsburg. Jan. 19.

[From our Special Correspondent.]

While there has been a fair amount of inquiry in the iron market since our last report, transactions have been restricted even more so than for some weeks past. Both buyer and seller have been waiting in hopes that something would turn up favorable to their side. So far they have waited in vain. The fact is beyond dispute the iron and steel trade is certainly in a very unsettled condition, and no person can predict what the future will be. Besides, there seems to be a general dissatisfaction all round. The manufacturers want a reduction in the price of labor, the furnace men want cheaper coke, cheaper labor, a reduction in freights, and ore that don't cost so much money, and a better price for pig-iron; on the other hand, workmen ask for better wages and a scale signed embodying that fact. How or when these matters will be adjusted the future only can decide. There are various rumors circulated: most of them are really laughable. For instance: One of our papers, whose information of iron affairs is fully up with their knowledge of the inhabitants of the moon, stated that pig-iron in this market declined \$4 per ton since the first of January.

A leading dealer remarked, the situation of the iron trade is about as good as could be expected. The strongest feature in the market is the heavy consumption going on, that brokers and manufacturers say must bring about an improved demand before very long. The furnaces that are out of blast will remain so until there is a perfect understanding, one that will continue at least until the end of the year. Another furnaceman remarked, we are out of blast and intend to stay out until we can obtain a better price for pig-iron. Of course how long that will be is uncertain. The large number of furnacemen idle has made Connelville coke plenty. The dangerous condition of the streets on account of the ice has beyond doubt been a drawback on business, it being unsafe to venture on the streets. Accidents have been numerous, some of them being of a serious nature. The sales furnished show the condition of the market better than any thing else.

SALES REPORTED SINCE OUR LAST.

Coal and Coke Smelted Lake Ore.	
500 Tons Bessemer, February.....	17.75 cash.
500 Tons Bessemer.....	17.75 cash.
275 Tons No. 1 Foundry, All Ore.....	19.00 cash.
350 Tons Mill Iron.....	16.75 4 mo.
150 Tons No. 2 Foundry.....	17.50 cash.
150 Tons Bessemer.....	18.75 cash.
100 Tons Mill.....	17.85 4 mo.
100 Tons No. 2 Foundry.....	18.25 4 mo.
Coke, Native Ore.	
200 Tons Gray Forge, Extra.....	17.50 4 mo.
150 Tons Gray Forge.....	16.50 cash.
120 Tons No. 1 Foundry.....	19.00 4 mo.
120 Tons No. 2 Foundry.....	18.00 cash.
25 Tons Slavery.....	18.50 cash.
Charcoal.	
25 Tons Old Blast.....	27.50 4 mo.
25 Tons No. 2 Warm Blast.....	23.00 4 mo.
Steel Billets.	
500 Tons Billets.....	30.00 cash.
Muck Bar.	
500 Tons Good Neutral.....	28.75 cash.
Steel Wire Rods.	
500 Tons American.....	39.00 cash.

FINANCIAL.

NEW YORK, Friday Evening, Jan. 20.

Mining Stocks.

Since our last there have been no important movements in mining shares. The market has undergone no special changes, the shares previously noted as displaying strength showing no loss, and the general market maintaining a fair degree of buoyancy. On Thursday, the trading was distributed through seventy shares, and this in itself is an encouraging indication. There has been of late a decided improvement in the method of dealings on the Mining Exchange. "Washing" has been indulged in to a much less extent than

WEEKLY REGISTER OF CURRENT QUOTATIONS.

This list is the result of careful compilation and is destined to meet the demands of all classes of subscribers. The prices quoted are those actually ruling in our own and foreign markets. Manufacturers and importers will please give notice of all modifications not later than Friday noon each week.

CHEMICALS.

Table of chemical prices including Acetic, Muriatic, Nitric, Oxalic, Sulphuric, Alkali, Alum, Ammonia, Asbestos, Asphaltum, Barium, Barytes, Borax, Bricks, Bromine, Building Stone, Cadmium, Calcium, Cerium, Cement, Chalk, China Clay, Chromium, Cobalt, Copper, Cream of Tartar, Didymium, Emery, Erbium, Feldspar, Fuller's Earth, Gallium, Glucinum, Green, Gypsum, Indium, Iodine, Iridium, Kaolin, Lanthanum, Lead, Litharge, Lithium, Magnesia, Magnesium, Manganese, Mercury, Mineral Wool, and Molybdenum.

Table of metal prices including Nickel, Niobium, Niobium, Platinum, Phosphate Rock, Phosphorus, Plumbago, Potassium, Potassium, Pyrites, Quartz, Rotten Stone, Rhodium, Ruthenium, Selenium, Silicium, Soda Ash, Soda Caustic, Sal, Sodium, Strontium, Sulphur, Tantalum, Tellurium, Thallium, Titanium, Thorium, Tungsten, Vanadium, Vermillion, Vitriol, Yttrium, Zinc Oxide, and Zirconium.

IRON AND STEEL.

Table of iron and steel prices including American Pig-Iron, Scotch Pig, Bessemer Pig, Spiegeleisen, Ferro Manganese, Steel Blooms, Steel Billets, Steel Nail Slabs, Steel Wire Rods, Steel Rails, and Structural Iron and Steel.

Table of machinery and equipment prices including Steel Plates, Iron Piles, Merchant Steel, Cast-Iron Pipe, Wrought-Iron Pipe, Boiler Tubes, Nail Fastenings, Wrought Scrap, Old Car Wheels, Old Rails, Nails, Louisville Prices, Philadelphia Prices, and Pittsburg Prices.

Table of pig iron and charcoal prices including Coke or Bituminous Pig, Charcoal Pig, and various grades of pig iron and charcoal.

Table of lead and tin prices including Domestic Common, Domestic Refined, Foreign, Sheet, Pipe, Tin lined Pipe, Shot, Tin Plates, Tin Spot, Banca pigs, English pigs, Straits pigs, Straits in bars, Ch., bright, Coke, Ternes, Zinc, Domestic spelter, Foreign spelter, Silesian, London, Sheet, American, Sheet, foreign.

STOCK MARKET QUOTATIONS.

Table of stock market quotations including Baltimore Stock Quotations, Birmingham, Ala., Stock Quot, and London Quotations.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Main table with columns: NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES, ASSESSMENTS, DIVIDENDS, and NAME AND LOCATION OF COMPANY, CAPITAL STOCK, SHARES, ASSESSMENTS. Lists various mining companies and their financial details.

G. Gold, S. Silver, L. Lead, C. Copper. * Non-assessable. * This company, as the Western, up to Dec. 10th, 1881, paid \$1,400,000. Non-assessable for three years. † The Deadwood was previously paid \$275,000 in eleven dividends, and the Terra \$75,000. Previous to the consolidation in Aug., 1884, the California had paid \$31,320,000 in dividends, and the Con. Virginia \$42,300,000. Previous to the consolidation of the Copper Queen with the Atlanta, Aug., 1885, the Copper Queen had paid \$1,250,000 in dividends.

NEW YORK MINING STOCK QUOTATIONS.

DIVIDEND-PAYING MINES.

NON-DIVIDEND-PAYING MINES.

Main table of New York Mining Stock Quotations, divided into Dividend-paying and Non-dividend-paying mines. Columns include Name and Location of Company, dates from Jan. 14 to Jan. 20, and Sales.

*Assessment unpaid. *Dealt in at the New York Stock Exchange. †Unlisted Securities.

BOSTON MINING STOCK QUOTATIONS.

Table of Boston Mining Stock Quotations, listing company names, dates from Jan. 13 to Jan. 19, and sales figures.

New York: Dividend shares sold, 57,300. Non-dividend shares sold, 152,570. Total New York, 209,870. Boston: Dividend shares sold, 15,024. Non-dividend shares sold, 14,703. Total Boston, 29,727.

COAL STOCKS.

Table of Coal Stocks, listing company names, par value of shares, and prices from Jan. 14 to Jan. 20.

San Francisco Mining Stock Quotations.

Table of San Francisco Mining Stock Quotations, listing company names and closing quotations from Jan. 13 to Jan. 19.

**Of the sales of this stock, 37,708 were in Philadelphia, and 206,835 in New York. †The quotations for these stocks are not percentages, but actual prices. Dealt in at the New York Stock Exchange Unlisted Securities.

Total sales, 327,690.

formerly, and the method previously in vogue, which brought such discredit upon speculation in mining shares, is now not often heard of.

Proustite shows continued strength, and much higher prices are predicted. To what extent the public are holders of these shares we are unable to say; but our reports from well-informed parties say that the mines are not shown to possess any such value as present quotations give. The price has been steady at from \$2.10 to \$2.45. Some 25,900 shares changed hands during the week.

Phoenix, of Arkansas, was sold at 50 cents on Thursday, and this caused such ejaculations as, "What a fall, my countrymen!" Of course this alleged transaction does not indicate that any lamb has been found verdant enough to buy these shares, and simply means that the fellows who hold the reins would be glad to find a purchaser at that price, if possible, outside the Phoenix office. The price to-day declined to 25c. As stated in these pages, when this stock was first launched the property had no intrinsic value as a mine.

El Cristo is now looked upon as completely defunct, and has been tenderly laid on the shelf like grandfather's clock of old. The public interest in these shares appears to have been completely eliminated. Only 1100 shares were sold, at prices ranging from \$1.80 to \$2.15.

Robinson Consolidated continues firm at 73 to 80c. Leadville Consolidated has been quiet, and declined from 65 to 48c. Cashier opened at 10c., and advanced to 18c. on Wednesday, declining again to 12c. yesterday. Breece shows sales at 29@30c. Chrysolite at from 40 to 43c. Dunkin is strong at from 95c. @ \$1. Little Chief at from 23@26c. Silver Cliff has taken a jump from 8@18c. Lacrosse declined from 14@11c. Eclipse attracted some attention and advanced from \$1@1.88 on Thursday, declining again to-day to \$1.25.

Towards the close of the week Santiago again appeared on the list at \$3.05. This stock has not been dealt in for a long time.

San Sebastian is quiet, selling at \$2.95. A little interest was shown in Carupano; sales were made at from \$2.05 to \$2.15.

Owing to the great number of stockholders of the Sutor Tunnel Company in Europe, as well as in the United States, subscriptions for the company's bonds under said plan are still being received until further notice. The right is reserved of advancing the price of the remaining bonds at any time. Subscribing stockholders must be prepared upon notice to pay in their entire subscription and to present their shares for identification as assenting shares. Mr. Theodore Sutor is reported to have said, regarding the reorganization, that the "bonds have met with considerable approval, and half the entire issue has been placed, which, in his opinion, insures the success of the reorganization." The official announcement is made that the royalties received by the company for the month ending January 10th amount to nearly \$30,000.

The price has declined from 20c. to 15c., the sales were large, and amounted to 44,400 shares.

Consolidated California & Virginia shows a lower movement, going from \$21 to \$18.13. The other Comstock shows the usual transactions, and but little variation in prices.

Belle Isle has declared a dividend of fifty cents per share, the first since December, 1879. The price advanced in consequence from 48c. to 70c., with transactions amounting to 5400 shares. North Belle Isle was quiet at from \$8@8.50 and Navajo at \$2. Found Treasure was quoted at the same price. Commonwealth declined from \$4.25 to \$4.10. Tornado was firm at \$1.

The Quicksilver stocks held their own, Preferred being sold at from \$37.75@38.25; Common declined from \$13@13.10.

The price of Brunswick remains unchanged at from \$1.60@1.70. Bodie Consolidated opened at \$2.80, and declined to-day to \$2.45. Bulwer was firm at 90c. Standard ruled at from \$2.35@2.65. It is stated that another dividend will shortly be declared.

Plymouth Consolidated remains at from \$19@19.50.

Amador was dealt in at prices ranging from \$1.50 @ \$1.60; Middle Bar at from 38c. @ 40c., Hector shows a sale at 45c.; Taylor Plumas, a few at 4c.

Eureka shows some activity, and advanced from \$8.88 to \$10.25.

Little is doing in Rappahannock, at prices varying from 19c. to 20c.

Iron Hill shows a few sales at from 85 to 92c. Dead wood was quiet at from \$1.90 to \$1.95. Caledonia at \$1.65.

Some 400 shares of Stormont were sold at 6c.

Auction Sale of Stocks.

The following securities were sold at auction in this city on the 18th inst.: 100 shares Quicksilver Mining Co., preferred, 33½; 100 shares Quicksilver Mining Co., common, 12½; 40 shares Marshall Consolidated Coal Mining Company, 6½; 200 shares Colorado Coal and Iron Co., 35½; 1720 shares Horn Silver Mining Co., 82c. per share; 100 shares Central Mining Co. of Colorado, dated 1864, \$1.50 lot; 1000 shares Keystone Silver Mining Co., \$4 lot; 5 shares Consumers' Coal Co., \$1 lot; 1000 shares Las Nueve Minas de Santa Maria Gold and Silver Mining Co., \$3 lot; 4000 shares Woodside Mining Co.; 5000 shares Georgetown Eureka Mining Co., \$15 lot; 100 shares Central Mining Co. of Michigan, \$13 per share; 500 shares Taylor Plumas Mill and Mining Co., \$11 lot; 100 shares Little Pittsburg Consolidated Mining Co., \$30 lot.

Meetings.

Annual and special meetings of the following companies will be held on the dates given:

Atlas Iron Mining Company, of Michigan, Room 21,

Benedict Block, No. 29 Euclid avenue, Cleveland, Ohio, February 15th, at two o'clock P.M. In addition to the annual election action will be taken towards securing loans for development-work.

Cameron Iron and Coal Company, Emporium, Cameron County, Pennsylvania, February 11th, at two o'clock P.M. Special meeting to vote upon a proposition to issue bonds of the company, secured by a mortgage on its properties, to provide means for the erection of additional furnaces and other improvements, and for such other purposes as the interests of the company may demand.

Carbon Iron Company, No. 15 Broad street, New York City, January 26th, at eleven o'clock A.M.

Commonwealth Consolidated Mining Company, Room 52, No. 309 Montgomery street, San Francisco, Cal., January 25th, at two o'clock P.M. Special meeting to consider the action of the board of directors in selling certain properties to the North Commonwealth and Del Monte mining companies.

Crane Iron Company, No. 224 South Fourth street, Philadelphia, Pa., February 8th, at twelve o'clock noon.

Cumberland Railway and Coal Company, Chesterfield Chambers, Alexis street, Montreal, Canada, February 8th, at half-past three o'clock P.M.

Dakota Water Power Company, No. 45 William street, New York City, January 25th, at twelve o'clock noon. Special meeting to increase the capital stock of the company to three million dollars.

Kittaning Coal Company, No. 333 Walnut street, Philadelphia, Pa., January 26th, at twelve o'clock noon.

Maryland Coal Company, No. 35 Broadway, New York City, February 7th, at eleven o'clock, A. M.

Standard Explosives Company, No. 25 William street, New York City, February 16th, at one o'clock P.M. Special meeting to determine upon the reorganization of the company to a limited liability company.

Wellington Mine, office of the Receiver, Mr. Levi S. Tenney, No. 7 Nassau street, New York City, at twelve o'clock noon. General meeting of the creditors for the settlement of all accounts against the corporation and the adjustment of open and subsisting contracts.

Winona Gold Mining Company, No. 61 Broadway, Room 24, New York City, February 8th, from one to two o'clock, P.M.

Dividends.

Atlantic Mining Company, of Michigan, has declared a dividend, No. 9, of one and a half dollars per share, or \$60,000, payable February 1st, in New York.

Central Mining Company, of Michigan, has declared a dividend, No. 26, of two dollars per share, or \$40,000, payable February 1st, in New York.

Columbia Oil Company has declared a dividend, No. 59, of two per cent, payable January 23d, at Pittsburgh.

Consolidated Coal Company of Maryland has declared a dividend of one dollar and fifty cents per share, payable January 31st at 71 Broadway, New York City.

Daly Mining Company, of Utah, has declared dividends No. 10 and 11, of twenty-five cents per share each, or \$75,000, payable January 31st, at Messrs. Lounsbury & Co., No. 15 Broad street, New York City.

Eureka Consolidated Mining Company, of Nevada, has declared a dividend, No. 81, of twenty-five cents per share, or \$12,500, payable February 3d, at Messrs. Laidlaw & Co., No. 14 Wall street, New York City.

Homestake Mining Company, of Dakota, has declared a dividend, No. 114, of twenty cents per share, or \$25,000, payable January 20th, at San Francisco, and also at the transfer-agency of Messrs. Lounsbury & Co., No. 15 Broad street, New York City.

Monongahela Navigation Company made on January 12th a distribution of capital stock pro rata among the stockholders, amounting to three dollars per share. Certificates of such stock, or scrip for amounts less than the par value of one share will be issued on application to the treasurer.

North Belle Isle Mining Company, of Nevada, has declared a dividend, No. 3, of fifty cents per share, or \$50,000, payable February 2d.

Odanah Mining Company, of Wisconsin, has declared a dividend of twenty-five cents per share.

Ontario Silver Mining Company of Utah has declared dividend No. 140 of fifty cents per share, or \$75,000, payable. January 31st at Messrs. Lounsbury & Co.'s No. 15 Broad street, New York City.

Philadelphia (Natural Gas) Company has declared dividend No. 27, of one per cent, or \$75,000, payable January 25th, at Pittsburgh.

Wyoming Valley Coal Company has declared a dividend of one per cent, payable February 4th.

Pipe Line Certificates.

Messrs. Watson & Gibson, petroleum and stock brokers, 49 Broadway, report for the week as follows:

Monday, oil closed 91½c., and on Tuesday it was two cents lower. Liquidation had then been in progress for several days, started by heavy sales to realize profit above 96c. When the market started down buyers held aloof, as they knew that there had been no reaction since 80c., and it was time to be cautious. On Tuesday the extreme point of depression of the

Assessments.

COMPANY.	No.	When levied.	D't'ng't' in office.	Day of sale.	Am't per share.
Alpha, Nev.	23	Jan. 9	Feb. 15	Mar. 6	.87½
Alpha M. & M., Nev.	1	Jan. 9	Feb. 15	Mar. 6	.25
Alfa, Nev.	36	Nov. 29	Jan. 3	Jan. 23	.50
Anchor, Utah.	11	Dec. 13	Jan. 13	Feb. 13	.20
Belle Isle, Nev.	11	Dec. 14	Jan. 17	Feb. 7	.15
Best & Belcher, Nev.	39	Jan. 4	Feb. 9	Mar. 2	.50
Cedar Rapids, Dak.	4	Dec. 17	Dec. 12	Feb. 14	.10
Chollar, Nev.	24	Dec. 5	Dec. 11	Jan. 31	.50
Climax, Dak.	2	Jan. 4	Feb. 11	Feb. 27	.004
Commonwealth, Nev.	6	Dec. 29	Feb. 6	Feb. 28	.50
Crown Pt., Nev.	6	Jan. 4	Feb. 8	Feb. 29	.50
Eldorado, Dak.	2	Dec. 14	Jan. 14	Jan. 31	.01
Emerson, Utah.	1	Dec. 10	Jan. 20	Feb. 9	.01
Eva, Nev.	1	Jan. 5	Feb. 10	Mar. 5	.05
Far West, Dak.	13	Dec. 13	Jan. 14	Feb. 4	.01
Golden Reward, Dak.	1	Dec. 31	Feb. 3	Feb. 24	.004
Hot Spur, Dak.	4	Dec. 12	Jan. 16	Feb. 4	.002
Iowa, Nev.	18	Dec. 21	Jan. 24	Feb. 11	.25
Kossuth, Nev.	9	Nov. 25	Jan. 5	Feb. 6	.10
Mexican, Nev.	35	Jan. 17	.....	.....	.25
Manhattan, Nev.	7	Dec. 9	Jan. 12	Jan. 31	1.00
Mono, Cal.	25	Dec. 20	Jan. 24	Feb. 23	.50
Morgan, Cal.	12	Nov. 26	Dec. 31	Jan. 24	.15
Nevada Queen, Nev.	3	Dec. 16	Jan. 24	Feb. 16	.50
Norway, Utah.	1	Dec. 9	Jan. 13	Jan. 31	.01
Occidental Con., Nev.	1	Dec. 12	Jan. 16	Feb. 8	.25
Pilgrim, Mich.	2	Dec. 10	Jan. 5	.....	.15
Piiche, Cons., Nev.	4	Dec. 30	Feb. 4	Mar. 22	.20
Potosi, Nev.	4	Nov. 30	Jan. 5	Jan. 26	.50
Ruby Bell, Dak.	2	Dec. 13	Jan. 14	Jan. 31	.002½
Sierra Nevada, Nev.	90	Dec. 7	Jan. 11	Jan. 30	.25
Utah Cons., Nev.	3	Dec. 13	Jan. 17	Feb. 3	.25
Vulcan, Dak.	1	Dec. 14	Jan. 17	Feb. 17	.001

break, 85½, was touched, partly owing to the enforced sales for a crippled bull operator, who was heavily long. This failure exerted a depressing effect, but each day since then the market has gathered itself together for higher quotations, and the close to-night was exactly six cents above the lowest figure. The edge of speculation was rather dulled by the twelve cent drop, and it is a narrower market than before, but certificates appear to be pretty well concentrated. It is well to remember that less than twenty millions are outstanding, and that the amount of "credit balances" or oil capable of conversion into certificates for "good delivery" on the Exchange is only five millions. The small quantity of oil, and a quantity which is diminishing each month, renders large sales for short account hazardous, except on sharp bulges.

The following table gives the quotations and sales at the Consolidated Stock and Petroleum Exchange:

Opening.	Highest.	Lowest.	Closing.	Sales.
Jan. 14	94	94c.	85½c.	91½c. 5,879,000
16	91½	93½	89	89½ 7,242,000
17	90	90½	85¼	86½ 9,563,000
18	87½	88½	86½	86½ 3,494,000
19	89½	90	88½	90 3,453,000
20	90½	91¼	89½	91¼ 3,759,000

Total sales in barrels..... 33,390,000

Financial Statements.

The following are the financial balances of the various mining companies on January 1st:

CASH ON HAND.	
Alpha Con.....	\$6,414.08
Alta	13,080.41
Andes	9,295.00
Belcher.....	18,352.52
Bodie	39,985.58
Bulwer	10,870.87
Bullion	31,603.39
*Con. Cal. & Va.	75,250.26
Challenge Con.....	15,170.88
Con. Imperial.....	9,886.97
Crocker	3,700.07
Dudley	842.16
Exchequer	8,918.41
Found Treasure.....	1,453.77
Gould & Curry.....	29,166.62
Independence	5,849.40
* Cash in bank and uncol bullion on hand of the value of \$12,432.40.	
+ Overdrawn, with \$84,428.95 in gross bullion and bills receivable of \$25,000.	
INDEBTEDNESS.	
Best & Belcher.....	\$5,758.59
Commonwealth.....	33,561.43
Crown Point	22,376.00
Chollar	32,555.53
Hale & Norcross.....	20,842.78
Mount Cory	46,594.90
Nevada Queen.....	45,808.00
Julia	\$1,452.23
Justice	10,151.19
Kentuck	946.37
Lady Washington	11,014.80
Mexican	4,035.28
Mono	16,735.50
+North Belle Isle	1,758.91
Orleans	1,297.79
Ophir	17,147.07
Peer	3,658.52
Peerless	19,249.06
Ponders	1,084.04
Standard Con.....	89,980.20
Syndicate	10,776.39
Weldon	6,242.16

Boston Mining Stocks. Jan. 19.

[From our Special Correspondent.]

The market for copper stocks from a period of depression during the early dealings this week has taken a sudden spring into activity and a desire on all hands to buy stocks at advancing prices. This is doubtless due to the reported sale of the production of the Tamarack mine to the French syndicate for the next three years at a figure not definitely announced, but supposed to be from 13c. to 15c. per pound. It is also rumored that other companies are in the deal, possibly the Calumet & Hecla, and the market for that stock to-day would indicate that there is some truth in the rumor. Other producing mines will undoubtedly join in the combination, and it is quite certain that the long looked for boom will soon be upon us, and the lucky holders of stocks at the low figures prevailing during the past three months will reap a rich harvest on their investments. Calumet & Hecla sold at \$193 early in the week, at \$196 yesterday, and to-day was in quick demand, and advanced rapidly to \$215, the highest point since last July. Tamarack advanced from \$125@142 yesterday, while to-day \$165 was bid without bringing any stock