THE ENGINEERING AND MINING JOURNAL

COAL

Entered at the Post-Office of New York, N. Y., as Second-Class Mail Matter.

VOL. LII. OCT. 24. No. 17.

RICHARD P. ROTHWELL, C.E, M.E., Editor.

ROSSITER W. RAYMOND Ph.D. M.E. Special Contributor.

SUBSCRIPTION PRICE, including postage:
Weekly Edition (which includes the Export Edition), for the United States, Mexico and Canada, $4 per annum; $2.25 for six months; all other countries in the Postal Union, $5.
Monthly Export Edition, all countries, $2.50 gold value per annum.
REMITTANCES should always be made by Bank Drafts, Post-Office Orders or Express Money Orders on New York, payable to THE SCIENTIFIC PUBLISHING CO. All payments must be made in advance.

THE SCIENTIFIC PUBLISHING CO., Publishers,

SOPHIA BRAEUNLICH, Sec'y & Treas. R. P. ROTHWELL. Pres. and Gen'l Manager.
P.O. Box 1833. 27 Park Place, New York.

Cable Address: "Rothwell, New York." Use A. B. C. Code, Fourth Edition

CONTENTS.

THE pyritic smelter at Deadwood, S. D., is operated intermittently, with uncertain success. The slags run high and it is said there is a considerable loss by volatilization. Pyritic smelting has thus far proved more or less an "iridescent dream." Probably some day the practical difficulties encountered, which seem small, will find a simple solution. The fact that so many intelligent minds are at work on the problem gives good ground for hope that such will be the event.

THE two leading copper producing companies of the Iberian Peninsula last week announced their interim dividends for the first half of the current year. The Mason & Barry dividend was at the rate of but 2 per cent. per annum, against 3 per cent. in 1890, the falling off being attributed to insufficient water supply at the mines. Rio Tinto paid at the rate of 12 per cent. per annum, against 15 per cent. last year. At the present market value of these shares, an investment in Mason & Barry returns but 5 per cent., and in Rio Tinto a little over 7⅛ per cent.

THE PRODUCTION OF PIG IRON IN THE UNITED STATES AND THE UNITED KINGDOM.

The statistics of the production of pig iron in the United Kingdom during the first six months of 1891, compiled by Mr. J. S. JEANS for the British Iron Trade Association, and recently published, render it possible to make a comparison between the iron industries of the United Kingdom and those of the United States, which is of especial interest in view of the fact that in 1890 the production of pig iron in the latter for the first time exceeded that of the former country. In the first part of 1890 the product of pig iron in the United Kingdom amounted to 4,668,670 short tons, but in the recent half it fell off, owing to the depressed condition of the trade, to 4,151,475 short tons, making the total for the year 8,820,145 short tons, the figures in all cases being those of the British Iron Trade Association. In the United States, on the other hand, the year was one of unparalleled activity in the iron industry, and the product of pig iron, according to the statistics of the American Iron and Steel Association, increased from 5,107,775 short tons in the first half to 5,199,253 in the second, making the total for the year 10,307,028 short tons. The product of pig iron in this country was thus greater in each half of 1890 than that of England.

In the first half of 1891 the situation was reversed. The unfavorable circumstances and depressed condition of the British iron trade continued, but not to such extent as in the preceding half year, and the production of pig iron showed, consequently, a small increase, amounting to 4,270,321 short tons, or about 3 per cent. more than in the last six months of 1890. In the United States the first half of the current year was a period of extraordinary depression in the iron trade and the make of pig iron fell off to 3,776,556 short tons, a decrease of 1,331,219 short tons, or about 26 per cent., from the last six months of 1890.

The output of pig iron in the United States during the first half of 1891 has been, therefore, 493,765 short tons less than that of the United Kingdom. Whether the total in this country for the year will again be in excess of that of the other is still an open question. The iron market in England seems to be getting gradually into a more healthy condition, and the outlook in the trade is now considered quite hopeful. A very encouraging feature, shown by the recent statistics, is the important decrease in stocks of pig iron during the first half year. On December 31st, 1891, these amounted to 1,531,318 short tons, and on June 30th to 1,451,040 short tons, a decrease of over 5 per cent. In the United States stocks also decreased during the first six months of the year, and in a more marked degree than in England, falling off from 741,281 short tons on December 31st, 1890, to 540,295 short tons on June 30th, 1891.

Since the latter date the iron market of this country has undergone a marvelous improvement, and the production of the second half of 1891 will certainly be much greater than that of the first. The improved condition of affairs in the iron industry of this country has been felt in all the important centers of the trade, although much more in the West than in the East. This has been due, of course, to the increased business prosperity following the immense crops of the year and the great exports of cereals to Europe. Notwithstanding the fact that this improvement in the iron market has been expected the rapidity with which it has taken place and the degree to which it has already gone have been wonderful. It is said that the demand for iron on the part of the railways is still disappointing, yet on October 1st, according to published statistics, furnaces with a gross capacity of about 870,000 short tons per month were in blast, while the maximum of 1890, reached on December 1st, was only about 882,500 short tons. This enormous product, however, has been readily absorbed. Indeed, consumption has clearly outstripped production, as the stocks of pig iron at furnaces were several thousand tons smaller on October 1st than on September 1st. Without regard to the railway demand, the American pig-iron market must be considered to be already in a very healthy condition.

Prices of pig iron do not, as yet, show any material change, although they are, generally, decidedly firmer than during the first half of the year. No advance was, however, to be expected. As the demand for consumption increased it was immediately met with an increased production by blowing in the many idle furnaces. Our furnace capacity is in excess of present consumption, even, and consequently there is not yet any apparent reason for a material advance in prices.

THE FREE-COINAGE DISCUSSION.

Mr. H. F. BARTINE, Congressman from Nevada, contributes a very long letter to the free-coinage discussion. His letter is in fact so long, and so much of it is devoted to a defense of Senator JOHN P. JONES, the official head of the Comstock mill ring, and of Senator WM. M. STEWART, its attorney, that we have divided the letter and publish only a portion of it this week.

Mr. BARTINE says that he has never before heard of "the Comstock mill ring," though he is a lawyer and the California courts have abundance of evidence upon the subject, and though he is himself Congressman by the grace and favor of Senator JOHN P. JONES, its official head, and is in fact himself credited with being its very willing and zealous servant. How little must he know about other matters if he can be so completely ignorant of his own political *raison d'être!*

The most casual visit to Virginia City will convince any one who makes there a few inquiries, as we have done ourselves, that in no other community in "free America" are the employés so completely "owned" by their masters as are the workmen there by the Comstock "ring." It is well known that any man who opposes or votes against, the ring nom-

inees is black-listed, and can find no work in the mines or mills controlled by it. The epithet "the white slaves of Nevada" is no misnomer, and the remarkable "unanimity" with which the four thousand voters of Lyon, Ormsby and Storey counties (about one-third the entire vote of the State) elect Congressmen and other nominees of the "ring" confirms the generally accepted explanation that they dare not vote otherwise, on penalty of losing their places and being left penniless and helpless in a place where the ring controls everything. Let any one not suspected of being a spy or tool of the ring spend a few hours among the workmen of Virginia City, and he will obtain abundant confirmation of this disgraceful but true explanation. It is not difficult to see wherein Senator JONES, the Comstock ring and other producers of silver would gain by the adoption of free silver coinage, though apparently Mr. BARTINE cannot perceive it.

If through the large purchases of the United States Government the market price is artificially greatly advanced, silver producers the world over get the benefit of it, and if the United States could only continue forever steadily increasing purchases, so as to take all the silver offered, and could pay for it in gold, thus keeping up the gold value of the silver dollar, the workmen and others would not be injured. No one imagines for a moment that this or any other country could do this. So that eventually, and no doubt before long, the purchases of silver must be reduced or our currency will settle down to the silver standard only, and gold will disappear as in other "silver countries."

If, however, the Comstock ring could get the Government to coin their silver bullion free of charge and give them the product in silver dollars they would gain the seignorage or difference between the market value of bullion and the nominal value of silver in coin, or at present about 30 per cent., provided always they could use the coin at its face value. If, for example, the Comstock ring could pay its employés in these silver dollars on which they had saved 30 per cent., *it would be equivalent to a reduction of 30 per cent. in wages.* No one imagines for a moment that the ring would advance wages, even should the workman not be able to get a gold dollar's worth of anything for his silver dollar. The ring would save at the expense of its employés 30 per cent. on its cost of producing silver and gold, and would sell its gold (nearly half the value of its bullion), which has currency everywhere, in the open market.

A decline in the market value of silver, which to us seems inevitable if our Government should adopt free coinage and therefore stop purchasing silver, *would not affect the producer so long as he could pay out his depreciated silver dollars at their full nominal value to his workmen. It is the wage earner, who takes at par a dollar intrinsically worth in the markets of the world only 75 or 80 cents in gold, who loses this difference.* And yet "the white slaves of Nevada" support with marvelous "unanimity" the candidates of the ring that is the chief advocate and motive power of the free-coinage craze.

We wholly disagree with Mr. BARTINE when he says that the Southern States "are overwhelmingly in favor of complete remonetization." We see a good deal of many of the Southern States, and the general opinion gained has been that they are for the most part opposed to free coinage, and where they have a leaning that way it has been gained by believing the unscrupulous misstatements of such paid advocates as Senator STEWART. These misstatements have now been so frequently exposed and contradicted by statistical facts that a reaction has already set in over the greater part of the country.

It is perfectly true that an argument should stand or fall by its own truth or falsehood, and not depend on the credibility of the person using it; but where so-called arguments, such as Senator STEWART uses, are mere statements on his own authority, which are contradicted by the well-known statistical records, then the credibility of the witness has a good deal to do with the weight to be accorded to the argument.

Our reference to the condition of the wage earners of the Comstock was based upon much trustworthy testimony, confirmed by personal acquaintance with the subject. There is, we believe, no more wretched population in any town of the West than that of Virginia City. There can be no independence or general contentment in a community where no man dares express an opinion opposed to the wishes of the mill ring for fear of being cut off from all opportunity to earn his living. The tools of the ring —those who aid in transferring the profits of the mines to the pockets of the mill owners—may grow rich with surprising and mysterious rapidity; but the workmen of the Comstock, as a whole, are far from being as prosperous as those of many other districts where the nominal rates of wages are much lower.

The fact that the population of Virginia City is steadily declining, and the place has that desolate and impoverished appearance so familiar in camps where men cannot earn fair average wages, sufficiently demonstrates that Mr. BARTINE'S rosy statements apply to only a very small part of the population.

There are few mining camps or factory towns in the East that present so desolate and unprosperous an appearance as Virginia City, and there is no other where a population has been so demoralized as to justify the well-earned epithet, "the white slaves of Nevada."

BOOKS RECEIVED.

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

A Course of Experiments in Physical Measurement. In four parts. Part IV. Appendix for the use of teachers. By Harold Whiting, Ph. D., formerly instructor in physics at Harvard University. Illustrated, 326 pages. Published by D. C. Heath & Co., Boston, 1891.

Annual Report of the New York State Engineer and Surveyor for the Year Ending Sept. 30, 1891. Illustrated, 457 pages. Albany, 1890.

Second Geological Survey of Pennsylvania. Report of the Geology of the Four Counties, Union, Snyder, Mifflin and Juniata. With descriptions of the Clinton Fossil ore mines, Marcellus carbonate iron ore mines, Oriskany glass sand mines, and Lewistown limestone quarries. By E. V. D'Invilliers. Illustrated, 420 pages. Harrisburg, 1891.

Geological Survey of Alabama. Report on the Cahaba Coal Field. By Joseph Squire, M. E. With an appendix on the *Geology of the Valley Regions Adjacent to the Cahaba Field.* By Eugene A. Smith, State Geologist. Illustrated, 189 pages. Montgomery, 1890.

Geological Survey of Pennsylvania, J. P. Lesley, State Geologist. *Atlas of Northern, Southern and Western Middle Anthracite Field.* Part III., IV. and VI., 1889, 1891.

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.

Peruvian Petroleum.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In the number of August 1st of your important paper I notice a statement, taken from a recent consular report, that the Peruvian kerosene from Talara had driven the American article out of the market. The average yearly importation of this article has amounted to about 200,000 gallons. The amount now afloat for here is as follows: Bark "St. Mary," sailed May 2d, 67,250 gallons; bark "Baldur," sailed June 22d, 53,000 gallons; bark "Hulda," sailed August 12th, 44,100 gallons. Besides the above, the barks "H. J. Libby" and "Nellie Brett" both brought kerosene, but we have not the amount at hand. You will see by this statement that the American kerosene still holds its own in this market.

LIMA, Peru, Sept. 11, 1891. F. L. CROSBY.

Tasmanian Silver Fields.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: To describe the locality of the Tasmanian silver fields would require large space and many names; therefore I must confine my description to the Mount Zeehan and Mount Dundas districts, which are situated on the northwest coast of Tasmania. Coming by any of the ocean-going steamers to the City of Hobart or Launceston, the traveler goes thence by coasting steamer to Strahan, where he will find good hotel accommodations; from there a railway toward Zeehan is in course of construction, and 21 miles being already finished he may ride this distance in an open ballast truck for 7s. 6d., and get his clothes smeared all over with soot and water from a primitive locomotive free of charge, and a few holes burned in his clothes by falling cinders.

The township of Zeehan contains about 5,000 inhabitants. It has one long street and several large hotels. The principal mines opened are the Silver Queen, Silver King, Silver Belle, Oceana, Western Argent, and Zeehan. The country rock of the district is sandstone, slates of various character, quartzite, and intrusive serpentine. The lodes vary from 1 ft. to 100 ft. in width. Their strike is from about N. 30° W. to N. 30° E., with an underlie to the west. The ore is principally galena, assaying from 30% to 82% lead, and 20 oz. to 240 oz. silver per ton. Silver also occurs in the ore in the forms of chloride and native silver. The veins also carry lead carbonate, pyrites, fahlore, and zinc carbonate. I think I shall be quite safe in stating that silver occurs here in as great variety as it does in any other place in the world.

The country is very hilly and densely timbered. Good mining and building timber is consequently in abundant supply. Some of these mines have now been opened for three years, and yet there is no furnace in the district, no concentrator, no amalgamator, nor even the Mexican *patio.* At the present time we cannot treat a one-hundredweight of ore. Some American engineer should come over and infuse energy into this district. One mine has over 2,000 tons of ore in sight, almost at the grass roots, and is being opened by a shaft sunk with a windlass.

B. P. EKBURG,
Engineer in Charge, Meteor No. 1, Silver Mining Company.
DUNDAS, TASMANIA, August 4, 1891.

Congressman H. F. Bartine on the Free-Coinage Question.—1

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In complying with your request for a contribution on the subject of the free coinage of silver, I deem it proper to say that it is my fortune to represent in the lower house of Congress the same State so ably represented by Senators Jones and Stewart in the upper.

As their motives are constantly impugned, I can scarcely hope that mine will be fairly treated, although I have not the remotest interest in silver mining, except the general interest of a citizen of a State which produces a considerable amount of silver in conjunction with nearly as much gold. I regret to observe that even your paper, which has the fairness to invite these discussions, does not hesitate to speak of Senators Jones and Stewart as members of the "Comstock mill ring," and to intimate that their motives are entirely selfish. In justice to my colleagues, I feel constrained to say that although my permanent residence is within a few miles of the Comstock, and has been for more than twenty-two

years, this is the first time I have ever heard of such a "ring." If it be actually in existence, it has no earthly bearing upon the silver question. The most casual visit of any Eastern financier to the State of Nevada will very speedily bring him face to face with the fact that in their advocacy of the free coinage of silver Senators Jones and Stewart are supported by their constituency with a unanimity not to be found upon any question of public concern, even in the smallest township of the United States, east of the Missouri River.

Further, that Senator Stewart has no personal interest in a single mine on the Comstock lode or elsewhere in Nevada, while Senator Jones is more heavily interested in gold mining than in silver. His chief interests on the Comstock are in mines that produce about equally of the two metals, while his outside mining ventures are almost exclusively in gold. If the effect of free coinage should be (as bimetallists claim it will), to raise silver a little, lower gold a little, and bring the two metals together at some intermediate point, it is impossible to say whether Senator Jones would gain or lose. That would depend upon where they meet. If, as our opponents generally claim, the effect would be to send silver lower than ever, then he and every other so-called "silver king" would sustain a positive loss. If the effect should be to raise silver to the *present value of gold*, he and every other silver producer would realize a profit. But that is precisely what our opponents say they want. They are urging an international agreement in order to reach that identical end. Therefore they would have no right to complain, for if we are to consider it merely as a question of profit to the silver producer, it can make no difference in principle, whether the value of his bullion be enhanced by international agreement or by the action of the United States alone.

The silver producer may be altogether selfish in his demand for free coinage, but certainly not more so than the manufacturer in his advocacy of a protective tariff, or the importer in painting the beauties of free trade. As a matter of fact, every question of political economy involves selfish considerations, for it is a science which deals solely with the material interests of man. The "silver question" is one of the most important to be found in the whole field of political economy. It has awakened the profoundest thought on both sides of the Atlantic. The Southern and Western States, speaking generally, are overwhelmingly in favor of complete remonetization, and there is a strong sprinkling in the East, even in New York City, imbued with the same idea. Many of its ablest and most determined champions have no connection whatever with silver mining, and the question should receive a calm and earnest consideration upon its merits It cannot be settled by crimination and recrimination. If an argument be sound it should be accepted, no matter whence it comes; if unsound, it should be rejected whether it emanates from a "silver king," striving to enhance the value of his product, or from the money lender of Wall street, anxious to maintain and increase the value of his "dollars."

There is one other thing to which I desire to allude for a moment, although it is not strictly germane to the "silver question." I do it simply as a matter of State pride. Your reference to Virginia City, Nev., is quite liable to create a misapprehension, and is a grave injustice, not only to the mine owners, but to the city itself. I feel sure that it is the result of misinformation on your part.

Every miner in the employ of John P. Jones, or any other mine owner, either in Virginia City or Gold Hill, is paid $4 a day for eight hours' work. Men working above ground receive from $3.50 to $4. There is no departure from these rates.

With one day's wages the miner can buy 100 lbs. of the best flour in the world; or 7 bushels of the finest potatoes ever grown; or 32 lbs. of choice beef; or 32 lbs. of prime butter, and almost everything else in proportion. With the product of a month's labor he can pay his board at a first-class restaurant, and have $94 left.

I ask you in all candor how that compares with the condition of the miner or the factory hand in New York or Pennsylvania, where the employers generally express so much horror and indignation at the thought of the laboring man being paid in "80-cent dollars"?

The Comstock miner thinks nothing of spending $50 for a day's amusement at a picnic. This may not be suggestive of rigid economy, but it certainly does not indicate that he is being shamefully wronged by his employer. There are, no doubt, some poor people there—sickness and misfortune invade every community.

Attracted by the high wage rate, more men go there than can find employment; but that is not the fault of the mine owners. They employ as many as they need, and those who obtain work are the best paid, best fed, best clothed, and most thoroughly independent class of workingmen to be found on the American continent, or on the surface of the globe.

I have been led into these preliminary observations by reading the marked editorial in your issue of August 8th (which seems to invite a reply), being prompted thereto partly by a sense of duty to my colleagues, and partly by a desire to meet one of the stock arguments of our opponents, many of whom seek to obscure the real issue by the imputation of selfish and sinister designs.

The utmost power of compression would not enable me to exhaustively discuss this question within the limits of such space as I feel at liberty to occupy in your columns, even upon your own invitation. It presents many phases, and innumerable ramifications, all of which require more or less of elaboration to make them clear. I will, therefore, confine myself to a few of its salient features, incidentally noticing some of the points suggested in your editorial referred to above.

I do not care to notice the communication of Mr. Atkinson further than to say that he does not even touch the outer rim of the subject, and that his language is devoid of the dignity that should characterize such a discussion. The substance of what he says is that a man who advocates the free coinage of a dollar worth 18 cents less than the gold dollar is a "knave." This is forcible, if neither courteous nor convincing. If the moral status of men depended upon the *ipse dixit* of Mr. Atkinson, the silver advocates would certainly be left in a sorry plight. But fortunately it does not. I might very easily retort in kind by saying that the man, who upholds a policy which compels the unfortunate debtor to pay in dollars worth 18 *cents more* than the *silver dollar*, ought to be in the penitentiary; and the two remarks would stand upon an equal plane of dignity; but with every principle of equity in favor of mine, as I will try to demonstrate a little further on. H. F. BARTINE.

(To be continued.)

THE MANUFACTURE OF CONTINUOUS SHEETS OF MALLEABLE IRON AND STEEL, DIRECT FROM FLUID METAL.*

By Sir Henry Bessemer, F. R. S.

Among the numerous inventions that are from time to time brought under public notice, a certain proportion is from some cause or other allowed to fall out of sight and be forgotten. This too frequently happens from some inherent defect or fallacy involved in the scheme itself. It is not, however, always the cause, for some inventions, which appear well worthy of a trial, are never put to any practical test, through having appeared at a time when the state of the particular manufacture to which they apply was not so far advanced as to render the proposal feasible with the then existing state of knowledge, although at a later period and a more advanced state of the arts, they would at once have been adopted. Hence, it has occurred to me that an invention in connection with the iron and steel manufacture, which has quietly slept in oblivion for the last 35 years might with advantage be discussed at a time when the manufacture of tin plates is occupying so much public attention. I have, nevertheless, felt much hesitation in venturing on this innovation, which need not be made into a precedent.

The production of continuous sheets of different materials, direct from fluid or semi-fluid matter, occupied much of my attention a great many years ago; and as far back as the year 1846, I took out a patent for the production of tin foil and sheet lead direct from the molten metal. I may mention that this invention was included in a patent for the manufacture of glass, and, as far as I know, this particular form of apparatus has never been put to any practical test.

In the year 1846 I commenced a series of experiments on the manufacture of continuous sheets of glass. The rapidity with which a thin sheet of glass passes from a soft and plastic state to one of extreme brittleness is peculiar to this material and presents a great difficulty in its manufacture, a difficulty which is much increased by the rapidity with which the sheet is produced, and which will be readily appreciated when I state that on one occasion a sheet of glass 70 ft. long by 30 in. wide was produced in about three or four minutes, the first portion having become hard and brittle while the latter portion still retained its plastic state. Fortunately, both iron and steel, after passing from the fluid to the solid state, still retain their malleable condition, and give ample time for further treatment before they become cold.

In August, 1856, I first announced to the world the fact that malleable iron in a molten state could be produced rapidly, and in large quantities. It is not surprising that I should have at once endeavored to avail myself of the advantages which this novel condition of fluidity presented. I saw, of course, that, like other fluid metals, malleable iron could be cast in molds into any desired form, and, reverting to my former inventions for rolling fluid lead and glass into continuous sheets, I at once grasped the idea that malleable iron or steel could be thus made not only into sheets and plates, but also into thin bars or rods, by passing the fluid iron in between a pair of rolls placed in the same horizontal plane. I was most anxious to bring to the test of experiment a system so novel, and so immensely important if successful.

At the period mentioned I was carrying on a secret process of manufacturing bronze powder at my works at St. Pancras, where I was also making my iron and steel experiments; and in the bronze works I had in daily use a pair of 12-in. chilled rolls. I saw at once that these rolls would enable me to make such a trial of the scheme as would prove the possibility or otherwise of producing a continuous sheet direct from fluid iron. Unfortunately these rolls were working at some distance from the model converting-house, and in a room that was carefully locked and guarded, and into which no strange workmen could be permitted to enter. I therefore had to depend entirely on myself for these experiments. I employed a common 20-lb. crucible as a converter, and after melting 6 lb. or 8 lb. of pig iron in it. I immersed the orifice of a fire-clay blow pipe in the metal, which was by this means wholly decarbonized. No manganese or spiegel was added to it. I then seized the crucible in a pair of tongs and ran with it into the bronze works. This naturally occupied some little time to accomplish, and when I arrived at the rolls the metal in the crucible had assumed the solid form, and could not be poured out. After several unsuccessful attempts I at last succeeded in reaching the rolls with some fluid metal. The crucible was lifted on to the back roll, and the molten iron was poured in between them The rolls were set at about $\frac{1}{16}$ in. apart, and a thin sheet was obtained some 3 ft. or 4 ft. in length. The small stream from the crucible did not spread itself far along the wedge-shaped space between the rolls, and as the quantity poured fluctuated a little, so the breadth of the plate increased or decreased in the same ratio giving an undulating line to the edges of the plate, some portions of which were afterward rolled to a thinner gauge. The sheet thus produced had a clear surface, almost wholly free from oxidation and absolutely free from scale. It was as tough as any rolled iron plate I had ever seen; indeed, it left no doubt in my mind of the entire success of this system of rolling thin sheets direct from fluid metal.

So impressed was I with the importance of this invention that I immediately applied for and obtained a patent for it, notwithstanding that, at this particular time, the Bessemer process was not merely under a cloud, but was regarded by the trade generally as an absolute failure. One need not, therefore, be greatly surprised that the production of continuous sheets direct from fluid iron did not excite a great amount of enthusiasm in the minds of tin-plate manufacturers of that day; in fact, the whole scheme was simply pooh-poohed and laid aside without any serious consideration of its merits.

From the foregoing brief sketch of my original form of apparatus, it will be seen that it would be very difficult to supply the molten metal to the rolls with that degree of regularity which is absolutely necessary, while more or less of the slag floating on the surface would be poured out simultaneously with the metal. It will also be observed that in this arrangement of apparatus the metal would fall only on one spot, and if wide sheets were being made, it would have to flow lengthwise along the rolls from this one central stream. A further disadvantage would result from the splashing and unquiet state of the metal between the rolls, owing

* From a paper read before the Iron and Steel nstitute, England, October 7th.

to the great height from which the metal would have to fall from the lip of the large ladle placed high above them.

Having thus freely criticised my first imperfect form of apparatus, I will proceed to explain in what manner I now propose to remedy these defects. These suggested improvements will be readily understood by reference to Figs. 1, 2 and 3; and here I beg to observe that I have not gone into the many details necessary for the construction of rolling mills of this description, but have merely given such an illustration of the general scope of my proposals as will enable them to be understood. The rolls *L* and *M* consist of two hollow drums through which a tubular steel axis *NN* passes, and conveys a plentiful supply of water for keeping the rolls cool. The brasses which support the roll *M* are fixed, while those that support the roll *L* are movable in a suitable slide, and are pressed on by a small hydraulic ram *X*, which is in free and uninterrupted communication with an accumulator, so that at any time, should the feed of metal be in excess, the roll *L* will move back and prevent any undue strain in the machinery, the only result being a slightly increased thickness at that part of the sheet of metal, a defect which, as it extends parallel across the whole width of the sheet, will be easily corrected in the next rolling operation. The rolls, by preference, may be made of 3 ft. or

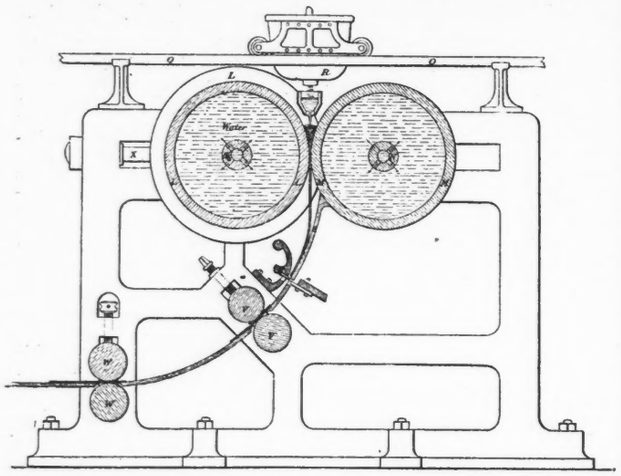


Fig. 1.

4 ft. in diameter, each having a flange on one end only, and thus form a trough with closed ends for containing the fluid metal.

In order to obtain a regular and quiet supply of metal, I employ a small iron box or reservoir lined with plumbago or fire-clay. Along the bottom of this reservoir, some ten or twenty small holes of about ¼ in. in diameter are neatly molded by a row of conical brass pegs. The reservoir is provided with a long bar or handle at each end, as shown in longitudinal section in Fig. 2. By means of these bars the reservoir is supported on the side frames, the bars falling into suitable notches made in the roll frame for that purpose.

The reservoir should be well dried, and its interior surface heated to redness prior to its use. For this purpose a small furnace or stove should be placed near to the rolls, the stove having two or three rectangular openings on its upper side, in size corresponding to the interior of the reservoirs, which are to be inverted over these openings, the hot products of combustion passing freely through the row of holes, and bringing up the interior surface of the reservoir to a full red heat. In this state the reservoir is to be placed in its proper position in the roll frame, immediately after the arrival there of the ladeful of fluid metal. A pair of rails, *Q*, are supported on the roll frames, and serve for the conveyance of the ladle *R*, which is mounted on wheels, and brings the metal direct to the rolls, or to any number of pairs of rolls that may be placed in line. The ladle is provided with one or more valves or stoppers of the usual kind, by means of which the supply of metal to the reservoir may be easily regu-

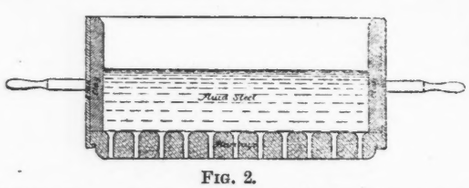


Fig. 2.

Fig. 3.

lated; the several small streams from the reservoir will deliver an almost constant quantity of metal, varying only slightly as the operator regulates the head of the metal in the reservoir—a means of regulating which a little experience would allow him to utilize with great advantage; from the smallness of the head of metal in the reservoir the several streams will fall quietly without splashing. These streams do not fall direct on to the rolls, but into a small pool formed between the thin films solidifying against the cold surface of the rolls, the metal at all times being free from floating slags.

The speed of the rolls also affords a means of regulating the quantity of metal retained between them; and as a pair of 4-ft. rolls would only require to make about four revolutions per minute, a quick-running engine could easily be provided with differential speed gearing, so as instantly to alter the speed of the rolls to the very small extent ever required during the rolling process. The thin sheet of metal, as it emerges from the underside of the rolls, is received between the curved guide plates *S* and *T*, to the latter of which a cutting blade *U* is bolted. Beneath the guide plate *S* a similar cutting blade is arranged to suddenly move forward by a cam and cut the thin sheet in two, the piece so cut afterward passing between the second pair of rolls *VV*, from which it again descends by gravity, and passes between the third pair of rolls *WW*, and is delivered on to a horizontal table, or it may be allowed to slide down the inclined end of a cistern of water, moved slowly forward, and thus cool, and stack a ton of plates without any labor or trouble.

The thickness of plates capable of being produced will much depend on the size of the rolls; if drums of 10 ft. or 12 ft. in diameter are employed, it is probable that plates of ¼ in. in thickness could be produced, or perhaps even thicker. The central space between drums of such large diameter would represent a sort of plate ingot mold with nearly parallel sides for some 8 in. or 10 in. in depth.

When producing sheets of steel the initial thickness of which does not exceed $\frac{1}{10}$ in., it might at first sight appear that the finished plate, with only two more rollings, would not get sufficient work done upon it to develop the same degree of toughness and cohesion that would be obtained by the many rollings which the present system necessarily involves, but a little consideration will render apparent the entirely different conditions under which the formation of the plates takes place.

Mild cast steel is a crystalline substance, and follows the inevitable law of all crystalline bodies, in so far as the size of the crystals depends on the bulk of the mass and the time allowed for their formation; the longer the time allowed and the greater the mass, the larger are the crystals obtained; their planes of cleavage are also more clearly defined and are more easily separated from each other, or, in fact, have a less amount of cohesion.

A cast ingot of 1 ft. square, quietly reposing in a soaking pit or heating furnace, may go on crystallizing for two or three hours, and develop a coarse crystalline structure, but, in rolling fluid steel in the manner proposed, we have, in place of a 10-in. ingot, a sheet of one-hundredth of that thickness only, and in lieu of the two or three hours allowed in ordinary cases for the development of crystals, we have, when using a 4-ft. pair of rolls, making four revolutions per minute, a transition from absolute fluidity to absolute solidity in just one-half of a second of time, in a mass of only $\frac{1}{10}$ in. in thickness; and if crystals are developed at any period during the half second of time occupied by this transition, they must be microscopic indeed, and possess but little, if any, of the properties that are developed in large masses during hours of repose in the soaking pits; hence it appears to me highly probable that the homogeneous fluid metal will pass at once into a perfectly homogeneous uncrystalline body, and being subjected to fluid, semi-fluid and solid pressure in rapid succession, will develop the full cohesive force and toughness which the metal is susceptible of.

It will be at once perceived that in this mode of disposing of a ladleful of steel in the rolls we avoid the cost and the wear and tear of casting molds, and the labor of their removal and rearrangement at each casting operation, also the need for soaking pits or reheating furnaces, with their accompanying cost of labor and fuel. There will also be no loss arising from the waste ends of piped ingots, etc.

It will be understood that thin sheets so produced will not acquire any scale during the single minute they are exposed to the oxidizing influence of the atmosphere prior to their immersion in the water tank, and in consequence of there being no overlapping of plates in rolling there will be but little loss of metal in shearing.

With reference to speed of production, let us assume the mill to be fitted with a pair of 4-ft. diameter rolls, 18 in. wide, and making four revolutions per minute, and set to produce a sheet having an initial thickness of $\frac{1}{10}$ in., and rolled by the third pair to $\frac{1}{200}$ in., we should thus have a surface velocity of the first pair of rolls equal to 50 ft. per minute, and making when finished 100 plates, 18 in. × 12 in., $\frac{1}{200}$ in. thick, and weighing 300 lbs., or equal to a production of one ton of plates in seven and a half minutes.

Hence it becomes a question which is the least costly mode of dealing with a ladleful of fluid steel?—forming it into massive ingots in molds, or making it into thin sheets in the manner proposed?

MECHANISM FOR PREVENTING OVERWINDING IN COLLIERIES.

Mons. Reumaux, director-general of the Société de Lens, has invented an ingenious contrivance for the prevention of accidents in collieries by overwinding. It is in use in the company's mines at Lens, in the department of Lille, France. The apparatus consists of an arrangement of valves, which come into play directly the cage reaches a certain point in the shaft and, if the engine should at that moment not be under control, immediately apply a powerful air brake. This, however, allows the cage to proceed at a certain speed. But should another point in the shaft be passed and the engine be still out of control, the brake is increased in power, steam entirely shut off, and the cage brought to a standstill.

Mr. A. E. Pinching, H. M. Inspector of Mines, thus describes the operation of this safety mechanism, during a recent visit to the Lens colliery:

"While being shown round the surface works by the director general. I was electrified to see him—while a large engine was winding on and off a 36-ft. drum a cage containing six full tubs of coal and a cage, if I mistake not, loaded with men proceeding underground—motion the engineman away from the handle and make him stand quite clear of the engine—and from the expression of the man's face it was quite evident that this had not been rehearsed—and thus leave the powerful machine entirely to itself. Almost immediately a warning bell rang, and we became aware that a powerful automatic brake—which I afterwards ascertained was on the Westinghouse principle—had been applied to the engine, and the drum was visibly slackening speed. The engineman was still told to remain where he was. Shortly afterwards another bell rang, steam was completely cut off, and the cage drew up to its platform exactly as if the engine had been controlled by the most practised driver. We saw the experiment repeated at two or three other mine shafts during the day without a hitch, and we were all greatly struck with the simplicity and safety of the operation. I could not also but greatly admire the courage and confidence displayed in conducting these experiments without any warning whatever."

Owing to the depression in the strontianite trade the strontianite mines, at Vorhelm, Germany, have been closed, says *Iron*, a large number of men being thus thrown out of employment.

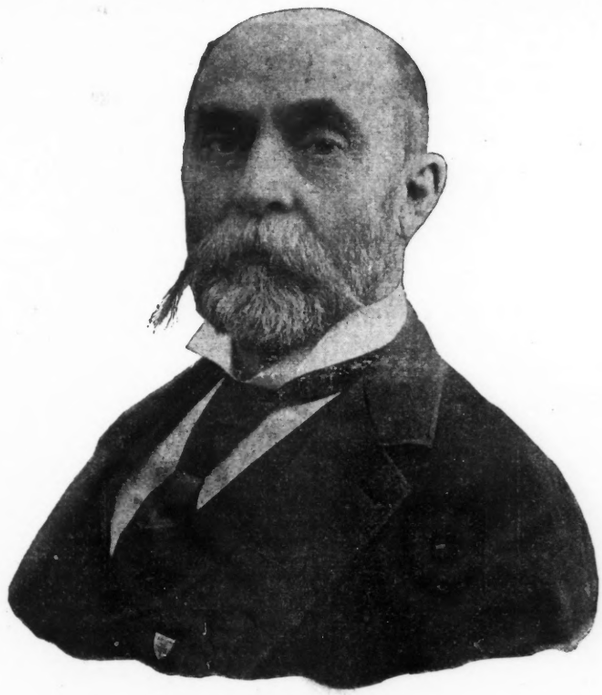
PROMINENT MEN IN THE MINING INDUSTRY.

William B. Cogswell.

The distinguished engineer and general manager of the Solvay Process Company and the Tully Pipe Line Company, of Syracuse, N. Y., was born in Oswego, N. Y., Sept. 22, 1834. His father was David Cogswell, who died in 1877. During the three years when the subject of this sketch was from seven to ten years of age, he attended the Hamilton (Oneida County) Academy. He afterward attended a school of some note kept by Joseph Allen in Syracuse, and also a school kept by Prof. Orin Root in Seneca Falls, N. Y.

During the two years 1848-9, Mr. Cogswell worked with an engineering party on the survey of the Syracuse & Oswego Railroad and the Syracuse & Utica Road. His natural tastes impelled him strongly toward engineering as a profession, and it is not, therefore, surprising that when his surveying experience ended, he should enter the Rensselaer Polytechnic Institute at Troy, N. Y., which he did on May 1, 1850, in the class of 1852. He remained with that excellent institution three years, and left it with credit; but owing to an extension of the course, no class was graduated in that year. In the year 1884 the degree of C. E. was conferred on him by this institution.

Soon after leaving the Rensselaer Polytechnic Institute Mr. Cogswell began an apprenticeship in the Lawrence Machine Shops, under the superintendence of John C. Hoadley. He came out of that apprenticeship three years later with a theoretical and practical education in engineering, mechanics and physics, with their allied branches, not often secured in so short a time by so young a man. He had studied and worked with the ardent devotion born of a strong love for his chosen profession, and the result was what always follows such efforts when put forth by native ability under such circumstances.



WILLIAM B. COGSWELL.

Returning to Syracuse in 1856 he was selected by George Barnes, of the same city, to accompany him to the State of Ohio to take charge of the machinery of the Marietta & Cincinnati railroad at Chillicothe. Of this road Mr. Barnes had been made superintendent. He remained in that position only three years, when the railroad became crippled in the financial panic of 1857. The year 1859 Mr. Cogswell spent as superintendent of the Broadway Foundry in St. Louis, Mo., and in 1860 returned to Syracuse, and in conjunction with William A. and A. Avery Sweet, started the works which were the inception of the present Whitman & Barnes Manufacturing Company.

Here the breaking out of the civil war found him, and in 1861 he was appointed civil engineer in the United States Navy. In this position he performed an enormous amount of labor in fitting up separate repair shops for five stations on the Atlantic seaboard, and lived at one of them erected on shipboard at Port Royal, S. C. In 1862 he was transferred to the Brooklyn Navy Yard and placed in charge of steam repairs in that then busy place, where he remained four years. The following two years he lived in New York City. In 1870 he was called to take charge of the completion of the Clifton suspension bridge at Niagara Falls, and at the same time gave his attention to the construction of two blast furnaces at the Franklin Iron Works (Oneida County).

This work brings the record of Mr. Cogswell's career down to 1874, and it had been a successful one in the broadest sense of the word. In no one of the responsible undertakings in which he had been engaged, or stations he had been called on to fill, had he failed of the most flattering success.

In 1874 came what may in some sense be viewed as a turning point in Mr. Cogswell's career. In that year he was solicited to go to Mine La Motte, in Missouri, to assume charge of the lead mines of the same name at that point, which he finally did. These mines were then and are still owned by Mr. Rowland Hazzard. Mr. Cogswell remained at Mine La Motte five years, until the spring of 1879, when he decided to remove to Syracuse, though retaining, as he still does, the management of the Mine La Motte lead mines.

After returning to Syracuse, and while in quest of some kind of employment, Mr. Cogswell decided to go to Europe to investigate the soda industry. Through a friend he made the acquaintance of Messrs. Solvay & Co., of Brussels, Belgium, who were the most prominent manufacturers in that line in Europe. The result was Mr. Cogswell was given a commission to inspect the various points in this country where a manufactory would be practicable, and report. After the receipt of the report steps were taken for the formation of a company for the manufacture of the various soda products. It was decided that Syracuse was the best point for the works, for it was believed by Mr. Cogswell that rock salt might be discovered in the vicinity. Several experimental borings were made in 1881 and in 1883, but without success: but information was obtained which led to experiments in Tully Valley in 1888 and the discovery of two veins of rock salt each about 50 ft. thick, at a depth of 1,200 ft. The company now receives its entire supply, equal to 400 tons of salt per day, from the Tully wells. The company also put in a plant of such capacity that a large quantity of saturated brine is sold to the salt manufacturers of Syracuse. The company was formed in 1881, with a capital of $300,000 and the following incorporators: Rowland Hazzard, president; Earl B. Alvord, Wm. A. Sweet, George Dana and W. B. Cogswell, treasurer and general manager. The capital has been increased from time to time as the business has increased until now it is $1,500,000, with a total investment of $3,000,000.

This great industry has led to the formation of the Tully Pipe Line Company for conveying brine from the wells to the works, with a capital of 300,000, and the Split Rock Cable Road Company, with a capital of 100,000. The production of the works for the year 1892 will be 75,000 tons of soda ash, 20,000 tons of caustic soda, and 6,000 tons of bicarbonate of soda.

Mr. Cogswell has received ample honors in his profession, as well as evidence of the confidence of business men which is a tribute to his judgment and his business qualifications. He is a member of the American Society of Civil Engineers, a member of the American Society of Mining Engineers, a member of the American Society of Mechanical Engineers, a Fellow of the Geographical Society, a member of the Society for the Advancement of Science, a member of the Society of Chemical Industry of England, and President of the Warners Portland Cement Company, organized in 1889, with a capital of $250,000.

Prehistoric Man in Ohio and Indiana.—Under the direction of Professor Putnam, Chief of the Department of Ethnology of the World's Columbian Exposition, a party of men has been making extensive excavations of the prehistoric mounds in Ohio and Indiana. Many skulls, skeletons, copper hatchets, pipes, ornaments, altars of burnt clay weighing 400 to 500 lbs., flint spear heads, etc., have been secured. In one mound situated near Anderson Station, Ind., 7,232 flint spear heads and knives were discovered. The bulk was so great that it took four horses and a large corn wagon to haul the flints to camp. The total weight was a trifle over 4,700 lbs. The implements were found in a layer one foot in thickness extending over a space 20 × 30 ft. Many of them were over 8 or 10 in. in length, some of them even larger, while the majority ranged from 7 to 8 in. They are made of gray flint found only in Indiana and show that there were from 60 to 70 flakes detached from each one in order to fashion it. The largest find of flint implements made in one place heretofore in America did not exceed 1,800 specimens. In one of the caverns occupied by primitive man in the valley of the Seine, below Paris, 2,300 implements were found in one deposit.

CRITICAL REVIEW OF EFFICIENCY TESTS OF COALS.*—III.

Written for the Engineering and Mining Journal by William Kent, M. E.

(*Continued from page 451.*)

The following notes concerning the action of the several coals may be of interest.

Beaver Meadow Slope No. 3.—Four trials were made giving results† 10·45, 10·19, 10·45 and 10·75 lbs., the corresponding rates of combustion per square foot of grate surface per hour being respectively 6·1, 6·5, 6·4 and 7·7 lbs. The results show that the maximum efficiency was obtained with the highest rates of combustion and of evaporation that were reached in the four trials. As the higher rate is much lower than is now reached in good practice, it is reasonable to suppose that still better results might have been obtained by Johnson if he had used a higher rate of combustion. One reason possibly why higher results were not obtained, is that the coal was not quickly ignited at the beginning of the test. Concerning this Professor Johnson says: "The difficulty of ignition will be, in part, understood from the fact that the boiler was not in steady action in the first trial until 5 hours and 3 minutes after the charging with coal commenced. In the second trial this time was increased to 5 hours and 43 minutes, notwithstanding that the first charge had been laid upon the grate before the fire of pine wood was commenced. In the third trial the time was reduced to 2 hours and 45 minutes, having the same advantage of a charge of anthracite laid upon the grate before charging with wood. At the fourth trial the time was further reduced to 1 hour and 55 minutes. It appears, therefore, that the average length of time required to bring the furnace into full activity, after the kindling wood was withdrawn, was 3 hours and 52 minutes—3.866 hours."

Two of the four tests were made with the air plates in the bridge wall open, admitting warm air to the gases of combustion as they passed the bridge. In these tests, higher results were reached than when the air plates were closed. If no other cause were acting to produce the low results when the plates were closed, it would appear that during these tests the sluggish draft and slow rate of combustion caused the gases to be imperfectly burned in the furnace, requiring the admission of air above the fire to complete the burning, which would not have been required if the draft had been stronger.

Beaver Meadow Slope No. 5.—Four trials gave results 10·55, 10·89, 10·87 and 10·06 lbs., the rates of combustion corresponding being 7·8, 5·9, 6·3 and 5·0 lbs. A remark appended to Johnson's table of the results of four trials says: "The efficiency of the pound of combustible on the fourth day's trial was less than on any of the others. The combustion and evaporation were much slower, the percentage of waste greater and yet the temperature of the air entering the chimney was but little above that of the steam in the boiler. The open air plates may probably, in connection with the partially drawn damper, be regarded as the cause of this inferiority of useful effect."

Here Johnson attributes to the open air plates just the opposite effect they apparently had in the trial of the coal of slope No. 3.

The "partially drawn damper," checking the draft so that the rate of combustion was only 5·09 lbs. per sq. ft. of grate surface, is, no doubt, the principal cause of the inferior results.

This coal was not quite as slow in igniting as the former coal, the time required to bring the boiler into steady action in the four tests varying from 1·42 to 3·5 hours.

Forest Improvement.—Four trials gave results, 11·17, 10·80, 10·05 and 11·21 lbs., the corresponding rates of combustion being 7·3, 6·5, 5·3 and 6·9 lbs. Here again the highest economy is obtained with the highest rates of combustion. Both the maximum and the minimum efficiency were obtained with the air plates closed, an intermediate result being found with the plates open. The minimum result is explained by Johnson as follows: "The slow combustion produced by drawing the damper but 4 in. during the third trial evidently reduced the useful efficiency of the unit of combustible matter from 11·058 to 10·054, or 9%. The coal was very difficult of ignition, requiring on an average 3·32 hours to bring the boiler into steady action."

Peach Mountain.—The same remarks apply to this coal as to the Forest Improvement. The best results were obtained with the highest rate of combustion. The coal required on an average 3.537 hours to bring the boiler up to its uniform rate of action.

Lehigh.—The remarkably low results obtained from this coal are very imperfectly explained by Prof. Johnson. It appears from the description of the coal and the remarks on the tests in the report that the ash was nearly white, the clinker was made up of semi-vitrified matter and small fragments of slate nearly white. The agglutination was not sufficient to cause much obstruction of the grate. The total percentage of ash and clinker found in the test averaged only 7·25%, and the moisture was 2·35%. These are not sufficient to cause any lack of efficiency in the combustible part of the coal. The difficulty of ignition was not greater than that of the other anthracites, requiring on an average 3·27 hours to bring the boiler into steady action.

A comparison of the analyses of the gases of combustion of the different anthracite coals affords some indication of the cause of the low efficiency of the Lehigh coal. The following table shows the analyses:

	Ratio of the total bulk of the dry gases, per cent. of the		Pounds of air required for 1 lb. fuel.
	Carbonic acid.	Oxygen.	
Beaver Meadow, Slope No. 3	8·76 to 11·08	13·82 to 7·67	23·7 to 18·6
Forest Improvement	8·45 to 10·76	13·22 to 8·95	25·4 to 19·4
Peach Mountain	9·49 to 13·	12·17 to 8·92	21·5 to 15·8
Beaver Meadow, Slope No. 5	5·13 to 9·92	18·11 to 13 01	40·0 21·7
Lehigh	4·57	16·7	47·9
Lackawanna	10·60	10·84	19·4

*Copyrighted, 1891, by the Scientific Publishing Company.

†The word "results" will be used in these notes to mean pounds of water evaporated from and at 212° F. per pound of combustible.

It will be seen from the above that the gases of combustion of the Lehigh coal contained a much smaller percentage of carbonic acid than the gases of any other of the anthracite coals, and that it required a much larger quantity of air for its combustion than any of the other coals. Prof. Johnson, in attempting to explain this peculiarity of the Lehigh coal, states that the large proportion of unchanged air in the chimney gases is probably due in some degree to the obstruction which the air meets in arriving at the surface of the coal from the coat of ashes which covers its surface during its combustion. He explains the existence of this coat of ashes forming on this coal more than on the others as being due to the purity of the ashes themselves, which hinders their vitrification and flowing away. If this reason for the low efficiency of the Lehigh coal is the true one, it would suggest that an improvement might be made by allowing the air to remain longer in contact with the coal, which might easily be done by increasing the thickness of the bed of coal, but it does not appear to have occurred to Prof. Johnson to try an experiment in this direction.

The case of the Lehigh coal differs from that of the other anthracite coals already noted, in that the best results of the four trials was obtained with a low rate of combustion, the efficiency being 9·92 lbs. with a rate of combustion of 6·52 and only 9·23 lbs. when the rate was 7·71.

The reason of this apparently is that, the bed of coal being too thin, a great excess of air passed through it, and a higher rate of combustion, caused by a stronger draft, would simply cause a still greater excess of air to pass through and so carry more heat away in the chimney gases. If the stronger draft and consequently still higher rate of combustion had been had with a thick bed of coal, much better results would no doubt have been obtained.

Lackawanna.—This coal, like the Lehigh, also gave the best results with a low rate of combustion. The results were more uniform than with most of the coals, varying in the four trials only from 10·61 to 10·99 lbs. In the test which gave the best result the grate was only 7 in. away from the boiler.

Lykens Valley.—The exterior characteristics of this coal are nearly related to those of many bituminous coals. It has a lower specific gravity and a higher percentage of volatile matter, and burns more freely than any of the other anthracites. There was a considerable difference between the highest and lowest result in four tests, viz., 11·39 lbs. and 10·09 lbs. The former was coincident with the lowest rate of combustion per square foot of grate surface, 5·42 lbs., and the lowest result with the highest rate, 7·99 lbs. The best result also was obtained with the air plates at the furnace bridge open. Prof. Johnson says that these facts point to the necessity of conducting the combustion of this anthracite either with a small supply of air thrown in above the ignited mass, or with only a thin stratum of coal upon the grate.

New York and Maryland Mining Company's Semi-Bituminous Coal.—Two trials gave results 11·09 lbs. and 11·32 lbs., the former with the lower rate of combustion, 6 lbs., and the latter with the higher rate, 6·57 lbs. These rates of combustion are less than half of those generally employed in practice. The highest result was obtained with the air plates closed, and the lowest with the air plates open.

Neff's Cumberland Coal.—The lowest result in four trials was 10·30 lbs., the highest 11·04 lbs., the former with a rate of combustion of 8·48 lbs. and the latter with a rate of 9 lbs. This coal ignites with great facility, requiring from 1·25 to 1·42 hours to bring the boiler into steady action. The two trials which gave the highest results were conducted with the air plates closed, the other two with the plates open. The time required to bring the boiler into steady action was only one hour when lump coal was used, and 2·5 hours when the coal was fine.

Easby's Cumberland Coal.—Only one trial was made. It closely resembled the two preceding coals.

Atkinson and Templeman's Cumberland Coal.—Two trials were made giving results agreeing quite closely; 11·64 lbs. and 11·60 lbs. The rate of combustion was 7·18 in the first, and 7·48 in the second. The air plates were open in the first and closed in the second. This coal gave the highest evaporation obtained during the research. The average time required to bring the boiler into steady action was less than one hour.

Easby and Smith's Cumberland Coal.— This coal was said to be from the same mine as the coal described as Easby's. Five trials were made, the results ranging from 11·26 lbs. to 10·87 lbs. The rate of combustion was nearly the same for the maximum and minimum results, viz., 7·72 lbs. and 7·69 lbs. The highest result was obtained with the air plates open, but a result nearly as high, viz., 11·17 lbs., was obtained with the plates closed. The time required to bring the boiler into steady action varied from 1·4 to 1·66 hours.

Dauphin and Susquehanna Coal.—Three trials gave results ranging from 10·97 lbs. to 11·54 lbs., the corresponding rate of combustion per square foot of grate being 7·32 lbs. and 6·89 lbs.

This coal takes fire promptly; the average time required to bring the boiler into steady action was 50 minutes. The best results were obtained with the air plates open. Johnson says this coal is interesting as illustrating the passage of the anthracite beds of Pennsylvania near their southwestern termination into those of a decidedly bituminous character. In undergoing the process of coking, the masses become slightly agglutinated together, still retaining to some degree the original forms.

Blossburg Coal.—Four tests gave results ranging from 10·58 lbs. to 11·14 lbs., the lowest results being obtained with the highest rate of combustion, 6·72 lbs., and the highest results with the lowest rate, 5·87 lbs. The best results were obtained with the air plates half open. With wide open plates an intermediate result, 11·05 lbs., was obtained and precisely the same result was also obtained with the plates closed. The average time required to bring the boiler into steady action was 50 minutes. This coal has long held the first place in the country as a "blacksmiths' coal."

Lycoming Creek Coal.—Three tests were made, giving results from 10·58 lbs. to 10·89 lbs., the best result being obtained with the highest rate of combustion, 5·85 lbs., and the worst result with the slowest rate, 6·73 lbs. The air plates were open, the tests which gave both the maximum and minimum results, and intermediate result, 10·69 lbs., being obtained when the air plates were open. This coal was more difficult of ignition than most of the other bituminous coals, requiring 1·72 hours to bring the boiler into steady action.

Quin's Run Coal.—Two trials were made, giving results 11·17 lbs. and 11·38 lbs. The corresponding rates of combustion were 7·12 lbs. and 7·48

lbs. The air plates were closed in the first test and open in the second. The average time to bring the boiler into steady action was about 45 minutes.

Karthaus Coal.—Four tests were made, giving results as follows: 9·23 lbs., 9·40 lbs., 9·87 lbs. and 11·05 lbs., the corresponding rates of combustion being, respectively, 5·80 lbs., 9·57 lbs., 6·36 lbs., and 4·94 lbs. The air plates were closed in the first test and open in the other three. The results of three of these four tests are far below the results obtained from all the other semi-bituminous coals. To explain this anomaly we have recourse to Professor Johnson's remarks on the tests. The miners forwarded the coal in four casks, and wrote as follows: "We do flatter ourselves to think, from the trials already made of our coal, that we have the best bituminous coal in the world. The coal we sent you was put in four hogsheads; two were from the Karthaus and two from the Salt Lick banks. We do not consider that there is any difference in the coals, as they are only one mile from each other, both on the west branch of the Susquehanna River." Johnson states in his notes to the table of results that as there were two varieties of coal in this sample, so there were two sets of results, as shown in the figures 9·23, 9·40 and 9·87, 11·05. The first and second trial appear to belong to one variety and the third and fourth to another As no marks were found to distinguish the coal of one locality from that of another, the whole is of necessity taken as one sample. Two specimens were taken for analysis. The percentage of volatile matter, other than moisture, was found, by rapidly coking the first specimen, to be 21·5%, and by coking so slowly as to prevent agglutination of the particles of coal it was but 13·06%. The second trial gave as a mean of two trials, both performed rapidly, 11·88%. Dr. Kiug obtained from two specimens a mean of 23·25% of volatile matter. The mean of trials on four specimens gives the total volatile matter 19·23%. Hence, says Johnson, it appears that the Karthaus coal is superior in the amount of its volatile constituents to any of the free burning coals hitherto examined. In working rapidly this coal discharges gas copiously, intumesces strongly, forming a coherent, porous mass, moderately tough and of a steel-gray color. By coking more slowly the consistence is more compact and tough; and by very slow treatment the powder is scarcely rendered in any degree coherent. On an average it required 1¾ hours to bring the boiler into steady action after the charging with coal had commenced. The action of this coal in an ordinary open grate fire indicates some important characteristics. With a good draught it was found to require considerable time for ignition, kindling slowly at the bottom. More than an hour elapsed before any considerable activity of combustion had been attained. While any of the vaporizable and gasefiable ingredients of coal remain, the mass will remain mostly black. White or yellowish vapors continue to be given off at the top of the mass, and even if temporarily ignited by bringing any flaming body in contact with these gaseous materials, they will generally burn but fitfully, and their inflammation will last no longer than the torch with which they are attempted to be ignited is kept in contact with the issuing current of mixed vapors and gases.

The wide variation in the percentage of volatile matter found in one specimen of coal, 21·5% and 13·6%, according to whether the coal was coked rapidly or slowly, is enough to throw doubt upon all of Johnson's figures of volatile matter. If the percentage of volatile matter varies according to the rapidity of coking in the other coals as well as in this, the recorded figures of volatile matter may have been obtained under different conditions and may therefore be not fairly comparable.

The action of the coal in coking and in burning on an ordinary grate suggests that in order to obtain perfect combustion certain definite conditions of temperature, air supply, strength of draught, thickness of bed, etc, are necessary. Even if we suppose that the coal used on the third and fourth trial giving results 9·87 and 11·05 lbs. was a different quality from that used in the first and second trial, these figures show too wide a difference to be explained in any other way than that in the test giving 9·87 lbs. the coal was not burned as completely as in the other test. The highest result taken alone would rank the Karthaus coal with the other semi-bituminous coals, but the other three tests would rank it with the bituminous coals. The result of the analysis, ranging all the way from 11·88% to 23·25% of volatile matter, leaves us in doubt where to place it. It is apparently on the border line between the two, and may actually consist of a heterogeneous mixture of both, which may account for the variable results both of analysis and of actual test.

Cambria County Coal.—Four trials gave results of 10·00, 10·76, 10·06 and 10·13 lbs., the correspouding rates of combustion being, respectively, 6·4, 8·9, 5·9 and 5·6 lbs. The air plates were closed in the first and fourth trial and open in the second and third. The best result having been reached with a rate of combustion much higher than the average, it would seem likely that a still better result would have been obtained if the rate had been still further increased. The temperature of the gases entering the chimney on the trial was only 270°, while in the first trial, with the lowest results, they were 288°.

Barr's Deep Run Coal.—Five trials were made giving results 10·58, 10·02, 10·35, 9·64 and 10·12 lbs., the corresponding rates of combustion being respectively 7·3, 7·9, 7·4, 7·3, and 8·1 lbs.

The air plates were open in the second trial, half open the fourth, and closed in the other three. The temperature of the chimney gases included from 280° in the first trial to 371° in the second.

This and the better results in the first trial than in the others are attributed by Johnson to the clean condition of the flues in the first test, and their gradual coating with soot and dust during the trials. This coating of the tubes with soot introduces an element of uncertainty into all the trials with soft coals. The more highly bituminous the coal, generally the more smoke and soot it makes under ordinary conditions of firing, and this may largely account for the low and irregular results obtained by Johnson with coals containing the higher percentage of volatile matter.

It is noted that on the second and fifth trials the rate of combustion was considerably more rapid than on the other three days, and on those two trials the proportion of clinker made is above that made on the other three trials, showing the effect of rapid combustion in vitrifying the earthy materials.

Crouch and Snead's Coal.—This coal had considerably more volatile combustible matter than any of the coals previously described, ranging in different specimens from 20·5% to 26·3%. The evaporative power as determined by the test was lower than that of any of the semi-bituminous coals, which contained less volatile matter. Four trials gave results 9·86, 10·01, 9·19, and 9·91 lbs., the corresponding rates of combustion being 9·09, 8·06, 6·00 and 5·38 lbs. The highest and the lowest results were obtained with the air plates closed, the first and fourth trials. with intermediate results, being obtained with air plates open. In the trials of this coal, therefore, other conditions seem to have more effect upon evaporative power than the condition of air being admitted above the fire. The low result in the third trial is accounted for by the fact that the lower damper in the boiler was left open, allowing gases of combustion to pass into the chimney without making the circuit round the boiler by way of the external flues. The temperature of the gas in the chimney in this test was 512°, while on the other trials it ranged from 299° to 319°.

Creek Coal Company's Coal.—Four trials gave results 10·10, 9·51, 8·49 and 8·76 lbs., the corresponding rates of combustion being respectively 9·85, 8·32, 7·53 and 8·67 lbs. The air plates were open in the first two trials, closed in the last two. The superior result in the first two trials is attributed by Johnson to the open air plates, and to the greater freedom of the flues from soot in these trials, but it also, he says, leads to the suspicion that the brisk action of the fire may have caused some water to escape on that day mechanically mixed with the steam. The best result was obtained with the highest rate of combustion.

Clover Hill Coal.—Four trials gave results 8·61, 9·15, 8·84 and 7·74 lbs., the corresponding rates of combustion being respectively 6·9, 5·1, 5·2 and 6·2 lbs. The lowest rate of combustion seems here to have produced the best results. The very low result in the fourth trial is explained by the statement that the flues were coated throughout with a thick mass of soot. The chimney gases in this trial averaged 406°, while in the other trials they ranged from 334° to 367°. The air plates were closed in the first two tests, and open in the last two.

Chesterfield Mining Company's Coal.—Four trials gave results 9·84, 9·79, 10·14 and 9·81 lbs., the corresponding rates of combustion being 10·96, 5·97, 8·35 and 8·55 lbs. It is noticeable that there is a wide variation in the rates of combustion, but an unusual uniformity of results. The temperature of the chimney gases in the four trials was 348°, 332°, 292° and 416°. The rate of evaporation per square foot of heating surface was 3·27, 1·92, 1·89 and 2·57 pounds of water.

The first rate named is the highest that appears to have been reached in any of Johnson's tests. It is about that which is attended in modern practice with the best results. The notes explain the rapid evaporation in the first trial by the cleanness of the flues, and the rapid combustion by the prevalence of a wind favoring a strong draught. The air plates were closed during the first two trials, and open the other two.

Tippecanoe Coal.—Five trials were made giving results, 7·19, 9·19, 8·09, 9·15, and 9·29 lbs. The corresponding rates of combustion were, 6·2, 5·6. 7·6, 6·4 and 11 lbs., the best result being obtained with the highest rate of combustion. The air plates were closed in the first two trials, and open in the other three. The average temperature of the gases in the chimney was quite low in all the trials, ranging from 244° to 328°. The notes say that in its variableness of efficiency at the different trials, as well as in many other circumstances, this coal bears a striking resemblance to the Clover Hill Coal; they do not, however, explain the cause of the variableness. The result in the fifth trial is nearly 30% gain on that of the first trial. There was probably a great difference in the method of firing adopted in these two trials.

Midlothian (screened) Coal.—Five trials were made, giving results 9·81, 9·72, 9·97, 10·64, and 9·71 lbs., the corresponding rates of combustion being 5·0, 5·3, 6·0, 6·4, and 8·5 lbs. In the first two trials the air plates were closed, and in the other three they were open. There is nothing in the record to explain why the results in the fourth trial were so much superior to all the other results.

Sidney, Nova Scotia, Coal.—Two trials were made, giving results 8·65 and 8·34 lbs.; the corresponding rates of combustion being 8·25 and 8·38 lbs. The air plates were closed in the first and open in the second trial. The average result of these two trials is 8·50, as compared with an average of 9·70 for the five samples of Pictou coal, although the Pictou coal contained only 56·98% fixed carbon, and 27·83% volatile matter, against 67·57% fixed carbon, and 23·81% volatile matter for the Sidney.

The Sidney would, therefore, following the general rule in these tests, be expected to have produced the better results. instead of the contrary, as it did. Johnson, referring to the difference in the results of these two coals, says, "this points to a distinct character in the combustible matter of each coal," but he does not indicate in what the distinction consists. It is more probable that the difference in results was due to a difference in firing, or to soot in the tubes, for the whole range in variation in all the tests of these two coals is not as great as the range in one coal, the Tippecanoe, already noted.

Pictou, Nova Scotia, Coal.—Four trials were made, giving results 10·21, 9·95, 9 59 and 9·09 lbs., the rates of combustion corresponding being 8·6, 8·5, 6·9 and 7·4 lbs. The air plates were open in the first and third trial and closed in the second and fourth. The notes state that the decided inferiority of effect in the fourth trial is probably to be ascribed to the coating of soot upon the flues, and the want of sufficient draught to burn completely the products of combustion.

Liverpool, England, Coal.—Four trials gave results 8·98, 8·30, 7·2 and 8·45 lbs. The corresponding rates of combustion were 9·7, 9·9, 6·6 and 8·2 lbs. The air plates were open on the first and fourth trial, and closed in the second and third. The average temperature of the gases in the chimney was in the four trials 317°, 347°, 279° and 355°, the highest temperature, according to the notes, being when there was the greatest accumulation of soot on the absorbing surfaces. A note in the remarks on the first trial says, "dense black smoke in large volumes from chimney." The low result in the third test is explained by lack of sufficient draught, the damper being open only 4 in. instead of 8 in., as in the other tests. A comparison of the first with the fourth trial shows, say the remarks, what effect in diminishing evaporative efficiency is to be attributed to the soot of the flues from three days' operation.

Newcastle, England, Coal.—Four trials gave results 9·64, 9·26, 8·61 and 9·20 lbs., the rates of combustion being 7·9, 9·1, 7·1 and 8·1 lbs. The air plates were open in the first and fourth trial and closed in the second and third. The lowest result was obtained in the third trial, with damper open only 4 in. instead of 8 in. as in the other trials. The notes to the third trial state that the smoke from the chimney, while charging and

stoking, was dense and voluminous and that there was more soot than in the two preceding tests. The notes to the fourth trial state that the smoke was less voluminous and darker than on the day before. The low result of the fourth trial, as compared with the first, is attributed to the coating of the soot on the flues, and this cause also is indicated by the increased temperature of the chimney gases, which averaged 408° in the fourth trial, and 318° in the first.

Scotch Coal.—The exterior appearance of this coal varied in different specimens. In some it was that of cannel coal, dull, devoid of lustre, and with conchoidal fracture; in others it was that of splint coal, with foliated texture and resinous or shining lustre. The specific gravity also varied, being in one specimen 1·58 and in another 1·45. In the first specimen the percentage of volatile matter was 28·3, fixed carbon 57·3 and earthy matter 12·3. In the second the percentage of volatile matter was 36·9, fixed carbon 45;8 and earthy matter 14.9.

Concerning these differences Johnson infers that the sample was obtained from a mine where these characters coexist. It seems probable, he says, that considerable diversity exists in the composition of different plies of the seam or bed from which it was derived. In some of our Western States similar diversities in the appearance of coal from the same bed are to be met with.

Four trials were made, giving results 8·09, 8·16, 7·26 and 7·36 pounds, the corresponding rates of combustion being 12·3, 10·9, 9·6 and 10 2 pounds. The air plates were open in the second trial, and closed in the others; the damper was open only four inches in the third trial, and eight inches in the others. This coal gives the lowest average result of any of those tested by Johnson.

From his analysis of the waste gases, giving the percentage of oxygen and of carbonic acid, he calculates the total heating power of the coal expended on the water in the boiler, the escaping gases of combustion, the water from combustion of the hydrogen in the coal, and the hygrometric moisture of the air, to be equal to an evaporation of 10·206 lbs. of water from 212 per lb. of combustible matter in the coal, while the theoretical heating power as calculated from the mean of Dulong's and Depretz's figures for the heating value of the constituents of the coal is equivalent to an evaporation of 12·98 lbs., the difference being 23·67% of the latter figure. We cannot suppose, says Johnson, that the deficiency is due to the carbon wasted in the smoke, since the amount of volatizable carbon altogether is but 20·05% of the combustible matter. It does not appear to have occurred to Johnson that there must have been far more important sources of waste than the carbon in the smoke, namely, that due to the imperfect burning of the carbon in the coal, to carbonic oxide instead of to carbonic acid, and that due to the non-burning of part of the volatile hydrocarbons of which the smoke must have been largely composed. Johnson's analyses of gases are imperfect, from their not including carbonic oxide and hydrocarbons, and his conclusions based on such analyses as were made are altogether unsatisfactory.

Pittsburg Coal.—In external character this coal is said to be almost an exact counterpart of the Newcastle English coal. Only one trial was made, giving the result 8·94 lbs., the rate of combustion being 8·25 lbs., the temperature of the chimney gases 265.° The air plates were closed and the damper open 8 in. There was only one cask of coal tested and the trial lasted only four hours. The results are so far below what is obtained with Pittsburg coal in modern boilers that Johnson's figures should be rejected as of no value. The low result is probably largely due to imperfect burning of the coal.

Cannelton Coal.—This was the only coal from the Western States tested by Johnson. It appeared to be quite variable in the composition, one specimen, with specific gravity 1·25, containing 35·6% volatile matter, 3·5% earthy matter and 58·3% fixed carbon, and another of specific gravity 1·30 containing 28·9% volatile matter, 8·2% earthy matter and 60·3% fixed carbon. Two trials were made, with results 7·25 lbs. and 8·22 lbs., the rates of combustion being 11·8 lbs. and 10·4 lbs. The air plates were closed in the first test and open in the second. Johnson's notes state that an obvious advantage was obtained in economy, both of time and of fuel, by using the open air plate. The maximum result, however, is so far below that of the Pittsburg coal, which itself is too low, as to lead to the belief that the combustion of this coal was very imperfect, even in the better of the two tests.

(To be concluded.)

New Alloys.—The following alloys have recently been invented, according to *Iron:* Nickel-aluminum, composed of 20 parts nickel and 8 parts aluminum, used for decorative threads; zinc-nickel, composed of 90 parts zinc and 10 parts nickel, used as a pigment; nickel-hardlead, composed of 100 parts type metal and 5 parts nickel, used for types; platinide, composed of 60 parts platinum, 35 parts nickel, 2 parts gold, and 3 parts iron, used for crucibles and chemical utensils; roseine, composed of 40 parts nickel, 10 parts silver, 30 parts aluminum, and 20 parts tin, for jewelers' work; sun bronze, composed of 60 parts cobalt or 40 parts cobalt, 10 parts aluminum, 40 or 30 parts copper; metalline, composed of 35 parts cobalt, 25 parts aluminum, 10 parts iron, and 30 parts copper.

Precipitated Phosphates.—In chemical works where it may be decided to replace the "Weldon" process by processes for the production of chlorine which utilize the hydrochloric acid more effectually, the abandoned apparatus may be utilized for the preparation of diphosphate of lime, generally called "precipitated phosphate," says P.de Wilde, Brussels, Belgium. For this purpose the solution of natural phosphate in hydrochloric acid is effected in the stills, as also in the neutralizing well. On the completion of this operation the acid solution is raised by a pump into the clarifying settlers. After the solid matter has been deposited the solution is made to flow into the oxidizing tower, where it is gradually mixed with the desired quantity of milk of lime, which is prepared in apparatus on the spot and forming part of the "Weldon" plant. During the last operation air is forced into the compound for producing as intimate a mixture as possible. The liquid containing the precipitated phosphate is caused to flow down into the mud settlers, where it is subjected to a series of decantations and washings for depriving the phosphate of the chloride of calcium which accompanies it. The precipitated phosphate is passed into the filter press and is dried or utilized in any of the known ways.

REPORT OF THE RAPID TRANSIT COMMISSIONERS.

The Board of Rapid Transit Railroad Commissioners for the city of New York, appointed by the provisions of Chapter 4 of the Laws of 1891, having determined upon the routes and general plan of construction of a rapid transit system, made a report on the same to the Common Council of the city, on the 20th inst., of which we make an abstract here. Having determined that the public needs could best be met by locating a line along the main artery of travel in the lower part of the city, Broadway, with diverging branches above Union Square, the two governing questions remaining were the general plan of the structure and the motive power to be used. Various plans for viaducts and tunnels under the blocks of the city were considered, but it was finally decided that a tunnel under Broadway would be the best plan; this decision was announced on May 27th, 1891. The impression prevailed to some extent that a tunnel could be driven under Broadway entirely through rock within a reasonable distance of the surface. To determine this the Commission caused careful borings to be made on Whitehall street and Broadway, at every cross street from Front street to Thirty-third street. These showed that bed rock was much further below the surface than had been supposed, and that the idea of a continuous rock roof for a tunnel must be abandoned.

The next question that arose was with respect to the depth of the tunnel below the street, and it was finally determined to adopt the plan of a tunnel as near the surface as possible without disturbing existing pipes, conduits, and other subways. A deep tunnel would have many advantages, but although modern and improved elevators would doubtless provide for regular traffic at ordinary stations, it was not believed that they would be adapted for large crowds. Moreover, it was not believed that a deep tunnel, with elevators, would attract short-trip passengers, and short-trip business was absolutely essential for the success of any line the cost of which at all approximates that of a four-track tunnel in New York City. These and other considerations led the Commission to place the underground structure as near the surface as possible, and the engineers of the Board were directed to submit two separate plans, one for four tracks on a level, the other for a double-deck tunnel with two tracks upon each deck.

These plans were prepared. The one for four tracks on a level provided for a tunnel occupying substantially the entire width of Broadway from curb to curb, but not at such depth as to require excavation below the foundations of the heaviest and most costly structures abutting on the street. This plan also provided for carrying on the work of excavation without disturbance of the street surface except for short distances at points of exceptional difficulty.

The other plan of double-deck tunnel would occupy less width of the street, and presented the advantage of the removal and replacement in galleries of the pipes and other existing underground structures. A disturbance of the street surface would be unavoidable in this case, but a great and permanent benefit would be derived from the fact that such disturbance would not be repeated in the future for any cause except the relaying of the pavement, as the pipes in galleries would be accessible at all times for purposes of repair. The excavation required by this plan was about 4 ft. more in depth than by the other. The length of stairway to the local stations would be less, but to the express stations greater than in the other plan. These plans were submitted to four consulting engineers—Messrs. Octave Chanute, of Chicago; Joseph M. Wilson, of Philadelphia; Theodore Cooper, of New York, and John Bogart, State Engineer, of New York. With the report of these gentlemen as a basis, the Commission came to the conclusion that while the double-deck plan provided for subways or galleries for the pipes and other underground structures, and the Rapid Transit Act authorized the Board to make such provision, yet it was felt that the intent of the act was that such power should be exercised only when necessary for the proper construction of any proposed railway. The adoption of such plan would not only again require the disturbance of Broadway, but might expose the railway and passengers to great annoyance, if not serious danger, from escaping gas and steam; it was open also to the objection of greater noise and possibly inferior ventilation.

The double-deck plan, moreover, burdened the enterprise with the heavy additional expense of pipe galleries and removal of pipes. Another and most serious question which the Commission was obliged to consider was facility of movement between the different tracks in emergencies causing congestion and delay. No system of rapid transit would be complete that did not provide on its main trunk line at numerous points for the movement of trains from either track to any other, and the transfer of passengers from disabled trains, if need be, at any point between stations. This in the double-deck plan could be but partially accomplished, while with four tracks on one level the entire blockade of the system would be almost an impossibility. So important is this consideration that the Commission was loath to recommend any plan wanting in this feature. It would have been regarded as essential even had the Commission adopted a plan for a tunnel at greater depth than the one now reported.

The Commission, after weighing carefully all these considerations, arrived at the following conclusions:

The underground rapid transit system shall consist of a main trunk line in Broadway below Union Square, and two branches above that point, one running under upper Broadway and the Boulevard to and over the Harlem River to the extreme northern limit of the city on the West Side, and the other under Fourth and Madison avenues to and over the Harlem River to the extreme northern limit on the East Side. From a point under Broadway between Morris street and Bowling Green, the tracks are to diverge, running under Whitehall street, State street, and Battery Park, forming a loop line. There is also to be a loop from Broadway, under Mail street, City Hall Park, Park Row, and Chambers street, and again connecting with the Broadway line.

Above 121st street the western branch is to be constructed partly by tunnel, partly by viaduct, and partly by a depressed structure. The eastern branch is to be constructed in similar manner above Ninety-eighth street.

Concerning the plan of construction, the Commission says:

"The general plan of construction of the loop under Battery Park, State and Whitehall streets shall be double track; from the Morris street junc-

tion to near Vesey street shall be three parallel tracks on the same level, with suitable switches and connections between them ; from Vesey street to 190th street on the west side shall be four parallel tracks on the same level; and thence across the Government ship canal and Spuyten Duyvil Creek to the city limits shall be two parallel tracks on the same level. On the east side line from Fourteenth street to the Harlem River shall be four parallel tracks on the same level, and thence to the city limits shall be two parallel tracks on the same level. The tunnels shall be not less than 11 ft. 6 in. in height in the clear and 11 ft. in width for each track. Whenever necessary for the proper support of the surface of the street, the roof of the tunnel shall be of iron girders with solid plate-iron covering supported by suitable iron columns between each of the tracks, and supporting walls on the outside. The roof of the tunnel shall be as near the surface of the street as the pipes and underground structures now laid therein and the street grades will permit. Viaducts shall be of masonry or iron, or both combined. The Government ship canal and the Harlem River shall be crossed by double-track drawbridges not less than 50 ft. in the clear above mean high-water mark, with clear spans of not less than 125 ft. between the center piers and bulkhead line. North of the Harlem River the construction shall be by viaduct, depressed structure, and tunnel, as the grades of the land upon the proposed routes shall require. The junction of the tracks near Fourteenth street shall be effected by dividing them around Union Square, raising one pair and depressing the other, so that trains going in opposite directions shall not cross on the same level. All station approaches shall be as far as possible through private property to be acquired for that purpose. Except that on the Boulevard, station approaches may be in the center of the street

"A footway shall be provided the whole length of the line between the center tracks, and refuge niches shall be built in the side walls at proper intervals for the convenience and protection of employés.

"The motive power shall be electricity, or some other power not requiring combustion within the tunnel; and the motor or motors shall be capable of a uniform speed for long distances of not less than forty miles per hour, exclusive of stops.

"The manner of construction from South Ferry to about Thirty-fourth street shall be by underground tunneling without disturbing the surface of the street. In case of necessity the excavations below Beaver street, and in the neighborhood of Canal street, and at such other special points as this Commission may during the progress of the work determine, may be made by excavation from the street surface, and all excavations in Fourth avenue above Fourteenth street, and in all other streets and avenues above Thirty-fourth street, may be made in the same manner.

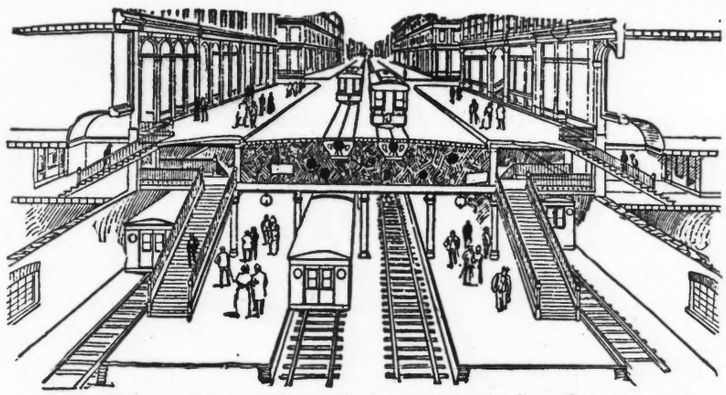
"The loop at Battery Park is adopted as furnishing the best and most convenient method for the terminal handling of the trains, both way and express. The three tracks between Bowling Green junction and Vesey street provide amply for the volume of traffic below the City Hall and avoid encroachment beyond the curb line in Broadway at its narrowest points. The introduction of a loop at City Hall Park by which trains may be stopped, turned, and dispatched uptown continuously and without switching, without grade crossings for trains in opposite directions, furnishes the best means of a second down-town terminus at the most important point and the best means of connecting with the Brooklyn Bridge. At Union Square a system of tracks has been devised by which all trains on the Broadway and Madison avenue line are accommodated at a single station, and all grade crossings between trains in opposite directions are avoided, thus facilitating high speed and eliminating in the best manner possible the dangers and delays incident to such crossings.

"At Ninety-sixth street the contour of the ground necessitates the termination of the tunnel. It, therefore, became necessary to deflect the line from Madison avenue, and occupy private property, thence to the Harlem River, on account of the prohibition in the Rapid Transit Act against the use of Madison avenue for an elevated structure.

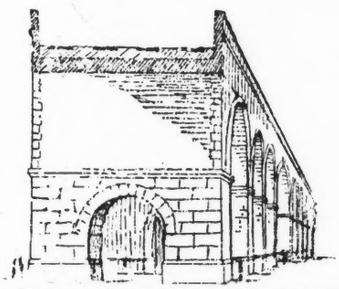
"The stations on the route selected have not been located for the reason that the Board was advised that they constitute part of the detailed plan which the Commission is required to complete after the general plan shall have received the approval of the Common Council. Detailed plans and specifications for the construction of the railway, including stations, devices, and appurtenances deemed necessary to secure the greatest efficiency, public convenience, and safety, will be prepared by the Commission in accordance with the provisions of the act if this report is approved.

"The Commission makes no recommendations as to the method of construction. These matters the Commission will deem it wise to leave, so far as permitted by the Act, to the judgment of the purchaser, subject always, as the Act requires, to the control of this Board. The particular shield, if any, to be used in excavating under the streets, the details as to materials and form of walls and other interior surface should, as far as consistent with the requirements of the Act, be subject to his selection. Any attempted determination of the method of construction in advance might narrow the field of possible competition to such an extent as to endanger the success of the enterprise.

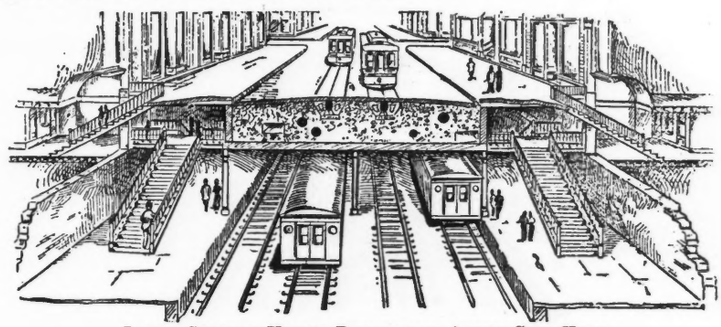
"When the Commission decided to adopt an underground route, it also decided that the motive power must be secured without combustion in the tunnel. Much attention has been devoted to the consideration of electricity as a motive power. Consultations have been held with eminent electricians; experiments have been witnessed; electric roads in operation have been examined. While the Board is convinced that electricity as a motive power is available for the purposes of the railway recommended by this report, it is not deemed wise at the present time to exclude other forms of power answering the essential conditions of speed and non-combustion in the tunnel, or to attempt to direct the exact method of application of such power as shall finally be adopted."



Express Station Under Broadway, Above City Hall.



Masonry Viaduct Above Ninety-Seventh Street.



Local Station Under Broadway, Above City Hall.

We are indebted to the New York *Herald* for the accompanying cuts.

Coal in Central Asia.—Turkestan contains great mineral wealth, says M. D. C. Mickenkow, head engineer of the Tashkend mines, which, for want of capital, have not hitherto been advantageously exploited. In this Trans-Caspian province are found most of the metals and coal. These mineral deposits were worked at a far remote period, but the small development of their production must be attributed to the primitive processes employed in extraction. No trace of coal-working by the natives can be found, and it is consequently concluded that that fuel was unknown to them. Since the Russian occupation of these provinces, coal-working has begun to develop slowly, since the annual production does not exceed 500,000 *pouds* (a *poud* = 36 English pounds). The coal beds belong to the brown Jura formation. The coal contains an average of 50% of carbon, 33% of volatile matters, and about 17% of ash and hygroscopic water. Calorific power, 4,509 to 6,500. Most of the seams are only worked at discovery. Extraction is easy, and may, most often, be effected without preliminary works. It has been found in some localities that the coal forms layers, the thickness of which varies from 3 to 8 *archines* (the *archine* = 28 English inches), and that some of the beds are of great extent. Another fuel, which may be called upon to play as important a part as coal in the industrial future of Turkestan, is naphtha. Most of the copper mines are situated by the side of the coal beds, and near important watercourses, which can thus be used to wash the ore, and also for motor power.

THE GOLD MINES OF NORTH CAROLINA.

Written for the Engineering and Mining Journal by Ad. Meszger, M. E.

I have before me the "Ores of North Carolina," being Chapter II. of the second volume of the "Geology of North Carolina," by George B. Hanna. The index shows 213 gold mines in this State, and it is said that out of this number 35 were running in 1888. I am able to state that at least seven, and perhaps more, of the mines mentioned have been stopped. On the other hand I am sure that the list of 213 does not cover the whole number of gold mines, although I have no means of ascertaining even approximately the true total. This would, of course, include many mines which never possessed much importance.

This decadence of an industry which has been started at so many places is surprising. The cause must be either the exhaustion of natural resources or commercial failure due to grave mistakes in mining and milling. I think it can be proved that the latter is the case.

The gold-bearing veins are generally bed and contact veins between the rocks which belong to the Laurentian and Huronian systems. Their strike is the strike of these systems, about N. 30° E; the dip generally 45° to 80° west, though eastward dips may be observed. The most striking characteristic is the lenticular form of all the rocks, often very slender and long, and often short and thick. In the latter case we find veins with a strike N. and S. or E. and W. The formation of the veins corresponds exactly with the theories of Volger and Sandberger: Lixiviation of the strata and crystallization of the silica, pyrites and gold in fissures, which have been formed by the mechanical force of the crystallization. A paper of mine describing very interesting features of the so-called plutonic rocks of this region (of which I had meanwhile opportunity of making many more observations) has been printed in the *Transactions* of the American Institute of Mining Engineers. Near the surface the sulphurets are oxidized, the gold occurs free in honeycomb quartz and in the different oxides of iron—the so-called brown ores. Below water level the pyrites remains unchanged and contains the gold only partly free and this part not all amalgamable. The greater part is in a state which permits no amalgamation, being contained in the pyrites, which must be destroyed to make the gold accessible for treatment.

Professor Hanna mentions in his book but few mines in which attention has been paid to the sulphurets. One is the Phœnix, where they have been treated by chlorination by Mr. A. Thies. Some five or six mines are named from which they have been shipped to northern smelting works. The charges of $14 per ton and 5% of the assay value added to the freight have brought the expense of such a course up to a considerable figure.

We find in all the older reports and again in Professor Hanna's book repeatedly remarks like this:

"The mine was paying very well until the works reached the water level, where the ores changed into sulphurets and operations were therefore stopped."

This notion that further mining is hopeless as soon as the sulphurets make their appearance is in fact the most important reason of the decadence of the whole industry. It is true that the brown ores are as yet by no means exhausted, but the sulphurets have practically not been touched at all—the quantities worked up being hardly worth mentioning. One might expect that the practical test of the Phœnix mine would have directed the attention of mine owners to the fact that the sulphurets can be successfully and cheaply treated; yet I know of one mine only where the erection of chlorination works at present is contemplated.

If we consider, on the other hand, the state of things as regards the dressing of the gold ores throughout this region, we are induced to feel almost an aversion against alleged improvements of any kind. What I give in the following has been gathered from the ruins of many deserted mines and from the explanations and descriptions of the "mining experts and mill men" of the country. We find stamps with plates and commonly a concentrator of one kind or another for the distinct purpose of collecting the gold and amalgam which went over the plates, only very rarely for the purpose of concentrating the sulphurets; and even in the latter case the tailings go off by far too rich. There is nowhere a laboratory, and the means of control of the work done are of the poorest kind, mostly nothing more than a pan. I hesitate to give my estimate of the gold lost for every unit of gold produced. It would seem incredible even in a process apparently so rude as the milling of free gold.

The notion exists that there is no capital in the South. This is an error. We have only to look at the cotton, oil and other mills, manufactories, tramways, etc., which are constructed in a surprising number everywhere. But there is certainly, so far as mining is concerned, no intelligence here, as long as the mine owners believe themselves to be able to go along without mining engineers, who know their profession. Salaries of $2 per day are not inviting inducements; and superintendents who have no idea about "specific gravity and all that theoretic and scientific trash"—as they call it—are not able to do anything from which the mine owners will reap benefit. They must engage mining skill, which, in the long run, will be considerably cheaper than the two-dollar superintendence.

It is very interesting to look a little into their work. Without investigating the physical and chemical conditions of the ores, in many cases, very considerable sums of money have been squandered for the wildest and most fantastical constructions of concentrators and amalgamators which necessarily proved to be failures, because there was no mathematical basis at the bottom, and because the laws of nature were absolutely disregarded. A small fraction of the money which has thus been wasted would have sufficed in many cases to engage skill and to put on a profitable and sound basis a mine which, for the reason mentioned, has been given up.

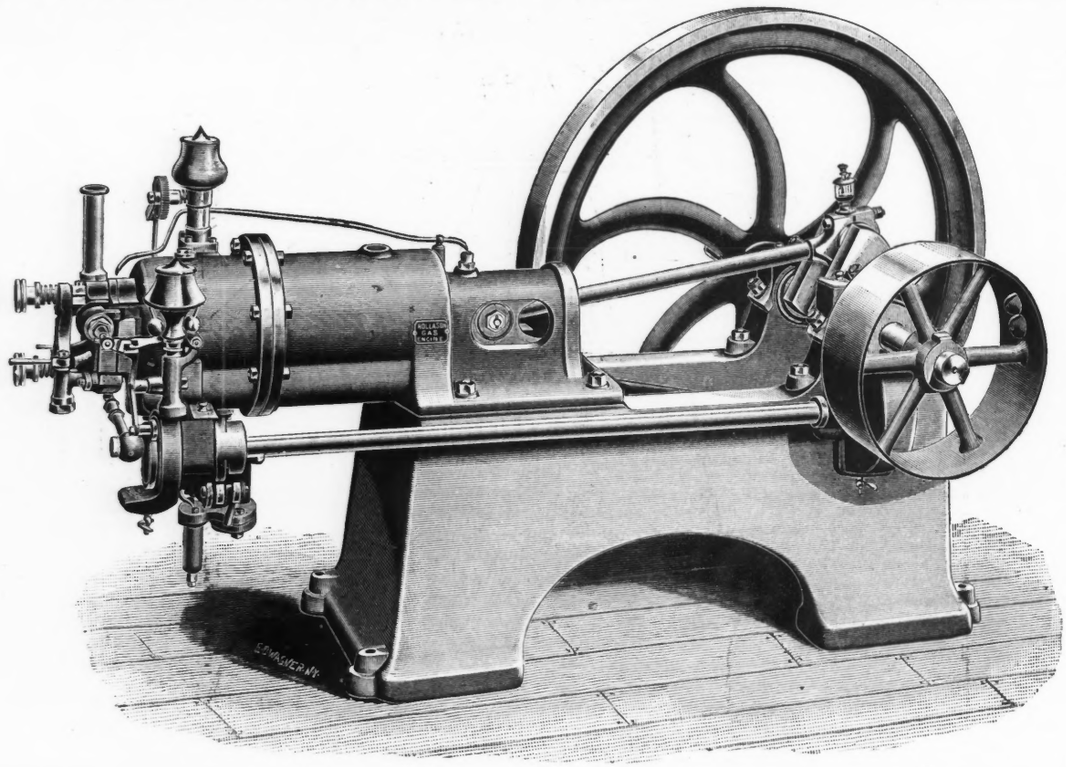


Fig. 1.—Rollason Gas Engine.

Southern capital is averse to gold mining, being afraid after the numerous failures, caused by the reasons given above. Starting works for the purpose of working brown ore, the limited quantity of which was known beforehand, and stopping work as soon as the brown ore was exhausted because the superintendents did not know how to treat the sulphurets, has been the general record. There was, I might say, in no single instance any other reason for stopping.

This aversion will have its consequences; the state of things is becoming known, and it is known that the sulphurets are as good as not touched at all; and if Southern capital is not forthcoming for this important industry, which could now be revived under the most favorable circumstances, foreign capital is sure to come and reap the benefits!

Mining Rights Over Others' Land.—A complaint which alleges that plaintiffs own mining claims adjoining and above defendants' land, and that they have a right to dig trenches and construct flumes across defendants' land, and have so constructed trenches and flumes, which defendants are filling and destroying, and will continue to do so unless restrained by order of court, shows a *prima facie* case for granting a temporary injunction.—*Power v. Klein, Supreme Court of Montana, 27 Pac. Rep.*, 513.

THE ROLLASON GAS ENGINE.

The Rollason Gas Engine which is now being introduced in this country by the Electric Manufacturing and Gas Engine Company, is the invention of Arthur Rollason, of Newcastle-on-Tyne, England, and has been in use in England for two or three years with, it is claimed, excellent results. The engine differs from other gas engines in the method of mixing the gaseous charge previous to ignition, and the burning of the mixture in a chamber which is heated and maintained at a high temperature.

The operation of engine is as follows: Supposing an explosion to have just taken place, the piston, under the impetus given, makes a forward stroke; the exhaust valve is then opened and the piston returns, expelling the larger portion of the products of combustion. During the next forward stroke a scavenger charge of air is drawn into the cylinder, and on return stroke is forced out through the exhaust, thus entirely clearing the cylinder and explosion chamber. On the fifth stroke a combustible charge of gas and air is drawn in, compressed ready for ignition by the sixth or return stroke; thus the cycle is completed. At the commencement of the seventh stroke an explosion again takes place and so on.

The construction of this engine is shown in the accompanying engraving. The connecting rod is pivoted directly to the piston, which has a guiding trunk. The cylinder is surrounded with a water jacket, which extends around the combustion chamber up to the rear valve face. The chamber itself is isolated from the influence of the jacket by an annular space, which is filled with a non-conductor. A side shaft, revolving at one-third the rate of the crankshaft, works the slide valve at the back of the cylinder by means of a connecting rod and a rocking beam. The slide valve is shown in the horizontal section of the cylinder (Fig. 2). This slide valve is formed with ports through which the supply of air and gas is admitted. The gas valve is raised at the proper instant by a cam, which is shaped to proportion the influx of gas to the speed of the piston. The amount of gas admitted is regulated by the governor, which is driven by the side shaft. The governor is connected by a rod to the valve, and as it rises it throttles the supply of gas to make it correspond with the work to be done. When the dilution of the charge has been carried as far as is economical, the gas is cut off entirely. A second lever connected with the governor carries a counterweight, and by altering the position of this weight the speed of the engine can be varied. This lever can be readily put in or out of connection with the governor, its principal object being to enable the engine to be slowed down when not actually doing work.

When combustible mixture is to be admitted to the cylinder, the valve ports coincide with admission, gas and air inlets, the gas valve is opened and the charge flows in, following the outward movement of the piston. The first portion of the combustible gases taken in flows down the center of the cylinder until the piston stops, and then it divides and flows back along the walls. This portion, which is diluted with the air in the combustion chamber, is congregated round the firing port, while the richer part of the charge is situated next the piston. The weaker part is ignited first, and the velocity of combustion increases as it approaches the richer part.

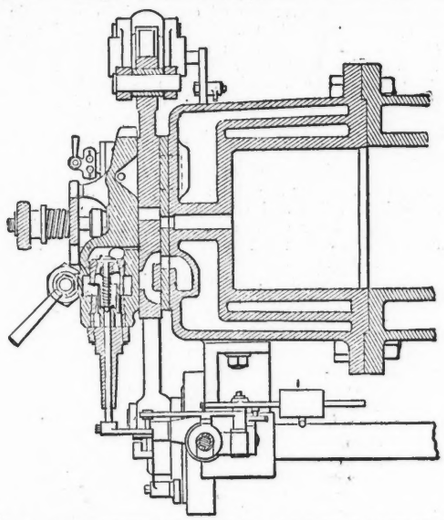


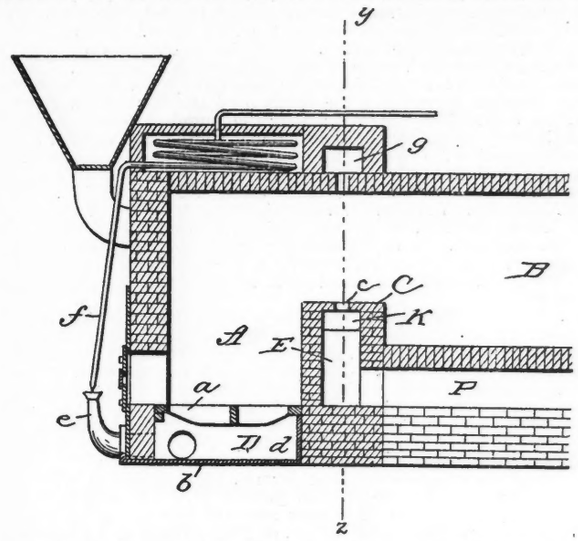
FIG. 2.—ROLLASON GAS ENGINE—SECTION OF CYLINDER.

German Iron and Steel Companies.—For the fiscal year ending July 31st, 1891, the Phœnix Company paid a dividend of 10% as in the previous year; the Rhenish Steel Works 11%, against 13½% in the previous year; and the Westphalian Union at Hamru 12%, as in the previous year. The Hörder-Verein, of Hörde, shows a deficit of more than $240,000 on the year's working.

New Coloring Matter for Porcelain.—Some Belgian manufacturers of glass and porcelain have recently introduced from Germany, says a correspondent of *Industries*, a new coloring matter, which can be fixed without the use of fire. In this process a mixture of two solutions, of which one consists of 100 parts of strong potash and 10 parts of acetate of soda, and the other of 15 parts of acetate of lead in 100 parts of water, is used. The second solution consists of 50 parts of borax dissolved in 100 parts of hot water and 20 parts of glycerine. Sixty parts of the first mixture are mixed with 40 parts of the second. When the composition has been applied the objects are placed in a bath, which is composed of one part of borax dissolved in 12 parts of water, mixed with 50 parts of hydrofluoric acid and 10 parts of sulphuric acid. After being allowed to remain in the bath for ten minutes, the objects are washed in clean water, when the color appears as clearly as when the objects are fired.

THE JAMES PUDDLING FURNACE.

At the Arethusa Iron Works, New Castle, Pa., a new puddling furnace invented by Jacob James has been in use for nearly a year and half, and all of the furnaces in the plant have been changed to this type. It is also being used by the Oliver Iron and Steel Company, Lloyd's Sons & Co. and the Republic Iron Works, Pittsburg. The furnace shown in the accompanying illustration, for which we are indebted to the *Iron Age*, has a hollow fire bridge, *C*, with a transverse flue, *K*, from which a number of orifices, *c*, lead upward. The air is preheated in the flue, *P*, which connects as shown with the space *E* in the fire bridge under the fuel



chamber *A*, and the grate bars *a* is an air chamber. *D*, formed by a tight box, *d*. Leading into this air chamber are a number of air pipes, *e*, into the bell-shaped mouth of which the nozzles of steam pipes, *f*, are projected, so that the steam draws in air. Above the bridge is a cold-air flue, *g*, connected with a number of openings with the furnace above the fire bridge. It is provided with a valve to regulate the admittance of cold air, when required.

While in the ordinary type of puddling furnaces the consumption of good Pittsburg coal was 2,200 lbs. at the Arethusa Works, with the James modifications the consumption was but 1,800 lbs. with the same coal. Similar results were attained in the heating furnaces of the plate mill. The furnace is simple and costs but very little, if any, more than those of the usual type.

THE DISCOVERY OF THE SOUTH AFRICAN DIAMOND FIELDS.

By J. Thorburn.*

The little instances I have to relate are connected with an epoch in South African history—the discovery of diamonds. Previously to the year 1870 the interior of South Africa was indeed a land of mysteries. Vague reports of hidden wealth were from time to time circulated, but were, even at Cape Town and other mercantile centers, hardly credited; and none but a few trek-Boers and adventurous traders and hunters ever desired to become acquainted with the land beyond the Vaal. But no sooner did the news of the discovery of diamonds in the interior reach the outside world than all thoughts of risk and danger were thrown aside, and men of every class and every nation joined in a rush which populated the banks of the Vaal river, and served to initiate the people of Europe into a due appreciation of the resources of South Africa.

Mr. John O'Reilly, an interior trader, was the discoverer of diamonds in South Africa, and to him the honor is due of proving that the precious stones were to be found in the district of the Vaal. O'Reilly was an old friend of mine, and I learned from his own lips the circumstances under which the first diamond was brought to light. In the winter of 1867, O'Reilly stopped at the house of a Dutch farmer, Van Niekerk by name, who lived close to the river, in the district of Griqualand West. While there engaged in bartering goods for the skins of game, he noticed, in a casual way, a game which the daughter of Van Niekerk and two little native children were playing. The children were throwing pebbles into the air and catching them as they fell—a species of the old English infantile pastime euphoniously known as knucklebones. While looking on, O'Reilly's attention was attracted by the peculiar clearness and transparency of one of the pebbles in use. He took it up, examined it, and was immediately satisfied that it was a stone of some value. He brought the stone over to where Van Niekerk was standing, and expressed his willingness to buy it. Van Niekerk laughingly replied that he could keep it if he wished, or he could find plenty like it in the river. O'Reilly answered that he believed the stone to be of value, and he would take it; should it turn out what he thought it was, and he succeeded in selling it, he would place half of what he received to the credit of the girl, and Van Niekerk would then be able to fulfil one of his greatest desires, and have her properly educated. Van Niekerk smiled at the probabilities of such fortune in a pebble, and the next day O'Reilly left on his homeward journey.

On arriving at Hope Town, then a frontier post in the old colony, he produced his stone, which he had carefully preserved throughout his travels, and his friends were consulted as to the identity of the specimen. O'Reilly himself believed it to be a diamond, but no one supported him in his belief. Most people laughed at the thought, their argument being based on the premises that a stone so large could not be precious. It was

* From London *Daily Graphic*, September 25th.

finally decided that the pebble should be sent to Dr. Atherstone, of Grahamstown, and this most capable authority immediately pronounced it to be a diamond of about 22 carats. The stone was shortly afterwards bought by the then Governor of the Cape, Sir Philip Wodehouse, who paid for it the sum of £500.

O'Reilly at once made preparations to return to the Vaal, where, on his arrival, honest man that he was, he faithfully fulfilled his promise to Van Niekerk, and handed over one-half of the proceeds of the sale of the stone to the little girl through whose instrumentality the first diamond was discovered. O'Reilly then employed natives in the district to collect for him all the transparent pebbles they could find on the river banks. He carefully examined sackful after sackful, but only secured a 4-carat stone—the second diamond found on the Vaal River. The news of the second discovery quickly spread, and hundreds of white men were soon traveling toward the Vaal to assist in the search for diamonds. The river's banks continued to attract diggers for some three years. Thousands of men were engaged in washing the banks for diamonds; some were successful, but the majority (myself among the number) were ill-requited for their labors. The finding of some diamonds in the mud walls of a Hartebeeste hut led to the opening up of the dry diggings, and soon the majority of the diggers were engaged in a more profitable search on hard ground, where now stand the famous mines of Du Toits Pan, De Beers and Kimberley. In June, 1871, Captain Findlayson and I measured off the Kimberley mine, which was divided into claims of 30 ft. square (Dutch measure). It was principally due to the foresight of Captain Findlayson that the working facilities of the mine were so complete, and through the medium of his road plans that the property was opened up so rapidly.

The De Beers and Kimberley mines were discovered in 1870 and 1871 respectively, and were situated on the farm of an old Dutch stock breeder named Johannes N. de Beer, and lying some 12 miles to the east of the Vaal River. De Beer was a hard-working, honest old fellow, who would undoubtedly have rested much more contentedly had the grass on his farm been left undisturbed, and the diamonds below permitted to lie in their earthy bed. For some time he endeavored to cope with the inrush of miners on his farm, and rented out claims, receiving very substantial financial returns, but ultimately the ever-increasing white population proved too much for the old stock farmer, who decided to trek to less lively pasturages. The result was that he agreed to part with all his right and title in the Kimberley and De Beers mines, with the farm, to Messrs. Dunell and Ebden, of Port Elizabeth, for the sum of £6,500. De Beer did not even wait for the payment of the money. He gathered his flocks and herds together, and, with his household gods, struck away Free State-wards. On the road he was overtaken by the agent of the purchasers, and on the box of his wagon received the first instalment of the purchase money for the two mines. De Beer never regretted their sale, and in the new home which he made for himself he was much more contented than he would have been had he neglected his stock for commercial pursuits. In the Free State he was my neighbor, and an honest, straightforward neighbor he proved himself—one of nature's gentlemen. He died in my house on the 20th of June, 1882, in the 52d year of his age.

THE THEORY AND PRACTICE OF METALLURGY.*—II.

By Prof. W. C. Roberts-Austen, C. B., F. R. S.

(*Continued from page* 448.)

(2) In turning to the modern aspects of metallurgical practice, we shall see that the whole range of the metallurgist's field of study is changing. It is no longer possible for him to devise a series of operations on the evidence afforded by a set of equations which indicate the completion of an operation; he has, as I have already suggested, to consider the complicated problems which have been introduced into chemistry from the sciences of physics and mechanics. He has, in fact, no longer to deal merely with atoms and molecules, but with the influence of mass. As Ostwald points out, we are reminded that many chemical processes are reciprocating, so that the original products may be obtained from the product of the reaction. The result of such opposed processes is a state of chemical equilibrium, in which both the original and the newly-formed substance are present in definite quantities that remain the same so long as the conditions, more especially temperature and pressure, do not undergo further change. Again, in very many metallurgical processes, reactions are rendered incomplete by the limitations imposed by the presence of bodies which cannot be speedily eliminated from the system, and the result may be to greatly retard the completion of an operation. The time has come when the principles of dynamic chemistry must be applied to the study of metallurgical problems if they are to be correctly understood, and it is, moreover, necessary to remember the part played by the surface separating the different aggregates in contact with one another. When, for instance, a reaction has to take place accompanied by the evolution of gas, there must be space into which the gas can pass. The rate, therefore, at which change takes place will obviously depend on the state of division of the mass.

One of the most remarkable points in the whole range of chemistry is the action engendered between two elements capable of reacting by the presence of a third body. It may be, and this is the most wonderful fact of all, that merely a trace of a third body is necessary to induce reaction, or to profoundly modify the structure of a metal. H. Le Chatelier and Mouret have pointed out that in certain cases it is inaccurate to say that the third body causes the reaction to take place, because, after it has destroyed the inter-molecular resistances which prevented the reaction taking place, the third body ceases to intervene. This is apparently the case when platinum sponge effects the union of oxygen and hydrogen, or conversely, when very hot platinum splits up water vapor into its constituent gases. Future investigation will, it is to be hoped, show whether the platinum does not exert some direct action in both cases. We can no longer neglect the study of such questions from the point of their practical application. The manufacture of red lead presents a case in point. In "drossing" molten lead, the oxidation of the lead is greatly promoted by the presence of a trace of antimony, and conversely, in the separation of silver from molten lead, by the aid of zinc. H. Roessler and Edelmann have recently shown that aluminum has a remarkable effect in protecting the zinc from loss by oxidation, and, further, the presence of one-thousandth part of aluminum in the zinc is sufficient to exert this protecting action on that metal. I am satisfied that if our metallurgists are to advance their industrial practice, they must, if I may use such an expression, persistently think in calories, and not merely employ the ordinary atomic "tools of thought." They will then be able to state what reactions can, under given conditions, take place; to indicate those which will be completed; and to avoid those that are impracticable.

In France, the country of so many great metallurgists, men like Le Chatelier and Ditte are doing admirable service by bringing the results of the labors and teaching of St. Claire Deville within the range of practical men. And if I do not refer more specifically to their work it is for want of space and not of appreciation, but a few simple cases of reversible actions will perhaps make the subject clear. In the blast furnace the main reducing agent, carbonic oxide, is produced from the solid fuel by the reaction $CO_2 + C = 2CO$, a reaction which is theoretically impossible because it is endothermic, and would be attended by absorption of heat. But heat external to the system intervenes, and acts either by depolymerizing the carbon into a simpler form which can combine with oxygen of the CO_2 with evolution of heat, or by dissociating carbonic anhydride sets oxygen free which combines with the carbon. Reduction of oxide of iron in the blast furnace is mainly effected by carbonic oxide according to the well-known reaction $Fe_2O_3 + 3CO = 2Fe + 2CO_2$. But the gas issuing from a blast surface contains carbonic oxide, an important source of heat. The view that this loss of carbonic oxide was due to the fact that the contact of the ore and the reducing gas was not sufficiently prolonged, led to a great increase in the height of blast furnaces, but without, as Grüner showed, diminishing the proportion of carbonic oxide escaping from the throat. The reduction of an iron ore by carbonic oxide only takes place within certain well-defined limits, and a knowledge of the laws of chemical equilibrium would have saved thousands and thousands of pounds which have been wasted in building unduly high furnaces. I would add that large sums have also been sacrificed in the vain attempt to smelt oxide of zinc in the blast furnace, for which operation patents have frequently been sought, in ignorance or defiance of the readiness with which the inverse action occurs, so that the reducing action of carbon on oxide of zinc may be balanced by the reoxidation of the reduced zinc by carbonic anhydride, which is the product of the reduction. A further instance may be borrowed from an electro-chemical process which has been adopted for obtaining alloys of aluminum. As is well known, all attempts to effect the direct reduction of alumina by carbon have failed, because the reaction $2(Al_2O_3) + 3C = 4Al + 3CO_2$ requires 783·2 calories, while only 291 calories would result from the conversion of carbon into carbonic anhydride, therefore the reaction cannot be effected; but in Cowles' process aluminum is nevertheless liberated when alumina is mixed with charcoal and strongly heated by the passage of an electric current. This result is due, not to a simple reduction of alumina, but to its dissociation at the high temperature produced by the passage of a current of 1,600 ampères between carbon poles, the liberated aluminum being at once removed from the system by metallic copper, which is simultaneously present and may not be without action itself.

An instance of the importance of these considerations is presented in the manufacture of steel by the basic process. Much care is devoted to obtaining conditions which will ensure not only the elimination, but the order of the disappearance of the impurities from the molten pig iron. In the basic process as conducted in the closed converter, the phosphorus does not disappear until the carbon has left the fluid bath, while, when the open-hearth furnace is used, the elimination of the phosphorus may be effected before that of the carbon, and it is asserted that if the carbon goes before the phosphorus is got rid of, a further addition of carbon is necessary. A curious and subtle case of chemical equilibrium is here presented. In the open-hearth furnace and Bessemer converter respectively, the temperatures and pressures are different, and the conditions as to the presentation of oxygen to the fluid bath are not the same. The result is that the relative rates of oxidation of the phosphorus and carbon are different in the two cases, although in either case, with a given method of working, there must be a ratio between the phosphorus and carbon in which they disappear simultaneously. The industrial bearing of the question is very remarkable. In the basic Bessemer process the tendency of the phosphorus to linger in the bath renders an "after-blow" necessary, it may be only of a few seconds' duration, but much iron is nevertheless burnt and wasted, and Mr. Gilchrist tells me that if this after-blow could be avoided, a saving of some 6% of the yield of steel would be effected annually; the value of which, at the present rate of output and price of steel, is no less than a quarter of a million sterling.

The volatilization of sulphur in the converter while it is retained by the steel in the open-hearth furnace, and the increase in the percentage of manganese, which leaves the slag and returns to the bath of metal in the converter at the end of the "blow," will probably be traced to the disturbance of equilibrium which attends very slight variations in the conditions, especially as regards temperature and pressure, under which the operations are conducted. In the blast furnace the reducing action must be greatly dependent on the rate at which alkaline cyanides are formed, and Hempel has recently shown, by the aid of well-devised experiments, that the quantity of cyanides which may be obtained at a high temperature from carbon, nitrogen, and alkaline oxides, increases as the pressure becomes greater.

Metallurgical chemistry is, in fact, a special branch of chemical science which does not come within the ordinary sphere of the academic teaching of chemistry. It is often urged that metallurgical practice depends upon the application of chemical principles, which are well taught in every large center of instruction in this country, but a long series of chemical reactions exist which are of vital importance to the metallurgist, though they are not set forth in any British manual of chemistry, nor are they dealt with in courses of purely chemical lectures. I feel bound to insist upon this point, because, as examiner in metallurgy for the Science and

* Presidential address to the Chemical Section of the British Association, August 20th, 1891.

Art Department, I find that purely analytical and laboratory methods are so often given in the belief that they are applicable to processes conducted on a large scale, and at high temperatures.

We are told that technical instruction should be kept apart from scientific education, which consists in preparing the student to apply the results of past experience in dealing with entirely new sets of conditions, but it can be shown that there is a whole side of metallurgical teaching which is truly educational and leads students to acquire the habit of scientific thought as surely as the investigation of any other branch of knowledge.

It is, in fact, hardly possible in a course of theoretical chemistry to devote much attention to specific cases of industrial practice in which reactions are incomplete, because they are limited by the presence of bodies that cannot be directly eliminated from the chemical system. Take, for instance, the long series of reactions studied by Plattner, who published the results of his investigations in his celebrated treatise. *Die Metallurgische Röstprozesse*, Freiberg, 1856, whose work I have chosen as a starting point on account of our presence in South Wales, near the great copper-smelting district of Swansea. A complex sulphide, of which copper is the main metallic constituent, contains some 50 oz. of silver to the ton. The problem may be supposed for the present to be limited to the extraction of the precious metal from the mass in which it is hidden, and the student deriving his knowledge from an excellent modern chemical treatise would find the case thus stated:

"Ziervogel's process depends upon the fact that when argentiferous copper pyrites is roasted, the copper and iron sulphides are converted into insoluble oxides, while the silver is converted into a soluble sulphate which is dissolved out by lixiviating the roasted ore with hot water, the silver being readily precipitated from this solution in the metallic state."

It is certain that if an observant, chemically-trained student visited a silver-extraction works, and possessed sufficient analytical skill to enable him to secure evidence as to the changes that occur, he would find a set of facts which his training had not enabled him to predict, and he would establish the existence of a set of reactions to the nature of which his chemical reading had hardly given him a clue. The process to be considered is a simple one, but it is typical, and applies to a large proportion of the 7,000,000 oz. of silver annually obtained in the world from cupriferous compounds. He would be confronted with a ton or more of finely divided material spread in a thin layer over the bed of a reverberatory furnace. Suppose the material is what is known as a complex regulus as imported into Swansea or produced at Freiberg, to which are added rich native sulphides. The mixture then consists of sulphides mainly of iron and copper, with some sulphide of lead, and contains 50 or 60 oz. of silver to the ton, and a few grains of gold. It may also contain small quantities of arsenic and antimony as arsenides, antimonides and sulpho-salts, usually with copper as a base.

The temperature of the furnace in which the operation is to be performed is gradually raised, the atmosphere being an oxidizing one. The first effect of the elevation of the temperature is to distil off sulphur, reducing the sulphides to a lower stage of sulphurization. This sulphur burns in the furnace atmosphere to sulphurous anhydride (SO_2), and coming in contact with the material undergoing oxidation is converted into sulphuric anhydride (SO_3). It should be noted that the material of the brickwork does not intervene in the reactions, except by its presence as a hot porous mass, but its influence is, nevertheless, considerable. The roasting of these sulphides presents a good case for the study of chemical equilibrium. As soon as the sulphurous anhydride reaches a certain tension the oxidation of the sulphide is arrested, even though an excess of oxygen be present, and the oxidation is not resumed until the action of the draught changes the conditions of the atmosphere of the furnace, when the lower sulphides remaining are slowly oxydized, the copper sulphide being converted into copper sulphate mainly by the intervention of the sulphuric anhydride formed as indicated. Probably by far the greater part of the iron sulphide only becomes sulphate for a very brief period, being decomposed into the oxides of iron, mainly ferric oxide, the sulphur passing off. Any silver sulphide that is present would have been converted into metallic silver at the outset were it not for the simultaneous presence of other sulphides, notably those of copper and of iron, which enables the silver sulphide to become converted into sulphate. The lead sulphide is also converted into sulphate at this low temperature. The heat is now raised still further, with a view to split up the sulphate of copper, the decomposition of which leaves oxide of copper. If, as in this case, the bases are weak, the sulphuric anhydride escapes mainly as such; but when the sulphates of stronger bases are decomposed the sulphuric anhydride is to a great extent decomposed into a mixture of sulphurous anhydride and oxygen. The sulphuric anhydride resulting from the decomposition of this copper sulphate, converts the silver into sulphate, and maintains it as such, just as, in turn, at a lower temperature, the copper itself had been maintained in the form of sulphate by the sulphuric anhydride eliminated from the iron sulphide. When only a little of the copper sulphate remains undecomposed, the silver sulphate begins to split up, and the furnace charge must therefore be immediately withdrawn, or the whole of the silver sulphate would be converted into metallic silver, partly by the direct action of heat alone, and partly by reactions such as those shown in the following equations:

$$Ag_2SO_4 + 4Fe_3O_4 = 2Ag + 6Fe_2O_3 + SO_2$$
$$Ag_2So_4 + Cu_2O = 2Ag + CuSO_4 + CuO.$$

If the charge were not withdrawn, the silver would thus be effectually removed from the solvent action of water, and the smelter's efforts would have failed entirely. The charge still contains lead sulphate, which cannot be completely decomposed at any temperature attainable in the roasting furnace, except in the presence of silica, and it is well to leave it where it is if the residue has subsequently to be smelted with a view to the extraction of the gold. The elimination of arsenic and antimony gives rise to problems of much interest, and again confronts the smelter with a case of chemical equilibrium. For the sake of brevity it will be well for the present to limit the consideration to the removal of antimony, which may be supposed to be present as sulphide. Some sulphide of antimony is distilled off, but this is not its only mode of escape. An attempt to remove antimony by rapid oxidation would be attended with the danger of converting it into insoluble antimoniates of the metals present in the charge. In the early stages of the roasting it is therefore necessary to employ a very low temperature, and the presence of steam is found to be useful as a source of hydrogen, which removes sulphur as hydrogen sulphide, the gas being freely evolved. The reaction $Sb_2S_3 + 3H_2 = 3H_2S + 2Sb$ between hydrogen and sulphide of antimony is, however, endothermic, and could not, therefore, take place without the aid which is afforded by external heat. The facts appear to be as follows: Sulphide of antimony, when heated, dissociates, and the tension of the sulphur vapor would produce a state of equilibrium if the sulphur thus liberated were not seized by the hydrogen and removed from the system. The equilibrium is thus destroyed and fresh sulphur is dissociated, the general result being that the equilibrium of the system is continually restored and destroyed until the sulphide is decomposed. The antimony combines with oxygen and escapes as volatile oxide, as does also the arsenic, a portion of which is volatilized as sulphide.

The main object of the process which has been considered is the formation of soluble sulphate of silver. If arsenic and antimony have not been eliminated, their presence at the end of the operation would be specially inconvenient, as they give rise to the formation of arseniate and antimoniate of silver, insoluble in water, which may necessitate the treatment of the residues by an entirely different process from that which has hitherto been considered. It will have been evident that effecting this series of changes demands the exercise of the utmost skill, care and patience. The operations beginning at a dull red heat, or a temperature of some 500°, are completed at 700°, within a range, that is, of 200°.

Judicious stirring has been necessary to prevent the formation of crusts of sulphates, which would impede the reactions, and, as has been shown, an undue elevation of temperature within a very limited range would, at any stage, have been fatal to the success of the operation. It is difficult to appreciate too highly the delicacy of sight and touch which enables an operator to judge by the aid of rough tests, but mainly from the tint of the streak revealed when the mass is rabbled, whether any particular stage has or has not been reached, and it will be obvious that the requisite skill is acquired solely by observation and experiment. The technical instructor may impart information as to the routine to be followed and the appearance to be observed, but scientific knowledge of a high order can alone enable the operator to contend with the disturbing influences introduced by the presence of unexpected elements or by untoward variations in temperature. In the training of a metallurgist it is impossible to separate education from instruction, and the above description of a very ordinary operation will show the intimate relations between science and practice which are characteristic of metallurgical operations. Practice is independent of science for its advancement, but scientific workers too often hesitate to attack metallurgical problems, and to devote the resources of modern investigation to their solution, because they are not aware of the great interest of the physical and chemical problems which are connected with many very simple metallurgical processes, especially with those that are conducted at high temperatures.

Proceeding yet one step further, suppose that the copper smelter takes possession of the residual mass, consisting mainly of oxide of copper, he would smelt it with fresh sulphide ores and obtain, as a slag from the earthy matter of the ore, a ferrous silicate containing some small proportion of copper. The displacement of the copper from this silicate may be effected by fusing it with sulphide of iron, a fusible sulphide of iron and copper being formed which readily separates from the slag. By this reaction some 20,000 tons of copper are added to the world's annual production. Proceeding a step further, suppose the smelter to have reduced his copper to the metallic state. If arsenic had been originally present in the ore, and had not been eliminated entirely in the roasting, extraordinary difficulties will be met with in the later stages of the process, in extracting small quantities of arsenic which resist the smelter's efforts. Copper, moreover, containing arsenic cannot be "overpoled," as the presence of arsenic hinders the reducing action of gases on the copper. The amount of arsenic which the copper smelter has to remove may vary from mere traces up to 1%, and if the copper is destined for the use of the electrical engineer, he will insist on its being as pure as possible, for the presence of a trace of arsenic would materially increase the electrical resistance of the copper, and would be fatal to its use in submarine telegraphy. If, on the other hand, the copper is intended for the maker of locomotive fire-boxes, he will encourage the retention of small quantities of arsenic, as it is found to actually increase the endurance of the copper, and the smelter will in such a case have no inducement to employ the basic furnace lining which Mr. Gilchrist has offered him, nor will he care to use the special methods for the removal of arsenic with which he is familiar. It may all seem simple enough, but the modern process of copper smelting has been laboriously built up, and has a long and interesting pedigree which may be traced to at least the eighth century, when Geber described the regulus "coarse metal" as being "black mixed with livid," and our familiar "blue metal" as being "of a most clean and pleasant violet color," and indicated the reason for the difference.*

(To be concluded.)

Density of Hydrogen, Oxygen and Nitrogen.—In a note read before L'Académie des Sciences, M. A. Leduc asserts that the density of hydrogen, oxygen and nitrogen is, respectively, 0·0695, 1·1050 and 0·972, thus making the oxygen present in the atmosphere 23·235 by weight and 21·026 by volume. The atomic weight of nitrogen would accordingly be 13·99, and that of oxygen 15·905, instead of 16.

*It must not be supposed that when commercially pure copper has on the furnace bed, ready to be transferred to molds, that its turbulent career of reactions is over. It might be thought that the few tenths per cent. of impurity, dissolved oxide and occluded gas, are so far attenuated by distribution that their interactions must be insignificant. This is far from being the case. I believe the bath of metal is seething from its reaction until the copper is solid and then polymerization proceeds. There may not be a sharply defined, critical range of temperature within which the metal can alone be successfully worked, and which varies, as regards its starting-point, with the kind of impurity present, as is the case with steel; but evidence of molecular change in the solid metal is afforded by the pyrometric curves of cooling referred to subsequently, and by the singular behavior as regards electrical resistance of various samples of copper in which chemical analysis hardly reveals a difference.

PERSONAL.

Mr. C. S. Batchelder, assayer and chemist, of Eureka, Nev., has removed to Salt Lake City, Utah, where he intends to open an office.

Mr. J. N. Wright, superintendent of the Calumet and Hecla mine, has returned to his post at Calumet, Mich., after a year's sojourn in Southern France.

Mr. L. H. Withey, of Grand Rapids, Mich., president of the Crescent Mining Company, Park City, Utah, was in Salt Lake City last week attending the annual meeting of the company.

Dr. P. A. H. Franklin, president of the Niagara Mining and Smelting Company, of Bingham Cañon, Utah, who has been ill for some months past at Chicago, Ill., has returned to Salt Lake City.

Colonel W. J. Sutherland, president of the Holmes Mining Company, at Candelaria, Nev., and managing director of the Candelaria Water-Works and Milling Company (Limited) of London, has returned from England.

Prof. N. S. Shaler has been appointed Dean of the Lawrence Scientific School, of Harvard University, Cambridge, Mass., from which position Prof. Chaplin recently resigned to accept the Directorship of Washington University, St. Louis, Mo.

Mr. Theodore Wetzel, Jr., has been appointed superintendent of the Derbec drift mine, near Nevada City, Cal., to succeed the late S. Galavotti, an account of whose untimely death was printed in the ENGINEERING AND MINING JOURNAL, of September 26th.

Prof. Ward, mineralogist and scientist of Rochester, N. Y., has offered to send his entire collection of geological specimens to the World's Columbian Exposition. At the Centennial exposition Prof. Ward was allotted a space of 120 × 130 ft. for the exhibition of his collection.

Prof. Traill Green, M. D., LL. D., dean of the Pardee Scientific Department, and head of the Chemical Department of Lafayette College, at Easton, Pa., has retired from active service in the institution owing to advanced years. He has been made professor emeritus of the Chemical Department.

Mr. C. H. Rockwell, general superintendent of the Columbus, Hocking Valley & Toledo Railroad, will retire to accept the position of general superintendent of the Chicago & Eastern Illinois and Chicago & Indiana coal roads, his resignation taking effect in November. His headquarters will be in Chicago.

At the meeting of the Academy of Natural Sciences, at Philadelphia, Pa., on the 20th inst., the Committee on the Hayden Memorial Geological Fund reported that they had decided to award the Hayden medal and accompanying fund this year to Prof. Edward Drinker Cope, in recognition of his numerous and valuable researches in the domain of geology and paleontology. This is the second award of this medal of honor, the first having been made to Prof. James Hall, the veteran geologist of New York and pioneer in the field of American paleontology. The Committee on Award this year consists of Dr. Persifor Frazer, Prof. J. P. Lesley, Prof. William B. Scott, of Princeton; Mr. Benjamin Smith Lyman, and Prof. Angelo Heilprin, chairman. The Hayden Memorial Geological Fund of the Academy of Natural Sciences was founded in 1888 by Mrs. Emma W. Hayden, in commemoration of her husband, the late Prof. Ferdinand V. Hayden, one of the organizers, and for a long time director, of the United States Geological Survey. According to the terms of the trust, a medal and the balance of the interest arising from the fund are to be awarded annually for the best publication describing the exploration, discovery or research in the sciences of geology and paleontology, or in such particular branches thereof as may be designated. The recognition is not confined to American naturalists.

OBITUARY.

Robert Briggs died suddenly on the 10th inst. at San Francisco. Mr. Briggs went to the Pacific Coast 30 years ago and settled at Angels' Camp, Calaveras County, Cal. He located in Nevada in 1864, and became well known in mining circles, his principal interests being in the Monitor and Bull Run mines. From 1880 to 1887 he represented White Pine County in the Nevada Legislature. About two years ago he went to San Francisco to live.

Stephen Fleming died at Spokane Falls on the 9th inst., aged 40 years. He was well known in the West, where he had been engaged in the mining industry for a long time. He was instrumental in several large deals, notably in the purchase of the Blue Bird mine in Silver Bow County, Mont., he at the time acting for Mr. Van Zandt. Mr. Fleming was in the Black Hills in early days, and in Colorado in different sections, especially Leadville, where he managed some large properties. He was in the Cœur d'Alene country during the excitement, but did not remain there very long. At the time of his death he was erecting a gold mill in the neighborhood of Hope, Idaho, where he had made some mining investments.

Joel Bennett Harris died in Rutland, Vt., on the 20th inst., aged 69 years. He entered the Rensselaer Polytechnic Institute at Troy, in 1840, and was graduated as a civil engineer. He was engaged as a civil engineer from 1842 to 1853, and as a railroad contractor from 1853 to 1860. He did the grading, masonry work, bridging and track-laying on the New York, New Haven & Springfield Railroad, the Boston & Albany, the Harlem and other roads. He lived for several years in Springfield, but went to Rutland in 1860, where he was engaged in the car wheel and general foundry business. In 1882 the business was reorganized as the Harris Manufacturing Company, and has since been conducted with Mr. Harris as president. He was also president of the Springfield Foundry Company.

John Baird died in New York on the 18th inst., aged 71 years. When 20 years of age Mr. Baird moved from Scotland to Canada, and began the study of mechanics. In 1842 he came to the United States, settling in Troy, N. Y. He was employed as mechanical designer in the Burden Iron Works in that city. By his mastery of all branches of iron designing he soon raised himself to be manager of the shops. In 1850 he became general manager in the Delamater Iron Works. The Cromwell Steamship Company employed him in 1857 to design iron steamships intended to run between this city and New Orleans. For this company, under Mr. Baird's direction, and from his designs, was built the first iron steamship ever launched on this side of the Atlantic. Every ship of the Cromwell line's present fleet was built from his designs. He remained in the employ of this company for twenty years. In 1887 Mr. Baird became vice-president of the Metropolitan Elevated Railway Company. He was the executive officer under whose supervision the construction of the Sixth and Second avenue lines was carried on. After the elevated railroad lease to the Manhattan, Mr. Baird retired from the vice-presidency, and from that time until within a few months of his death had employed himself in patenting inventions relating to engines and boilers. He made more than thirty such inventions, five of which he had received the patents for within the last two months of his life.

SOCIETIES.

The Engineers' Club of this city has on its roll 261 resident and 287 non-resident members.

The American Society of Civil Engineers will in future hold its meetings on the third Wednesday of the month. Meetings will be called to order promptly at 20 o'clock, and reading and discussion of papers will continue until 21 o'clock, when a collation will be served and opportunity given for social intercourse.

The National Street Railway Association opened its 10th annual convention at Pittsburg, Pa., on the 21st inst., President Henry M. Watson in the chair. Three hundred delegates and about 700 supply men were in attendance. Mayor Gourley, of Pittsburg, welcomed the delegates, after which President Watson spoke at length upon the history and prospects of the association.

The American Gaslight Association opened its 19th annual meeting in New York on the 21st inst., with William Henry White, of New York, the First Vice-president, in the chair in the absence of President John P. Harbison, of Hartford, Conn. The minutes of the preceding meeting were read and approved, and the report of the Council upon the application for and transfer of membership heard. Fifty-two new members were admitted by the payment of the initiation fee, thus making the number of members 428. The report of the treasurer showed the association to be in good condition. The Special Committee which was appointed at the last meeting to consider the advisability of making an exhibit at the World's Fair in the name of the association reported adversely to such action, stating that the better plan apparently was for the members to make individual exhibits when practicable. The Nominating Committee made its report, and the list of officers prepared by them was elected by the secretary's ballot. The officers elected are as follows: President, William Henry White of New York; vice-presidents, A. E. Boardman of Macon, Ga.; W. H. Pearson of Toronto, Canada; Walton Clark, of Philadelphia; secretary and treasurer, A. B. Slater, Jr., of Providence, R. I. The Council, C. H. Nettleton, of Birmingham, Conn.; James Somerville, of Indianapolis; A. W. Littleton, of Quincy, Ill.; Frederick Egne, of New York; Joseph B. Crockett, of San Francisco; C. J. R. Humphries, of Lawrence, Mass.; John Young, of Allegheny, Pa., and Irvin Butterworth, of Columbus, O.

INDUSTRIAL NOTES.

The Chester Foundry and Machine Company, of Chester, Pa., made an assignment on the 20th inst. It is reported that the company has made no money for some time past.

The Lawrence Cement Company's mill, warehouses, cooper shop, and other buildings at Binnewater, N. Y., were burned on the 17th inst. The loss was $300,000; insurance $100,000.

Messrs. William Hoskins & Co., of Chicago, Ill., manufacturers of hydrocarbon blow pipes and furnaces, inform us that among their recent shipments was a large plant to the Mammoth Mines, Arizona; the third plant for the University of Alabama; and six complete outfits for Japan.

The Berlin Iron Bridge Company, of East Berlin, Conn., has received the contract for a new blacksmith shop building for the Dixon Manufacturing Company, of Scranton, Pa. Owing to the peculiar formation of the ground the building will be in the form of a letter L, and will be 60 ft. wide by 235 ft. long, constructed entirely of iron.

The McCosh Iron and Steel Company, operating a large plant at Burlington, Ia., is said to be in trouble financially. On the 20th inst. the creditors of the concern brought suit for the appointment of a receiver and the sale of the property, to satisfy a mortgage on a trustee's deed to the amount of $225,000 and interest since September 1st, 1890.

A meeting of the diamond workers in New York on the 21st inst. was held to organize a union under the auspices of the New York Federation of Labor. There are only 56 diamond workers in this country, and they say that although their wages are nominally good, they are made to pay for bench room, and suffer so many deductions for alleged cutting off too much diamond that they really receive only a mere pittance.

The Blandon Iron and Steel Company, of Blandon, Pa., suspended payment on the 19th inst. The company was incorporated under the laws of New Jersey in April last with an authorized capital stock of $100,000, succeeding to the business of the Blandon Rolling Mill Company. Eugene L. Froment was president and Charles B. Froment, vice-president and manager. The business has been running about four years.

The Calumet Iron and Steel Company, manufacturers of bar iron, angles, splice bars, etc., whose rolling mill is at South Chicago, shut down October 17th on account of the prevailing low prices of the finished material made by it. When, in the opinion of the officers of the company, business becomes active and prices advance they will resume, but not until then. They further add that business during the past year has been unprofitable and that they might as well shut down now as at the close of the year.

The directors of the American Tin Plate Company held a meeting at Anderson, Ind., on the 18th inst., and let the contracts for the erection of a tin plate mill at Elwood, Ind. The construction of the buildings will begin at once, and the works, it is said, will be in full operation next spring. The officers of the company are A. L. Conger, Akron, O., president; John F. Hazen, Cincinnati, vice-president; W. B. Leads, Richmond, treasurer; Charles S. Tarlton, Indianapolis, secretary.

The trial of a suit brought by the Phœnix Bridge Company against the Keystone Bridge Company and several other bridge companies to prevent its expulsion from the American Bridge Manufacturers' Association, and to prevent the forfeiture of its $40,000 interest in a fund established by the trust, was begun on the 21st inst. in New York, before Judge Beach, of the Supreme Court, Special Term. At the organization of the trust a fund was started for the purpose of carrying out its objects by a levy of entrance fees. It was to be increased by the payment of four-tenths of a cent a pound by the members of the trust on all iron shipped from each manufactory. The Phœnix company, under the articles of the association, obtained exemption from this payment on a large amount of iron it was to furnish for the Kings County Elevated Railroad in Brooklyn. The officers of the association alleged that an excess beyond the exempted amount was furnished, and that on that the Phœnix company was bound to pay a tax amounting to about $33,000. The Phœnix company refused to pay, and its expulsion from the trust and the forfeiture of its share in the fund were threatened. An injunction was granted some months ago to prevent the carrying out of this threat until the case could be tried.

On the 15th inst. a conference was held between Chas. M. Schwab, general manager of the Edgar Thomson Steel Works of Carnegie, Bros. & Co., Limited, Bessemer, Pa., and a committee of workmen of the converting department of the plant. The conference was for the purpose of arranging the scale of wages to be paid the men in that department, to go into effect on January 1st of the coming year. The scale now in force expires on the last day of this year. The conference lasted all day, and a scale of wages was agreed upon, but was not made public. From some of the workmen, however, information was obtained that some very heavy reductions have been made. Under the old scale the steel melters were paid $1.06 per 100 tons; the new scale, as first submitted by the firm, asks them to accept 62½ cents per 100 tons, or nearly 50% of a reduction. The men compromised by accepting 65 tons per 100 cents. Under the

old scale they made $195 a month, and by the reduction they will earn about $117.50. The vessel repairers were reduced from 37 cents per 100 tons to 26 cents. Under the old scale wages were about $150 per month, while under the new one they will earn about $100 per month. It is stated that the vesselmen will suffer the greatest reduction. They have been making about $200 per month, and it is said that the new scale reduces their wages about 50%. On the 7th inst. the scale for the blooming mill was arranged. It is stated that the ladlemen have been reduced from $1.19 per 100 tons to 89 cents. Other departments have been reduced in proportion. It is probable that the scale for the rail department will be taken up at once and will probably be adjusted to the satisfaction of both sides. From present indications there will be no trouble of any kind over the arrangement of the new scale, as the men realize that the introduction of new and improved machinery will permit of their making a greater tonnage, and while their wages have been considerably reduced they will still have the benefit of an increased output. It is probable that within a week or 10 days at the furthest the scale for the entire plant will be agreed upon and adopted.

SOUTHERN INDUSTRIAL NOTES.

(From our Special Correspondent.)

The Ashland Fire Brick Works, of Ashland, Ky., has declared a 5% dividend.

The Portsmouth Fire Brick Company, of Portsmouth, O., has made large purchases of fire clay lands in Carter County, Ky., and will erect additional works at a point near Olive Hill.

The Mary Lee Coal and Railroad Company's roundhouse at East Birmingham, Ala., was recently burned. No rolling stock was destroyed, though some freight cars were slightly damaged.

The Irondale Glass Works have been incorporated under the laws of New York, with G. M. Urie, president, and H. A. Rice, secretary and treasurer. It is proposed to erect a $40,000 plant at Irondale, Ala., near Birmingham. The capital stock is $100,000.

The Norton Iron Works' furnace is being relined to run on Bessemer pig iron. The Sarah Furnace at Ironton, O., has been purchased by the Kelly Nail and Iron Company, and will be prepared as rapidly as possible to commence the manufacture of Bessemer pig iron. The product of both of the above furnaces will be used by the Ashland Steel Company.

The Ashland Steel Company, of Ashland, Ky., will commence active operations about December 1st. Mr. I. A. Kelly, vice-president of the Kelly Nail and Iron Company, of Ironton, O., will move to Ashland, Ky., and, as president of the steel company, be in full charge. The works proper have been completed by the contractors and there will now be erected machine shop, laboratory and office. The trestles are about completed and the work on tracks will be commenced at once.

MACHINERY AND SUPPLIES WANTED AT HOME AND ABROAD.

If any one wanting Machinery or Supplies of any kind will notify the "Engineering and Mining Journal" of what he needs, his "Want" will be published in this column, and his address will be furnished to any one desiring to supply him.

Any one wishing to communicate with the parties whose wants are given in this column can obtain their addresses from this office.

No charge will be made for these services

We also offer our services to foreign correspondents who desire to purchase American goods, and shall be pleased to furnish them information concerning goods of any kind, and forward them catalogues and discounts of manufacturers in each line, thus enabling the purchaser to select the most suitable articles before ordering.

All these services are rendered gratuitously in the interest of our subscribers and advertisers; the proprietors of the "Engineering and Mining Journal" are not brokers or exporters, nor have they any pecuniary interest in buying or selling goods of any kind.

GOODS WANTED AT HOME.

2,415. A surveyor's compass with telescope, pin, chain and other paraphernalia. Kentucky.

2,416. A noiseless, smokeless dummy and one closed car. Engine must be able to pull two loaded passenger cars over 6% grade and 60° curve. North Carolina.

2,418. Brick machinery. Georgia.

2,420. A 5-stamp mill without engine or boiler, but complete in all other particulars. Stamps to weigh about 750 lbs. New or second-hand, in good order. Alabama.

2,421. A rock crusher. Alabama.

2,422. A pumping engine and stand-pipe of largest diameter, 40 ft. high; 1,700 ft. pipe to connect pump with stand-pipe, and about 10,000 ft. of pipe for main. Texas.

2,423. Equipment for a cotton tie plant and merchant bar rolling mill, including a puddling mill plant, 12 or 16-in., three high train of rolls and a cotton tie mill, with all shears, buckles, machines, and everything complete. Texas.

2,425. Equipment for a small electro-plating establishment, such as may be enlarged to meet increased business from time to time. Virginia.

2,427. Hose and reels for a fire department. Alabama.

2,428. A 10-H. P. stationary engine and boiler for running a moss factory; give prices, discounts, etc. Florida.

AMERICAN GOODS WANTED ABROAD.

2,417. Steel engravings. A Spanish correspondent wants to know the cost of putting up an establishment for engraving and printing bank bills, bonds, etc., on a moderate scale. New York.

2,419. A correspondent who is largely interested in the mining industry of South Africa wants catalogues and price lists of everything connected with mining or milling, and in all branches of gold, silver, copper, coal, petroleum, etc. South African Republic.

2,424. A stove polish machine of about 100 lbs. an hour output. Canada.

GENERAL MINING NEWS.

The shipments of iron ore from the Gogebic range of Lake Superior for the season, up to October 14th, aggregated 1,160,064 tons. From the Vermilion range during the same period the shipments aggregated 740,092 tons. The two Menominee range mines which made reports show outputs during a like period as follows: Ludington, 116,164 tons; Hamilton, 46,065 tons.

The *Marine Review* claims to have secured from official sources lake shipments of iron ore from the different Lake Superior ports. It places the aggregate on October 1st at 5,066,860 gross tons, as against 6,479,975 gross tons on the corresponding date in 1890, or a decrease of 1,413,115 tons. On September 1st, a month ago, the difference was 1,505,000. The September movement, 1,112,350 tons, was much larger than it was expected it would be, but in considering the difference in the shipments this year and those of a year ago, consideration must be given to the fact that about 800,000 tons was shipped by rail last season, while rail shipments this season will be very light on account of the refusal of the railway companies handling the ore between the mines and lake ports to allow their cars to be used for rail shipments while a rush to get ore to lake forwarding ports was in progress. On this account it can be said that a very large portion of the ore that would under ordinary conditions have gone by rail has helped to swell lake shipments. It is now about certain that the total output of the mines will be in the neighborhood of 6,500,000 tons, as against 9,000,000 tons in round numbers last season.

TENNESSEE COAL, IRON & RAILROAD COMPANY.—The output of the Tracy City Division of this company for the month of September was 37,455 tons of coal. Shipments for the month were: Coal, 16,922 tons; coke, 12,396 tons; total, 29,318 tons. From January 1st, 1891, the output is 295,483 tons, and shipments as follows: Coal, 149,860 tons; coke, 94,064 tons; total, 243,924 tons.

ALABAMA.

(From our Special Correspondent.)

VIRGINIA & ALABAMA COAL COMPANY.—This company has recently made a contract to furnish 50,000 tons of coal from its Patton mines to the Mobile & Ohio Railroad. To comply with this contract, as well as a former contract to furnish the Central Railroad of Georgia with coal, will give this company an immediate market for all the coal that it can put out.

CALHOUN COUNTY.

(From our Special Correspondent.)

WOODSTOCK IRON COMPANY.—The stockholders of this company, at a meeting on the 15th inst., adopted a resolution calling on the stockholders for a loan of $2 per share, to be used in equipping the furnace and securing a fund for working capital. The president submitted a plan showing that coke furnace No. 3 has been running at a profit since it was blown in about two months ago. A proposition to lease the furnace was also submitted and referred to the directors, who will report at a meeting of the stockholders on the 3d of November.

TUSCALOOSA COUNTY.

TUSCALOOSA COAL, IRON AND LAND COMPANY.—A dispatch from from Tuscaloosa says that a contract was closed on the 20th inst., between F. M. Abbott, representing Pennsylvania capitalists, and this company, whereby the former undertake to build a railroad from deep water at Tuscaloosa northward to the coal fields. They also contract to build a coke plant at Tuscaloosa.

WALKER COUNTY.

(From our Special Correspondent.)

CORONA COAL COMPANY.—Work in the new shaft of this mine has been commenced, and the railroad to Slope No 3 completed. Some improvements have been made in the method of transportation and handling the coal to meet the increased output.

SHEFFIELD LAND, IRON AND COAL COMPANY.—At a recent meeting of the stockholders of this company at Memphis, Tenn., negotiations with Wm. Duncan and associates were concluded, resulting in the sale of the company's property, an option upon which had been previously secured A new company will be organized, which will make many improvements at Sheffield.

ARIZONA.

PIMA COUNTY.

PEER MINING COMPANY.—The weekly letter from this company filed at the San Francisco Stock Exchange last week, said: On the 100-ft. level near the north end, also from the open stopes near the same point, ore of good grade continues to be extracted and other stopes will soon be opened at this end at points where ore of good grade has been exposed. Preparations are being made to connect this point with the main openings leading to the mill for handling ore. The stopes on the 50 and 100-ft. levels from shaft No. 1 are furnishing the regular amount of ore of good quality.

PINAL COUNTY.

MAMMOTH GOLD MINES, LIMITED.—The bullion product for the month of September was $15,500. Tons of ore crushed, 1,696. The mill ran 18 days. The expenses for the month were $9,800. The manager reports that the mine is looking well and that everything is going satisfactorily.

MINERAL KING MINING COMPANY.—The superintendent of this company, Mr. C. Wilfert, says that the new strike promises a sufficient supply of ore to start up the smelter, and it will probably be blown in very shortly. The discovery of a new body of ore in the Silver King mine to the east of the former workings leads to the belief that the main ore body may yet be found on the Crispin mine, which adjoins the Silver King on the east and belongs to the Mineral King company.

CALIFORNIA.

NEVADA COUNTY.

(From our Special Correspondent.)

WYOMING CONSOLIDATED MINING COMPANY.—Less than a month ago the 2-ft. vein of quartz cut by the drift being run to the Powning incline, to connect for ventilating purposes, encouraged the management, and now it is pretty conclusively proved that there are three veins all close together. The ore showed well in free gold, galena, and sulphurets, and active work is being prosecuted to define the extent of the chute.

SANTA BARBARA COUNTY.

(From our Special Correspondent.)

SANTA BARBARA ASPHALT COMPANY.—The mine of this company at La Patera has only been opened about 12 months, and during that time over 200,000 tons of asphaltum have been taken out.

SAN BERNARDINO COUNTY.

SAN JACINTO ESTATE, LIMITED.—Hugh Stephens, an officer of this company, writes from Temescal to the *National Provisioner*, under date Oct. 6, and says that so far about 25 tons of tin metal have been produced and shipped to the agents of the company, W. W. Stewart & Co., of San Diego, in quantities of from 2 to 8 tons. Much of this tin has been sold in San Francisco, Chicago and Philadelphia, and the purchasers are greatly pleased with its uniformly pure quality. He explains the small output in a long detailed statement of the business difficulties which have been experienced, but says that though only one tin lode has been thoroughly tested, fresh lodes are being opened, and a new stamp mill, consisting of two pneumatic stamps capable of crushing 70 or 80 tons of ore daily, was erected and began work in September. The output will, therefore, no doubt soon be vastly increased. He totally denies that the "truck" system is, or ever has been, in use at the mine, or that preference is given to Cornishmen over Americans in selecting employés. There are only 20 Cornish men among the 110 men employed, and most of these have been in this country over 15 years.

TRINITY COUNTY.

The San Francisco *Post* of the 16th inst. says that there is some talk now about a compromise in the litigation over the ownership of the Altoona quicksilver mines, in order to effect a sale of the property.

COLORADO.

BOULDER COUNTY.

(From an Occasional Correspondent.)

BOULDER, Oct. 17.

With the help of good crops, and fairly good prices for farm products, and with a steadily improving market for our stone and brick—by the way, Boulder produces excellent pressed brick—we feel somewhat more comfortable than we have ever felt before. Our "eggs are no longer all in one basket." Our well-being is not *wholly* dependent on the prosperity of our mines of gold and silver, although these mines are now in better condition, on the whole, than they have been in for years. As announced in my last letter, the Victoria, at Summerville, has entered the list of producers, and is shipping steadily ore that will run 300 ozs. silver per ton, not 30 ozs. as I was made to say in the letter referred to.

The excitement over the rich strikes at Caribou has somewhat abated, but the prospecting due to the discoveries still continues.

Gold Hill is very dull, some of the largest mines being in litigation. Just below, however, on Left Hand Creek there is considerable activity. The

Prussian is reported to be in bonanza, and I am convinced of the correctness of the report. The mine is a good one and paid largely two years ago, but the owners stoped out the ore as fast as they came to it, and sunk the money in other enterprises. When lean ground was encountered—as it is sure to be in every mine—there was no money for development work, and the mine was sold for much less than its real value. The present owner, Mr Cragg, has spent considerable money in putting this and other mines in the immediate neighborhood in shape, and is in a fair way to be well repaid for his outlay. He has just completed a new concentrating mill, and is about to put in a chlorination plant. Mr. C. A. Russell has been appointed superintendent, and will give up his business as deputy mineral surveyor in order to devote his whole time to the management of Mr. Cragg's properties.

Farther up Left Hand, Colonel Brainerd is steadily at work developing his mines and adding to his already enormous holdings. His plans are good; and, as he has plenty of money with which to carry them out, a great success seems certain.

Next comes Mr. Hulings, who has an appalling amount of assessment work to do; his claims covering the hills in all directions. He has leased his Columbia mine and is devoting his time to his outlying claims. The lessees of the Columbia do not say very much, but they are doing well. They have followed a fine body of ore to within a few feet of the boundary and there it stands tantalizingly before them bigger and better than ever. The fortunate owner of the adjoining ground is Senator H. M. Teller. "All things come to him who waits." Senator Teller's property at Ward has increased ten fold in value in the last five years, without the expenditure of a dollar by him.

Adjoining Mr Teller's property is the Madeleine, recently consolidated with the Ni-Wot. The bottom of the Madeleine shaft is in big ore, and I am assured that the grade is excellent. To the east of the properties named above are the East Columbia, Baxter, Boston and Utica. All are on the same vein and all working. On the Baxter a new shaft house is nearly completed, and new machinery is being erected. The old shaft is to be unwatered for the first time in years and put in working order. It is 520 ft. in depth, and is the deepest shaft in Ward District. At some points in the shaft the ground is bad, and there is likely to be trouble from caving. Next to the Baxter comes the Boston, next to the Boston the Utica, which is in bonanza, and is the great producer of the camp at the present time. Mr. Reid, the superintendent, tells me that 65% of the gross product of the mine is profit, and I believe it. The lower workings show an enormous body of ore of excellent quality. Attempts have been made to buy the mine, but the owners ask fifty times what the property cost them, to say nothing of the fact that the cost has already been repaid time after time.

Mr. Reid is also re-opening the Humboldt, an old mine with a good record.

A number of other mines are working at Ward, but I cannot give particulars at the present time.

LAKE COUNTY.

(From our Special Correspondent.)

Bangkok Cora-Belle Mining Company.—It has been deemed the most advisable plan to place a diamond drill in the new shaft of this company, and a start has been made with a contract to sink 725 ft. The shaft is now in white porphyry at a depth of 125 ft. It is conceded, however, from the dip of the ore body in the workings of the old shaft, that it will be met in the new one at about 400 ft. from the surface.

Breece Mining Company.—Sinking on the main shaft continues, and it is now down about 580 ft. from the surface. The bottom is in hard, grey porphyry, very silicious, with iron sulphide disseminated through it. No increase in the volume of water is noticed.

Evening Star Mining Company.—The old Roberts lease of the Evening Star mine has been forfeited, and there are now numerous applicants for the ground. It is expected that a new lease will be granted immediately.

Fanny Rawlings Mining Company.—This shaft has been enlarged and retimbered down to about the 100-ft. level, and a fine plant of machinery is now going up. When this is ready, the cutting out will be resumed, the shaft being about 300 ft. deep, and in iron ore.

Great O'Sullivan.—The shaft on this property has been carried down a further 90 ft., making the total depth a little more than 400 ft. A channel in the limestone was followed, which carries a fair grade of silver-iron, and at that depth drifts have been started, and are already out 25 ft. each. These follow the strike of the channel, which is about north and south. A night shift has been put on to continue the sinking, the day shift driving the drifts ahead. This development is rather a new thing for Rock hill, and is being watched with interest by mining men.

La Plata Mines, Limited.—New contracts for the output of these mines having been made, and there are now about 40 men working under leases on the upper levels. From these quite a deal of lead carbonate ore is being shipped continually, and in block 5 a strike of high-grade ore has just been made. This carries some copper, in addition to 150 oz. of silver per ton and 64% lead. The ore occurs in a natural cave in the blue limestone, into which the lessees were led by following a stringer of the same class for more than 100 feet. The company is doing no work just now, the contract on the raise at the end of the south drift from the 500-foot level having expired. This raise is up about 100 feet through limestone. It is thought that over this stratum and under the porphyry, ore will be met with.

Leadville Consolidated Mining Company.—On the main incline of the Carbonate mine some 40 men are now employed by the different lessees, and a considerable quantity of lead carbonate ore is being mined and shipped. On the north end the Thompson shaft is now down about 110 ft., from which point drifts are being run east and west on a channel in the limestone. From this some 10 tons a day are being shipped, the ore being of an exceptionally high grade for that class.

Morning Star Consolidated Mining Company.—More attention is being paid by this company to the mining of lead carbonate ore than has hitherto been the case, owing to the lapse of contracts for argentiferous iron ores. These, however, are about to be renewed. Some 200 tons of lead carbonate ore have been shipped during the past week from shafts worked by the company, while the ground leased to the Elk Mining Company has put out about 35 tons a day.

Nisi Prius Consolidated Mining Company.—On the Crown Point a great deal of work is going forward from a raise that was made from the south drift from the 550-ft. level. This drift cut through a dyke of porphyry standing nearly vertical, and the raise went up for more than 200 ft. to the east of it before the regular lime-porphyry contact was met with. In this contact some fine lead carbonate ore was encountered in detached bodies, and the present drifting in all directions is for the purpose of finding the main ore chute. The Vivian shaft, on this company's property, is now following a body of argentiferous iron ore in the limestone, at a depth of 300 ft. from the surface. At present this ore is not of much commercial value.

S. Small.—The new strike on the S. Small continues to open up, and some 2 ft. of gray lead carbonate sand, mixed with contact matter, has been gone through. Under this a stratum of white quartzite is coming in, under which it is more than probable the ore body will be found to be more solid and in place.

OURAY COUNTY.

Ironclad Gold and Silver Mining Company.—The directors of this company held a meeting in Denver on the 14th inst., at which it was announced that the block of 100,000 shares, offered for the purpose of raising working capital, had been fully subscribed, the company realizing a $10,000 fund therefrom. Manager Weston will at once begin work with two shifts driving a tunnel on the vein of ore which outcrops nearly on a line with the Bright Diamond vein. Work will begin where the big diorite dike cuts up through the regular formation, within the limits of the Ironclad property. Mr. Philip Argall, M. E., of Denver, has been elected a director to fill the vacancy created by the death of L. L. Higgins.

Mickey Breen Mining Company.—The *Solid Muldoon*, of Ouray, states that the St. Louis management of this company is trying to get an unlimited option on half of the stock at 50 cents per share for a strong home syndicate, believed to be composed of Granite Mountain-Bi-metallic people.

Red Mountain Silver Mines, Limited.—This company has increased its capital stock from £50,000 to £60,000.

Yankee Boy Mining Company.—A pocket of rich ruby silver ore, extent unknown, was struck in the Yankee Boy mine on the 5th inst.

PITKIN COUNTY.

Compromise Mining Company.—This company has decided to drive a cross-cut tunnel 2,500 ft. long to work the Connemara mine to better advantage. The tunnel will be 8 ft. × 8 ft. in the clear, and will be equipped with an electric tramway. It will tap the Connemara shaft at a depth of about 900 ft. The tunnel will run through ground belonging to the Aspen Mining and Smelting Company and thence into the Connemara. The preliminary surveys have already been completed, and it is expected that the work will be finished by June 1st, 1892. It will be in charge of Mr. Geo. W. Lloyd, mining engineer. It is reported that the company has paid dividends to the amount of $360,000 since manager E. M. Ray assumed charge of affairs.

SAN JUAN COUNTY.

Whale Mining Company.—The property of this company, at Silverton, has been attached for $12,000.

SUMMIT COUNTY.

The large dressing works at Kokomo, owned by A. R. Wilfley, burned last week. The loss is estimated at $35,000. The fire is supposed to have been incendiary.

FLORIDA.

MARION COUNTY.

(From our Special Correspondent.)

Dunbar Phosphate Company.—This company has been incorporated with a capital stock of $200,000, by J. Dunbar, Jr., D. J. Sinclair and Oliver Rells. It is proposed to develop phosphate deposits near Citra. The principal office will be at Steubenville, O., with a branch office at Citra.

Wekiva & Withcoloochee Land Company.—Mr. A. P. Mann, Jr., of Ocala, is president of a company which has been formed for the purpose of purchasing the property belonging to this company, comprising over 300 acres of land in Monon and Citrus Counties. The Dunnellon town site is also to be embraced in the purchase. It is the company's purpose to develop the town of Dunnellon in connection with its phosphate lands. Henry Marcotte, of St. Augustine, is vice-president of the company.

IDAHO.

OWYHEE COUNTY.

De Lamar Mining Company, Limited.—During September 1,362 tons of ore were crushed, producing $38,900 bullion; estimated value of shipping ore, $15,000; miscellaneous receipts, $850; total revenue, $54,750; total expenses, $24,530. Everything is reported to be going right at the mine, and good progress is being made with the enlargement of the mill. There are 8,000 cords of wood already stacked.

Poorman Mines, Limited.—The manager reports that a new ore body, 4 in. wide, assaying $992 per ton, has been struck in the Poorman mine. A new strike has also been made in the North Empire. The mines are said to be improving rapidly with development.

ILLINOIS.

VERMILION COUNTY.

A fire occurred on the 17th inst. at the Grape Creek coal mine, No. 5, near Danville. The pump room, engine and cage rooms at the foot of the main shaft were destroyed. The eastern part of the mine, which is not now in operation, is still on fire.

KENTUCKY.

BELL COUNTY.

(From our Special Correspondent.)

It is reported that a Belgian syndicate has purchased over 150,000 acres of coal, iron and timber lands in this section, including the Cumberland Colliery Company's plants at Pineville. Mr. J. H. Allen, of Pineville, has negotiated the sale. It is proposed to speedily develop the property, including building of a railroad, iron furnace, coke ovens, and opening coal mines. The reported capital of the new company is $5,000,000, with $1,000,000 paid in.

LOUISIANA.

CALCASIEU COUNTY.

American Sulphur Company.—This company, which owns a large property in Calcasieu Parish, after boring a number of deep holes to prove the great sulphur bed which underlies a portion of the property, found the very valuable heavy oil which has been flowing for many years, to come from three separate horizons. The first of these is in the sand at a depth of about 160 ft., and the chief source in rock at a depth of about 400 ft. The company is sinking a shaft to the sulphur bed, and in passing through the upper oil bed an enormous quantity (some 2,000 bbls.) came into the shaft before the bed was cut off. This oil is now being carefully prepared for the market and is a very remarkable and valuable product. Whether the proximity of the sulphur has any effect on the oil is not known, but it is certain that the latter possesses very remarkable lubricating properties; it is a sure cure for hot journals, and is used by the company on every class of machinery. The following analysis, made by the distinguished chemist, Dr. Gideon E. Moore, of New York, shows in part the reason for its superior quality in its high temperature volatilizing point: Specific gravity of crude oil, 0·97 (15° B.); sulphur, 0·43%, on distillation yielded 86% of oil, about 16% of which is mineral sperm, for burning in locomotive headlights, or spindle oil, and 71% in machinery lubricating oil of excellent quality, having a boiling point of from 550° F. to over 680° F., and a density from 22° to 26° B. The American Sulphur Company is now preparing this oil, which it styles "Brimstone Oil," very carefully, and offering it in quantity, by tank-cars or carloads, and offers to send samples, etc., to any one desiring to see or test this remarkable product. Thus we are promised a new and important industry in Louisiana. The company, which is controlled by a few rich New York parties, looks to its sulphur as of immense value and this important oil supply as of less importance, though possibly sufficiently valuable to warrant it in providing its own transportation outlet if that should become necessary.

MICHIGAN.

COPPER.

Huron Mining Company.—The following self-explanatory notice has been sent out by the directors of this company. It furnishes abundant food for serious reflection:

To the Stockholders of the Huron Copper Mining Company: After consultation with the Eastern and Lake creditors of the Huron Copper Mining Company, your directors have decided to levy an assessment of $3 per share upon the capital stock of the company, payable at the office of the company in Boston, October 24th, 1891, with interest at 6% from that date. In June, 1890, an assessment of $5 per share was levied, payable July 7th

following. It was thought at the time that this assessment would pay all the debts and leave a balance of assets of over $30,000. The product, however, fell off so rapidly that it was impossible to operate the mine without using a portion of this assessment for that purpose, and therefore a part of the indebtedness remained unpaid. The present unsecured indebtedness of the company is, in round numbers, $160,000, to offset which we have supplies on hand and rock broken in the mine valued at $95,000. This is exclusive of mining machinery and plant, which is valued at $161,559.30, and of the mine itself. December 31st, 1890, the total liabilities of the company as per published report amounted to $220,184.34; to offset this there were cash and copper (valued at 14 cents per pound) amounting to $140,597.02; in addition there were on hand at the mine supplies and rock ready for hoisting valued at $80,449.37. These latter items were not then, and are not now, available for the payment of debts, but are absolutely essential for the working of the mine. Since that time we have added to the amount of supplies on hand $14,759.14, and there has been a shrinkage in the estimated value of copper amounting to about $18,000. There has also been an apparent deficiency in carrying on the business of the company of about $53,000, between January 1st and October 1st, 1891. A large portion of this loss has been owing to the fact that the ground opened was not as productive as expected and hoped for. These openings were principally in the northerly part of the mine. Within a short time, however, the mine has been examined by several well known mining experts of Lake Superior, who unhesitatingly give their opinion that the southerly end of the mine, where there is abundant ground, will pay a profit for working, and all openings now made are in that direction. It June last the drafts of the company went to protest, as the supplies at the mine could not be used to raise money on, and the amount of copper produced was not sufficient to pay running expenses at the mine. The Lake creditors attached the real and personal property of the company last June, since which time it has been operated by your agent with the consent of the attaching creditors. Your directors have strenuously worked to avoid the necessity of calling an assessment, but they have been unable to accomplish this result; and they deem it their duty not to abandon the property to the creditors without giving the stockholders the opportunity of preserving it. The payment of the amount called for will relieve the company from its present difficulties, and leave a balance of assets estimated at over $50,000 (not including mine, mining machinery and plant), which will be necessary for the working of the mine, but will not be available to raise money upon. Your directors are of the opinion that this assessment will result in benefit to all stockholders, inasmuch as it will relieve the property from attachments, and put the directors in position to negotiate with parties who are anxious for consolidating several properties at the Lake, of which the Huron is an important one. Said consolidation would be greatly to the advantage of all concerned.

J. C. Watson,
H. J. Stevens,
D. L. Demmon,
} Directors.

We are informed that at least one half of the stock is held in New York and certain local stockholders are issuing a circular advising all persons interested not to pay this assessment until a special meeting of the company has been called to investigate the affairs of the company and examine its books.

Quincy Mining Company. — Superintendent S. B. Harris, of this company, writes that during September the No. 2 shaft was sunk 26 ft. below the 40th level and that No. 4 shaft was sunk 7 ft. below the 41st level. The man engine was extended to the 28th level during the month. A second reservoir was also made adjoining the first, making a capacity of 1,100,000 galls. Excavation was made for a compressor building, 32 by 80 ft. inside, and this is expected to be built this fall. Work on the addition to the stamp mill progresses very well. The new boilers and pumping engine are expected to arrive this month. A sufficient number of bricks and cement has been ordered for all contemplated work in that direction; also a fire pump and a boiler feed pump. The mine looks well, especially at the south end, which continues to improve.

IRON—MARQUETTE RANGE.

Lake Superior Iron Company.—The directors of this company have authorized the building of two new lake ore carriers. The directors deem it for the best interest of the company to organize their terminal track, equipment, rights of way and buildings into a separate organization to be owned by the Lake Superior Iron Company, and to purchase any additional equipment necessary. Also to open the section 21 and control dock space at Lake Erie ports to handle the company's ores as expeditiously and economically as possible. A special meeting will be held December 23d to vote on a new issue of stock at par to furnish funds for these projected undertakings.

IRON—MENOMINEE RANGE.

According to the *Diamond Drill*, the find recently made by Thos. J. McCusker on the Paint River is situated on section 4, 42-32, about four miles from Crystal Falls. Ore has been uncovered a distance of 15 rods. It lies from one to three feet under the surface. The width of the vein is 75 ft. between the walls, which are soapstone on the west and red slate on the east side. This ore seems to be of good grade. Nothing is being done at present toward further opening the property.

Commonwealth Iron Company.—This company is working but one shaft viz, "D," at its old mine, and is turning out therefrom 200 tons of ore per day. The stock piles contain between 16,000 and 17,000 tons. At the Davidson work has been suspended. During the season the amount contracted for, or 30,000 tons, has been mined and shipped. There is plenty of ore left in the mine, but it is not considered profitable to stock-pile it. The Badger, virtually a new mine, but under the same management, is putting out 1,000 tons daily. The season's production has been 50,000 tons. The deposit is about 700 ft. long, and from 80 to 125 ft. in width. The company's season's output has been variously estimated, ranging between 130,000 and 200,000 tons.

Iron Star Mining Company.—This company is soon to discard the old hoisting plant at its Great Western mine and replace the same with a full equipment.

Nanaimo.—This mine, located in the Iron River district, will ship 5,000 tons of ore during October, against 3,000 tons last month. Preparations are in progress for the sinking of another shaft.

Pewabic Mining Company.—A second shaft has been started at a point 2,000 ft. east and south of the old shaft. When the ledge is reached a diamond drill will test the formation, and if the ground is found satisfactory, the shaft will be continued, and made the second working shaft of the mine. The surface equipment of the mine is first-class. The twin air-compressors are supplying the mine with air, cheaper, it is said, than it can be furnished by the Hydraulic Power Company. The company will do considerable exploring this winter on other lands it holds. The old Keel Ridge mine, it is said, will be pumped out and thoroughly explored.

Penn Iron Company.—This company's mines have shipped 180,000 tons of ore during the season to date. The season's total production will be about equal to that of 1890; the shipments, however, will be less.

STONE.

Michigan Red Stone Company.—At this company's quarry at Portage Entry, a space 100 × 100 ft. has been stripped to an average depth of about 9 ft. About 10,000 cu. ft. of No. 1 red stone has been taken out in large blocks and is now awaiting shipment. The company's lease covers 128 acres. The entire stripping for the next four years, it is estimated, will not average over 14 ft. in thickness. A contract for stripping is now being executed. The 1892 output is estimated at 150,000 cu. ft. of stone. The surface equipment includes a dock on Lake Superior 232 ft. long. A contract has been let for the extension of this dock 450 ft. further.

MINNESOTA.

IRON—VERMILION RANGE.

The Duluth *Herald* in an interview with Mr. Alfred Merritt, one of the chief promoters of the Duluth, Mesabi & Northern railroad, reports that a right of way extending over 46 miles, from the St. Louis river to the Iron Mountain mine, will be cleared in two months. The company has decided to build the road independent of contractors, and claims that it can do the work at a total expense of $220,000. It is said to be the intention of the company to ship ore by July, 1892.

MISSOURI.

JASPER COUNTY.

(From our Special Correspondent.)

Joplin, Oct. 20.

There was a heavy output of both lead and zinc ore last week and good average sales, aggregating almost $100,000. Zinc ore ruled in the Joplin and Webb City camps at $22.50 per ton; Carterville ore brought $23. Zincite, $24.50, and Lehigh, $25.

Following are the sales from the different camps:

Joplin mines, 1,592,990 lbs. zinc ore and 199,910 lbs. lead; value, $22,922.

Webb City mines, 1,677,680 lbs. zinc ore and 3,702 lbs. lead; value, $13,049.50.

Carterville mines, 2,100,760 lbs. zinc ore and 121,430 lbs. lead; value, $27,193.75.

Zincite mines, 217,000 lbs. zinc ore; value, $2,552.

Lehigh mines, 46,000 lbs. zinc ore; value, $575.

Oronogo mines, 43,570 lbs. zinc ore and 22,070 lbs. lead; value, $930.

Carthage mines, 284,000 lbs. zinc ore; value, $3,418.35.

Galena (Kans.) mines, 900,520 lbs. zinc ore and 238,640 lead; value, $15,092.

District, total value, $85,732.60.

Aurora, Lawrence County, mines, 320,000 lbs. zinc ore, 400,000 lbs. silicate and 262,000 lbs. lead; value, $12,259.

Lead and zinc belt, total value $97,991.60.

A big strike of zinc ore was made in West Hollow by some miners at a depth of 80 ft., and with two men in the ground they took out in four days 17 tons of clean zinc ore.

The past two weeks have fully demonstrated that the extremely dull times of the past summer in Joplin have passed away, as the city is full of strangers who are investigating the mining resources with a view of investment. City real estate has commenced to move, and the brokers are busy, and from now to the holidays the mines will make a wonderful showing. The output of the district for 1891 is likely to run over $4,000,000.

Oswego Mining Company.—The most important strike of the week occurred on the Oswego land within the city limits. The miners were sinking a prospect shaft and at 40 ft broke into a large body of lead ore. Some drifting has been done but the lead ore still continues. It is already the largest body of lead ore that has been opened in a number of years.

MONTANA.

Anaconda Mining Company.—The *Wall Street News* stated on the 22d inst. that "Mr. Haggin yesterday settled with Union Pacific and Northern Pacific the long disputed question of rates over Montana Central, and immediately telegraphed to reopen the Anaconda mine, which has been idle for a long time."

Boston and Montana Consolidated Copper and Silver Mining Company.—At the meeting of this company on the 20th inst. it was voted that a dividend of $1 be declared, payable November 20th, to stockholders of record at the close of business October 31st. The transfer books will be closed at 3 P. M., October 31st, and will be opened at 9 A. M., November 9th. This is the fourth quarterly dividend for the calendar year 1891; it calls for the disbursement of $125,000, and makes a grand total disbursement of $2,075,000 in 14 regular quarterly payments, beginning August 20th, 1888.

BEAVERHEAD COUNTY.

Golden Leaf, Limited.—The secretary announces receipt of the following dispatches from Mr. J. H. Longmaid, the manager of the mines, October 5th: "Strike reported in south drift on 100-ft. level, below the main tunnel. The average assays for last month were: Gold, $37; silver, $41. From 4 south raise, north drift has been run in ore 50 ft. The average assays for last month were $31. The mine is looking well everywhere. Working mill to its utmost capacity on $50 ore." October 7th: "During September the mill at Empire worked 60 stamps for 27 days, crushed 4,800 tons, and the yield was as follows: Bullion, $13,200; sundries, $800; total, $14,000. The working expenses for the month were $9,000—$5,000. Expended on capital account, $1,250."

JEFFERSON COUNTY.

Elkhorn Mining Company, Limited.—During the month of September the mill ran 24½ days, and crushed 863 tons of ore. Bullion amounting to $29,095 was shipped; 186 tons of smelting ore sold, bringing $14,000. The total produce was, consequently, $43,095; the total expenses were $22,838.

Stella.—In drifting from the 120-ft. level of this mine, Amazon district, a vein of galena ore was struck recently. Development work has since been in progress, and the vein now shows a width of about 4 ft. of nearly solid galena. The operators will send this ore to the Boulder sampling works.

LEWIS AND CLARKE COUNTY.

Montana Company, Limited.—The total weight of ore crushed during September was 7,000 tons; yield from the mills, $58,100; working expenses for the month, $48,300. The estimated number of ounces contained in returns by assay were: Gold, 1,998 oz.; silver, 13,023 oz.

SILVER BOW COUNTY.

The silver bar shipments from Butte for the week ending the 16th inst., via American and Pacific expresses, were as follows: Blue Bird, 11 bars, value $17,872; Alice, 20 bars, value $20,224; Lexington, 15 bars, value 15,392; Butte & Boston, 15 bars, value 24,000; total, 61 bars, value $87,488.

Butte & Boston Mining Company.—Improvements continue at this company's property. The smelter is kept busy to its full capacity on ores from the Silver Bow mines and also from the East Gray Rock. The silver mill runs on ores from the Belle of Butte as well as from the other silver properties of the company. The Poland mine has been taken under lease and bond by the company which is experimenting on the claim; if a strike is made the company will assume the obligations outstanding against the old leasers.

NEVADA.

ELKO COUNTY.

Nevada Queen Mining Company.—The annual meeting of this company was held in San Francisco on the 14th inst.; 90,515 shares were represented and the following board of officers elected for the ensuing year: P. C. Hyman, president; Thomas Cole, vice-president, and Thomas Bell, William Bowers and George W. Grayson, directors. R. R. Grayson was re-elected secretary; his financial statement showed an overdraft of $14,797.23.

EUREKA COUNTY.

Cortez Mines, Limited.—The mines produced in August 49,000 ounces of silver at an expense of $15,840; the mills crushed 662 tons of ore. Development expenditure amounted to $2,385.

ESMERALDA COUNTY.

COLUMBUS BORAX COMPANY.—An attachment for $20,625 has been issued against the property of this company in Nevada and New York. The attachment, secured by Gruber & Landon, is in a suit by Marcus A. Josephi, who claims $7,500 as money loaned the company and the remainder as unpaid salary due him as its treasurer. Josephi, besides being treasurer of the Columbus Borax Company, was secretary and treasurer of the Chemical Importing and Manufacturing Company. E. C. Calm was president of both. There was a dispute between Calm and Josephi which resulted in the removal of the latter from his offices. Hence the suit.

LANDER COUNTY.

AUSTIN MINING COMPANY.—The water is being lowered in the Patriot mine at Yankee Blade, says the Austin *Advocate*, at least one-third having been pumped out. It is now down to the 400 level. The company has about 20 men at work, and the visit of President Washington and General Manager Farnsworth will probably result in more active operations.

PITTSBURG CONSOLIDATED GOLD MINING COMPANY, LIMITED.—Bullion shipments during September amounted to $4,500. The total expenses for the month, at mine and mill, were $7,700.

LINCOLN COUNTY.

PIOCHE CONSOLIDATED MINING AND REDUCTION COMPANY.—The new lead furnace, which is of a capacity of 50 tons, is now making a successful run of about $2,000 worth of bullion daily, says the *Beaver Utonian*. The second stack, which will be of a capacity of 75 tons, is nearing completion, and will doubtless be ready to "blow in" about the time the Jackrabbit railroad is completed. A shipload of about 2,000 tons of English coke has been ordered, and has now arrived in San Francisco, whence it will be shipped as soon as practicable to Pioche.

The Half Moon mine is developing an immense body of pure galena. The ore in this mine has previously been of a mixed character In the Mendha mine a body of ore 13 ft. in thickness and of unknown depth was recently struck. Unselected samples from this last strike give an average assay of 75 oz. silver per ton. In the Junction a similar body of ore to that in the Mendha has been recently struck, samples from which also give an average of 75 oz. silver.

STOREY COUNTY—COMSTOCK LODE.

Some months ago a suit was entered in the District Court of Virginia City by the Alta Mining Company against the Benton Consolidated Mining Company for $8,000, money claimed to be due the Alta for labor and the privilege of working the Benton mine through Alta ground. Judge Rising issued an order for a sale of the Benton property, and the Alta people bought in sufficient to satisfy its judgment. On the 16th inst., Major Huffaker received a certificate of sale of the property from the Alta to the Benton, the latter company having bought it back. The Benton is now in full possession of all its ground, says the Virginia City *Chronicle*, and stockholders in the company whose minds have been agitated since the termination of the suit may rest easy regarding their interests.

BELCHER MINING COMPANY.—The official letter of this company, filed in San Francisco on the 15th inst., says: "During the week the east crosscut on the 200 level has been run a total length of 89 ft. It has passed through 5 or 6 ft. of quartz yielding fair assays and which is being saved for pay. Have stopped the crosscut and are now running north from it on the quartz. East crosscut No. 2 on the 300 level in the west ledge has been advanced 21 ft. since last report, and is now out 105 ft. The face is in porphyry and streaks of low grade quartz."

SAVAGE MINING COMPANY.—The official report of this company for the second week of this month says: "We have hoisted 531 cars of ore from the 500, 750, 950 and 1,450 levels; shipped to the Nevada mill 525 tons and milled 500 tons; average battery assay, $18 04. Have bullion on hand for October amounting to $9,637.75. The west drift from the new station, Potosi tunnel level, was extended 24 ft., making its total 530 ft. On the 950 level the upraise from face of the west crosscut continues in ore of good quality. We are timbering this upraise and preparing to start a stope following the ore. On the 1,100 level the north lateral drift was advanced 25 ft., making that 40 ft. On the 1,450 level from the face of the joint west crosscut on our south boundary we have started a northwest drift and advanced some 15 ft.; face is in quartz giving low assay. On the 1,500 level the north drift from the Hale & Norcross side was advanced 15 ft., making its total 208 ft. from our south boundary; face is in quartz and porphyry. East crosscut 2 was advanced 45 ft., making its total 73 ft.; face is in porphyry and clay. At a point in the north drift, 190 ft. from our south boundary, we have started west crosscut 2. This crosscut is now advancing in quartz giving fair assays. We have started work in the ledge from the main Sutro Tunnel, where it intersects our ground on the 1,650 level."

VIRGINIA & GOLD HILL WATER COMPANY.—This company's assessment has been raised by the State Board of Equalization from $50,000 to $150,000.

(From our Special Correspondent.)

The following is the weekly statement of ore extracted, with the battery assay values from Comstock mines:

Mine.	Tons extracted.	Tons milled.	Assay Value. Oct. 10.	Oct. 3.
Con. Cal. & Va....	991	991	$23.00	$19.07
Chollar.....	418	418	16.13	.....
Hale & Norcross..	*111	...	.....	.....
Occidental.....	254	254	16.30	16.40
Overman.....	476	476	19.58	.....
Savage.....	*531	500	18.04	18.52
Yellow Jacket.....Not rep't'd.		...	.....	.....

*Cars. Small amount of exploration ore taken out from the Ophir.

CONSOLIDATED CALIFORNIA & VIRGINIA MINING COMPANY.—Bullion valued at $24,492.72 was shipped last week to the Carson mint. With the return of Mr. Mackay to the Comstock the battery assay value of the ore has increased, but outside that fact no particular news of importance has arrived from the mine. The various openings in the mine have yielded the usual amounts of ore, which has been shipped to the Morgan mill.

HALE & NORCROSS MINING COMPANY.—A considerable amount of fair grade ore is being taken out the east crosscut, 1,100 level, near the north boundary, and also from the slope opened on the 1,450 level, north of the winze. The main incline has been retimbered 20 ft., making its total below the 1,500 level 238 ft., and it has now reached the Sutro tunnel level. Several weeks ago talk was rife regarding the arrangement supposed to have been made by which either the ore or waste, or both, might be conveyed from several of the mines through the Sutro tunnel. The proposed contract was outlined in the ENGINEERING AND MINING JOURNAL at the time, also the vacillating remarks of President Levy, of the Savage Company. Now, however, the waste from the Hale & Norcross and other mines is being transported through the tunnel at the rate of 40 cents per ton. Should the plan of building a narrow gauge track for one mile, to connect with the railroad communicating with the mills, be decided upon it will be but a short time until ore also will be sent through the tunnel.

OCCIDENTAL CONSOLIDATED MINING COMPANY.—Certain suggestions embodied in the annual report of the Comstock Tunnel Company have ultimated in an arrangement being made between the tunnel company and this mining company that may prove of vast importance to the Comstock. The tunnel company has agreed to run a drift from the tunnel to connect the Occidental at a perpendicular depth of 1,000 ft. In order to do this interesting ground will have to be traversed. Starting at a point in the tunnel where it cut the Monte Cristo (Brunswick) lode, it will pass through St. John ground to the Occidental. In the olden days some good ore was taken from the top of the St. John ground, but as most of the ore at depth ran about $20 or less, nothing could be done with it. Now, with improved methods, the ore that before was unprofitable to work can be handled to the advantage of the mill owners, at least, if not to the shareholders. The block of ground to be developed by this drift is practically virgin soil, and should any ore body be uncovered then every mine on the Monte Cristo (Brunswick) lode would again soon be in active operation. The Monte Cristo, or as it is more commonly known, the Brunswick, lode extends for about 11,000 ft. from the old Monte Cristo on the north, to and through the Occidental ground on the south. While ore has been taken from the surface in no case have the workings reached over 700 ft.

WHITE PINE COUNTY.

CHAINMAN.—It is reported that a fine body of ore was struck in this mine last week. The mine has been paying development expenses for some time past.

NEW EBERHARDT COMPANY, LIMITED.—The gross yield from the mill during the month of September was $9,500. Expenses, $2,500; net profit, $7,000. Eberhardt expenses amounted to $3,500. Prospects at the mine remain unchanged.

NEW MEXICO.

GRANT COUNTY.

BEATRICE MINING COMPANY.—This company has resumed work on its property near Pinos Altos, says the Silver City *Enterprise*. Six men are now employed on the "101" mine, and are extracting sufficient ore to keep the mill running steadily. The main vein was struck recently, and has been sufficiently tested to demonstrate its value. The ore body is 14 in. thick, and carries $23 in silver and $8 in gold per ton. There is no waste in the ore body, and everything is being put through the mill as it comes from the mine. The 5-stamp mill gives satisfactory results. Captain B. W. Davis is the superintendent of the mine.

NEW YORK.

ORLEANS COUNTY.

While workmen were drilling on a farm south of Medina on the 16th inst. natural gas was struck. It is estimated that the present pressure is 20 lbs. to the square inch.

OHIO.

NATURAL GAS.

The exhaustion of the gas fields which supplied Columbus a year ago, and the lessening of pressure at a number of points in Northwestern Ohio, is now followed by an alarming falling off in pressure in the more recently discovered St. Mary's district, which supplies Dayton, Springfield, Urbana, Sidney, Troy, Piqua, and many smaller Southwestern Ohio towns. The rock pressure in the wells about St. Mary's was about 400 lbs. to the square inch when they were drilled in, but it has now fallen to 200 lbs. or less. The result is that while the volume is sufficient to furnish an abundant supply in the immediate neighborhood of the wells, the lack of pressure makes it impossible to pipe it any considerable distance. At Springfield many consumers are already taking out the gas connections, which were put in at a considerable expense not many months ago, and will not depend on gas for winter fuel. At Dayton, a petition has been filed in the Common Pleas Court to restrain the Dayton Natural Gas Company from supplying Springfield, Troy and other places, on the ground that the company, by its franchise and agreement with Dayton, has pledged itself to furnish gas to the city at 10 cents per 1,000 cu. ft., and keep a pressure of 4 oz. in the pipes, and that the supply is now failing.

PENNSYLVANIA.

COAL.

The striking coal miners at Scott's No. 2 mine, at West Newton, Pa., resumed work on the 20th inst. at the old price, thus breaking the solidity of the miners' strike. An effort was made to introduce Hungarians at the Watsontown mines, but they were persuaded by the miners not to go to work.

The Molsberger mines, which were the first to pay the advance to the miners, have closed down again on account of the mysterious disappearance of the manager, Winibert Molsberger. It is said that the men are three weeks in arrears in wages, and Molsberger went to Pittsburg last Saturday to get the money to pay them. He did not return and on the 20th inst. the mines were closed down. The amount due the men is about $2,000. Nothing is known concerning Molsberger's whereabouts.

LEHIGH & WILKESBARRE COAL COMPANY.—Affairs at the collieries of this company since General Superintendent E. H. Lawall assumed control, with general Inside Superintendent Morgan R. Morgan as his able assistant, run along very smoothly, says the Wilkesbarre *Record*, and the condition of the workings is such that they are able to work the extensive collieries to their utmost capacities. There have been no serious accident to record. Such a record shows that everything in and around the collieries is properly systematized, which can only be accomplished by the selection of competent foremen both in and out of the collieries. The celebrated Nottingham colliery, Plymouth, of which William Leckie is inside foreman and George Connor outside foreman, made another remarkable run on the 15th inst.; 1,313 cars were hoisted in nine hours. At No. 11 colliery of the same company, on the same date, in a day of nine hours, 693 cars were hoisted. Such a showing as this must assuredly make the present management feel proud.

Suit has been brought against this company by miners at Wilkesbarre to compel the company to pay the wages semi-monthly instead of monthly, as is now the custom.

It is reported that an explosion occurred on the 21st inst., at the No. 6 colliery at Lansford. Two miners are reported killed.

MERRIAM.—An explosion of gas occurred at this colliery at Ashland on the 16th inst. A miner was killed and two more were seriously injured.

OIL.

According to Pittsburg dispatches, W. L. Mellon, backed by Andrew Carnegie and Mellon Bros., is making preparations to build a new pipe line from Pittsburg to Philadelphia. The route has been surveyed and the right of way is now being secured. The line is to have a carrying capacity of 40,000 bbls. per day. Branch lines are to be laid into the West Virginia fields.

The total production of the McDonald field on the 20th inst. was placed at 61,500 bbls. per day. The Sturgeon well No. 1 was agitated and started to flow 375 per hour, but soon fell off to 150. The following are some of the hourly gauges taken from the larger wells in the field: Matthew No. 1, 425; Bell No. 2, 100; Heron No. 1, 180; Baldwin, No. 1, 150; Elliott No. 1, 129; Elliott No 3, 200; Sturgeon No. 1, 150; Greenlee and Forest No. 1, 250; Miller No. 1, 100, No. 4, 150, and Nos. 3 and 5, 200. On the 21st inst. the production of the field fell off to 60,000 bbls. per day.

SOUTH DAKOTA.

LAWRENCE COUNTY.

The Deadwood *Times* is the authority for the statement that all differences between the Iron Hill and Calumet mining companies have been satisfactorily adjusted, and the Iron Hill now controls the capital stock of the Calumet company. A few months ago, a lease of the Iron Hill smelter and mills for one year was made to the Calumet company. At the first meeting held by the Iron Hill directors, elected last June, a resolution was passed cancelling the lease. The directors of the Calumet company refused to be bound by this action and still maintained their right to the plant, and to hold the North Star and Black Sulphates lodes at Ruby Basin. Recently, however, the whole affair was settled by the delivery to Secretary Baggaly, of the Iron Hill company, of all Calumet stock owned

by it, and by an agreement of the Calumet directors to relinquish the claim of the company to the Iron Hill plant. President and Superintendent Cooper, of the Iron Hill, has been appointed superintendent of the Calumet, and on the 16th inst. paid an official visit to the mines in Ruby Basin. He will, the *Times* says, at once begin the erection of an ore platform, and will very soon begin shipping ore to Omaha. There are at present on the dump of the mine about 100 tons of ore that is said to assay more than $30 per ton.

GOLDEN REWARD CHLORINATION WORKS.—The semi-monthly cleanup was made at these chlorination works at Deadwood on the 16th inst., and resulted in a brick weighing 926 oz., and valued at over $15,000, with about $1,000 left in the vats.

TEXAS.

(From our Special Correspondent.)

It is now definitely known that a railroad penetrating the Llano iron ore fields of this State will be built soon. The Austin & Northwestern Railroad will be extended from Burnette to Llano.

UTAH.

SUMMIT COUNTY.

UNION CONCENTRATING COMPANY.—At a meeting of the stockholders of the Union Concentrating Company, held in Salt Lake City on the 15th inst., the following officers were elected: E. P. Ferry, president; A. B. Richardson, vice president and treasurer; W. V. Rice, secretary and manager. Directors: E. P. Ferry, A. B. Richardson, Henry Newell, W. V. Rice, A. Hanauer, R. Mackintosh and N. Treweek.

WOODSIDE MINING COMPANY.—At a meeting of the stockholders of this company, held at Salt Lake City on the 15th inst., the following officers were eleeted: E. P. Ferry, president; D. C. McLaughlin, vice-president; W. V. Rice, seeretary and treasurer. Directors: E. P. Ferry, A. B. Richardson, W.V. Riee, Francis Smith, and D. C. McLaughlin

VERMONT.

RUTLAND COUNTY.

VERMONT MARBLE COMPANY.—Rutland's two great marble concerns, the Vermont Marble Company and the Sheldon Marble Company, are to be united. P. W. Clements, who is prominent in the management of the latter company, confirms this statement, adding: "The Vermont Marble Company will take the management of all the quarries, mills and property owned and managed by both companies; that is, unless the plan fails, which is not likely." The Vermont Marble Company is the largest marble-producing concern of Vermont, and the Sheldon eompauy ranks next. A consolidating arrangement made a couple of years ago gave these two companies control of all the great West Rutland quarries, as well as the supply at Proctor, which used to be known as Sutherland Falls marble, and the new arrangement will put all but some small marble concerns iu the State under one management. It is reported that the union will be in the form of a lease of the Sheldon property to the Vermont Marble Company.

FOREIGN MINING NEWS.

CANADA.

PROVINCE OF NOVA SCOTIA.

COPPER.

EASTERN DEVELOPMENT COMPANY, LIMITED.—Advices from the Coxheath copper mine, under date of October 15th, state that "Vein B" has been eut on the 320-ft. level at shaft No. 2. The wall was eneountered at 89 ft. from the shaft center, nearly perpendieular, but dipping slightly toward the shaft; on the wall is a rieh stringer of ore, then 11 ft. of low-grade ore and rock, followed by 8½ ft. of solid ore of a high grade; this makes 19½ ft. of vein matter so far and the farther wall not yet reached.

CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, Oct. 23.

Heavy Chemicals.—The situation is firm at about the same prices that have ruled for some time. These are firm with a rising tendency. The Alkali Union is showing its strength by the way in whieh it handles the bleaching powder trade. The almost universal feeling on this side of the water is that the organization will have no difficulty in at least maintaining prices. The demand in almost all commodities is good. Stocks with one or two exceptions are fair on the spot.

Caustic Soda.—Several arrivals during the week eased the market, and enabled the filling of several pressing eontracts. Just at present buyers are fighting shy on futures owing to the belief that priees will be lower. Spot goods are firm and in good demand. We quote: 60%, 3·25@3·30c. for spot and 3⅛c. for futures; 70@74%, 3⅛@3·15c. for future shipments; 76%; the quotation has eased off to 2·95@3·05e; there is some inquiry in this brand but prices are too low to eapture business; 76%, stocks very light, with several lots near by, 3·20@3·25c.; 77%, strong at 3⅛c. spot and 3·05e. futures.

Carbonated Soda Ash.—There is more of a demand. The window-glass manufaeturers are, one by one, resuming production, and are beginning to put out feelers for stocks. The outlook for the window-glass industry does not appear very bright, owing to large stocks on hand, and it is doubtful if any very extensive eontracts will be made in the near future. We quote: 48%, 1·60@1·65c.; 58%, on basis of 48%, old process ashes, 1·55@1·57½c.

Alkali.—This article is one of the most active in the market. Arrivals have been of good proportions, a large part of which went to supply contracts. Transactions in futures have been quite general, the prevailing belief, as expressed thereby, is that the "Union" will maintain prices during 1892. B. M., 48%, sold quite extensively at 1·57½@1·60c; high-test B. M. is in good demand at 1·47½@1·50c.

Bleaching Powder.—This is the strongest article on the list. There are absolutely no spot stocks. A small lot sold this week at 2·30c. The usual quoted price is 2·15c. J. D. & D. S. Riker, syndicate's agents, inform us that they are taking contracts extending over all of 1892 at 2½@2·15c., and that they have already placed orders covering this period, which are more than 50% of the business expected for the entire year.

Sal Soda.—The stock is sufficient to meet all demands made. Quiet market at 1·05@1·10c.

Acid.—This market continues, week by week, to score an improvement that is most gratifying to the manufacturers. It is all because of the demand, which is excellent, and which seems to steadily grow better. There is no boom in the market, nor is there likely to be one. Prices are all very firm, and have an upward tendency. There is a greater range. Acid is sold as cheap to-day as it was two months ago, but only to old and valued customers. The market is not yet strong enough to enable manufacturers to raise quotations in that quarter. It is the jobbing trade that is paying the advance. Makers are running their works to full eapacity, and are unable to keep up with their orders. Conditions are crystallizing in a way that leads to the belief that the industry will be favored with a good trade during the greater part or the whole of 1892.

We quote per 100 lbs. in New York: Acetic, $1.55@$1.65; alum, lump, $1.55@$1.60; muriatic, 18°, 90c.@$1; 20°, $1@$1.12½; 22°, $1.12½@$1.25; nitric, 40°, is selling for $4.50, and from that upward, according to quality, etc.; 42°, $5@$5.50; 66% sulphuric, 90c.@$1.50.; oxalic, $7@$7.25.

Blue Vitriol.—There has been a further hardening of this market, which is due to conditions previously noted. Small lots command 3¾c., while a larger order could be placed at 3½c.

Brimstone.—The unhealthy pulse of this market indieates a slacking up in the number of orders. A drop has been ordered. The priee on the spot is $30.50, with about 300 tons available. To arrive, November steamer, seconds are quoted at $28.70, thirds at $27.70. With an influx of orders which will he apt to follow this decline, the market is likely to take a jump. The manipulators are too completely in control of the situation to allow any very great amount of stock to go at present quotations.

Fertilizers.—This market is not, as has been written, in a demoralized condition. It is quiet for this season of the year, but nevertheless enjoying a fair volume of business at sustained values. The check which the fall trade has received has been eaused by the threatened low price of cotton. The South, with this gloomy prospect in view, will be apt to buy very sparingly of fertilizers, and will seek long credits on any transactions made. The fertilizing manufaeturers are anticipating this eondition, and are moving very cautiously in the matter of purchasing supplies.

The ammoniates are scarce. It is expected that they will he easier after the winter killing of hogs begins, or November 1st. For sulphate we quote 3·05@3·15; bone sulphate is worth 3·05c. Dried blood is in very limited stock. It commands $2 per unit. Tankage is sought at $19@$21. Azotine is in good demand at $2 per unit. Bone meal is quoted at $22@$23. Acidulated fish scrap is worth $11.50; dry fish serap is quoted at $21.50.

Double Manure Salts.—Demand quiet. The season of the year for the renewal of eontracts has not yet arrived. We quote the syndicate price of 1·10@1·12½c. for 48%. For 90%@95% basis, 90% foreign invoice, weights and lists, 2·07½@2·10c. Lots under 50 tons are proportionately higher.

Kainit is quoted at $8.75@$9.25 according to quantity.

Muriate of Potash.—Arrivals for the week were 2,000 tons, most of whieh went directly into consumption. The sales during the week were 300 tons.

Nitrate of Soda.—Very strong, with little doing. Sales during the week were made at 2·10c.; the ruling spot price, however, is 2½c. Futures range from 2·05@2·07½c. The "C. P. Dixon" arrived this week with 8,700 bags, a considerable portion of which went directly into consumers' hands.

South Carolina Phosphates.—This class of crude material is affected to a more or less degree by the financial difficulties in the South. Nevertheless there is considerable business doing. We qnote: Land rock, $6.50@$7.50 wet and dry respectively, f. o. b. vessels and mines, and $6.75@$7.75 f. o. b. cars. Florida phosphate, land rock, has weakened a little. It is quoted at $9, destination, for 60%.

MINING STOCKS.

[For complete quotations of shares listed in New York, Boston, San Francisco, Baltimore, Denver, Kansas City, Birmingham, Ala., Pittsburg, St. Louis, London, and Paris, see pages 491 and 496.]

NEW YORK, Friday Evening, October 23.

The week under review has seen no great activity at the Consolidated Stock and Petroleum Exchange, in so far as the market for mining shares is concerned, but a better feeling has been experienced. "Hope springs eternal in the human breast," but we doubt if a crowd of men can be found which, as a body, is more hopeful than the mining element at the Consolidated Exchange. The long-looked-for mining-stock boom has been seen approaching during the week by brokers whose range of vision is in proportion to their interest in the speedy arrival of the aforesaid boom. Certain it is, however, that our brokers have come to regard our utterances as true, and the advice we have from time to time published in this column is bearing good fruit. Brokers realize that they must make an effort to bring the investing public back to the mining fold—not that it might be shorn, as of yore, but to help it to obtain reasonable returns for its investments. To summarize, it may be stated that interest has been displayed in the case of those mining stocks which have some intrinsic worth, and that the wild-cats are slowly but surely being consigned to the state of "innocuous desuetude" which they so richly deserve.

The doings in Plymouth Consolidated have not been so prominent a feature of the market this week as they were last. There were sold 450 shares at $2.50@$3.10, the first price being obtained at the close, showing a deeline of 60c. per share. In view of the interest displayed in this stock, and of the numerous rumors concerning a "deal" by the "insiders," a representative of the ENGINEERING AND MINING JOURNAL called at the office of the eompany. There it was stated that the reason for the non-issue of a finaneial statement since that of July 23d is the fact that nothing of importance has happened since that time. The officers, it was said, were not in the habit of issuing any statement unless the importanee of the developments at the mine warranted it. On July 1st the mill was shut down, and was not started until October 1st. Meantime operations were confined to the new tunnel. A letter from the superintendent, dated October 10th, says: "Our new tunnel is in 300 ft. The ground is soft and dry, with a very little quartz in it. No sign of the vein yet. The ore is doing pretty well, and takes from 15 to 20 oz. of quicksilver per day." A gentleman who has just arrived from Plymouth informs us that the company had 20 stamps running, and there was a vein of ore at the mine 6 ft. wide, going about $12 per ton. To our own knowledge the speaker has bought a fair amount of the stoek. It is currently believed at the Exchange that the next statement of the company will show that a good state of affairs prevails at the mine; notwithstanding all that the officers say about it to the contrary, the impression prevails that for some reason or other the company has not seen fit to publish all that it knows.

Among other California stocks we note sales of 300 shares of Bodie Consolidated at 45c. There was a sale of 100 shares of quicksilver, preferred, at $23; 300 shares of the common stoek of this company were sold at $4.75@$5. Trading in Standard aggregated 900 shares at $1.30@$1.35; of Astoria, 3,500 shares were sold at 1c. Belmont this week was dealt in to the extent of 1,400 shares at 75c., and Brunswick at 10@12c. disposed of 1,700.

The Comstocks this week have generally obtained better priees and were traded in to a greater extent than last week. Consolidated California & Virginia was rather quiet at $4.75@$5, although at the elose the latter priee eould not buy any stock. Crown Point at $1.30@$1.70 was dealt in to the extent of 500 shares. Gould & Curry was quiet at $1.75@$1.85; of Hale & Norcross at $1.25@$1.30 only 200 shares changed hands. Sierra Nevada was quiet at $2@$2.20; Yellow Jacket advanced from $1.55 to $1.85 with reported sales of 400 shares. Sales of Best & Belcher were 335 shares at $2.45@$2.85; Comstock Tunnel stock was sold at 17c., 3,200 shares having been disposed of at this figure. There were 700 shares of Mexican sold at $2.20@$2.50; Occidental was quiet at 70@75c., and Potosi shows a solitary sale of 500 shares at $2.15. There were 300 shares of Union Consolidated sold at $2.10, and 1,400 shares of Utah at 50@65c. Of the Tuscaroras, Nevada Queen had sales of 300 shares at 26c.; North Belle Isle was stationary at 60c. Among the other Nevada stocks we note a sale of 200 shares of Eureka Consolidated at $1.50.

Among the Colorado stocks Leadville Consolidated was by all odds the feature of the week. There were sold 3,900 shares at from 13c. to 15c. We are reliably informed that the company is today in better condition than ever before. The company's mines have been leased by Estey & Co., of Leadville, for a term of three years at a royalty of 40%, the lease dating from June 1st. The output has been increasing steadily. Last month the lessees took out 131 tons of ore which brought them over $10,000 and which netted the company slightly over $4,000. The Hegeman shaft which has not been worked for a number of years is being retimbered, and preparations for pumping it out have been made. Explorations for

the second contact will then commence. A very prominent stockholder of this company informed the ENGINEERING AND MINING JOURNAL that the prospects of a dividend are very good, and that he will make a decided effort to cause one to be declared. He also stated that the officers of the company, who are very conservative, are inclined to agree with him.

Among other Colorado stocks we note sales of 200 shares of Breece at 47c.; 100 shares of Chrysolite at 20c.; 700 shares of Freeland at 11c.; 500 shares of Little Chief at 30c.; 500 shares of Robinsen Consolidated at 45c.@50c.; 150 shares of Adams at $1.95, and 300 shares of Pœnix Lead at 14c.

Horn silver was in greater demand during the week, 1,700 shares having been sold at $3.45@$3.55. Through the courtesy of Mr. A. I. Harrison, secretary and treasurer of the Horn Silver Mining Company, we are enabled to publish the principal items of the financial statement soon to he issued. The mining expenses for the quarter ending Septemher 30th were $41,945.99; general expenses, $2,332.94; the usual quarterly dividend $50,000; expenses at the New York office, $3,068.87. The receipts during the same time were: From sale of ore $80,550.60; interest on sundry amounts, $3,908.08; smelter expenses, $385.02. This makes the cash on hand $280,616.22. News from the mine is to the effect that a great deal of ore is being extracted, the amount for the first half of the present month being 1,100 tons. The latest weekly statement shows that the property is doing well.

Of the other stocks listed at the exchange, Ontario was dealt in to the extent of 130 shares at $40@$40.25. This company has declared its usual dividend of $75,000, at the rate of 50 cents per share.

Of the Black Hills stocks there were 200 shares of Deadwood Terra sold at $2@$2.10, and 25 shares of Homestake at $11.50. The latter company has declared its usual monthly dividend of 10c. per share. There was a sale of 100 shares of Alice at $1.65.

Of Silver Mining of Lake Valley 500 shares were sold at 35@40c.

There was a solitary sale of 100 shares of El Cristo at 38c.

Transactions in Phœnix of Arizona this week aggregated only 800 shares at 33@43c.

Denver.

Prices and sales for the week ending October 17th, 1891:

Company.	Opening.	H.	L.	Closing. Bid.	Sales
Mines.					
Alleghany	20a	....	....	20a	....
Amity	02½b	*02¾	02½	02½b	20,000
Bangkok-C.-B	04b	04½	04½	04¾b	500
Bates-Hunter	70a	....	....	66a	....
Brownlow	10¼b	*11½	10¼	10½b	13,800
Calliope	20a	....	....	14b	....
Cash	14b	....	....	12b	....
Clay County	112b	†123	115	114b	700
Gettysburg	22b	22	21½	22b	1,700
Gold Rock	60b	†70	61	*68b	2,000
Leavenworth	07b	07	06	06b	200
Little Rule	†10b	....	....	†110b	....
May-Mazeppa	125a	*117	*116	*100b	300
Matchless	....	....	....	285b	....
Oro	75b	....	....	101b	....
Pay Rock	02b	03½	02	02¼b	1,700
Puzzler	02b	02½	02½	02½b	200
Reed National	99a	....	....	....	....
Rialto	111a	111	110	†113b	700
Running Lode	22½b	....	....	22¾b	....
Whale	†09b	14	11	12b	400
Bal. Smuggler	61a	..	....	60a	....
Prospects.					
Argonaut	10b	....	....	15b	....
Big Indian	15a	05	05	..	100
Big Six	06½b	07¼	07	07¼b	300
Claudia J	05¼b	06	05	05½b	13,100
Century	30b	35	34	35b	600
Diamond B	02½b	03¼	02½	03¼b	12,500
Nat. G. & Oil Co	13	*14½	11	11½b	8,600
Emmons	*48b	*48	45½	*48b	4,500
Golden Treas	84b	90	84	90b	2,500
Ironclad	09b	15½	09½	13½b	18,500
John Jay	01¼	01½	01	¾b	3,100
Justice	13½b	†14½	13	13¼b	5,400
Morning Glim	47a	....	....	....	....
Park Consolidated	10a	....	....	05b	....
Potosi	02½	02½	02½	02¼b	4,700
Total					116,100

* Buyer 30. † Buyer 60. ‡ Seller 60. § Seller 30. a Asked. b Bid.

Boston Oct. 22.

(From our Special Correspondent.)

During the early dealings of the past week in the copper stocks, prices were fairly steady, especially for the Montana group, which showed a fractional advance up to to-day. The report this morning that the Anaconda mine had settled its difficulties with the railroads, and that the mine would at once resume active operations, together with lower quotations for copper in England, had a demoralizing effect upon the market, and under pressure to sell, prices went off quite rapidly, closing at the lowest point of the week.

Calumet & Hecla declined from $260 to $255; Tamarack from $170 to $165; Osceola from $35 to $32; Kearsarge from $14 to $11; Centennial from $15½ to $14¼; Franklin from $17 to $16½; Boston & Montana sold up to $44¾ yesterday and declined to $43¼ to-day. Butte sold at $17 early in the week and at $15½ to-day. Atlantic held steady at $13.

Allouez selling, assessment paid, at $2¼, declined to $1⅛. Wolverine after selling at $4½ declined to $4.

Santa Fé declined to 35c., and Bonanza sold at 50c.

Considerable Huron has changed hands during the week at prices ranging from 25c. to 10c. per share. The $3 assessment recently levied, and the poor outlook for the future of the mine is responsible for the decline. It is stated that this assessment will only afford temporary relief to the company, and that fully $500,000 is needed to make the property productive.

In silver stocks there is very little activity. Napa Quicksilver sold at $4@$4½. Breece was offered at 40c., Dunkin at 45c. and Catalpa at 23c., without sales.

San Francisco. Oct. 15.

(From our Special Correspondent.)

The mining share market has had a set-back during the week, hut as the chipping element has practically had control the decline, shown on comparing prices to day with those ruling a week ago, means very little. Consolidated California & Virginia stock that sold a week ago for $6.37½ has been ruling to-day at $5.37, under the sale of 800 shares in morning session. Ophir at $3.35; Mexican at $2.45; Sierra Nevada at $2.20, and Union at $2.15, all sold more freely than might have been expected, although the decrease in the figures quoted was not so great during the week as in the case of the leader.

Savage has continued to attract more attention than any other middle Comstock. To-day 900 shares were sold in regular session at $2.60, a decline of 35 cents during the week. Best & Belcher ruled at $2.85; Gould & Curry at $1.70; Hale & Norcross at $1.30, and Potosi at $2.30; all selling quietly.

Of the Gold Hill stocks, Bullion sold to-day in small lots at $1.35; Occidental Consolidated for 60 cents; Overman at $1.00 and Yellow Jacket at $1.60. As several of the stocks hear assessments soon to fall delinquent, the prices quoted, relatively speaking, are fairly strong.

The outside stocks, with the exception of the Tuscaroras, that have at length shown some signs of movement, continue in a moribund condition. In the Tuscarora group Belle Isle has sold at 50 cents; Del Monte, 15 cents; North Belle Isle, 65 cents and Nevada Queen, 25 cents. With the exception of North Belle Isle, which has advanced 25 cents during the last six days, the ruling prices are as they were a week ago.

It is likely that Pine street brokers may have more trouble soon. The publication in the ENGINEERING AND MINING JOURNAL of the ironclad document termed hy certain brokers a "contract" caused certain firms to recall the new "contract" and fall back on the old form. But the unlucky hrokers seem destined to be impaled on the horns of a dilemma, do what they may. This week a woman dealer who was sold out of a large line of stocks was informed there was a balance due her of $100. The day following she, through her attorney, informed the broker that unless he returned the sum of $3,500, heing the sum she had deposited as margin when the stocks were bought, suit would at once be instituted to recover that amount, under the legislative act which declares that dealings upon margins are illegal.

As the new form or "contract," so called, is an outrageously worded evasion of the law, and the old form lays a hroker open to such suits as the above, the fraternity on Pine street is not having quite a happy time.

SAN FRANCISCO, Oct. 23.—(*By telegraph.*) Prices to-day show a uniform improvement over those telegraphed last Friday. Latest quotations to-day are: Alta, 40c.; Best & Belcher, $2.70@$2.75; Bodie Consolidated, 35c., assessment not paid; Belle Isle, 40c.; Bulwer, 20c.; Chollar, $1.25; Con. California & Virginia, $5⅝; Crown Point, $1.35; Eureka Consolidated, $1.50: Gould & Curry, $1.65; Hale & Norcross, $1.10@$1.15; Mexican, $2.35; Mono, 35@40c.; North Belle Isle, 25c. bid, offered at 40c.; Navajo, 10c.; Nevada Queen, 20c.; Ophir, $3.20; Potosi, $1.90; Savage, $2.30@$2.35; Sierra Nevada, $2.00; Union Consolidated, $2.15@$2.25; Utah, 50c.; Yellow Jacket, $1.65@$1.70.

St. Louis. Oct. 20.

(From Our Special Correspondent.)

Mining matters this week are decidedly dull as compared with business of the past few weeks and prices are very unsteady, and on the whole slightly weaker. Elizaheth, Granite Mourtain and Montrose all fell off in value, while the very steady stocks, Adams and Bi-metallic, though firm, were entirely neglected.

Granite Mountain opened at $20.50 and on a sale of 20 shares declined to $19.75. Thursday found the market firm at $19.75 with sales amounting to 10 shares. During the remainder of the week the stock was quiet at $19.75 and to-day again resumes its old figure of $20.50.

Elizaheth opened in sharp demand at $1.65 and sold very well; later it fell to $1.60, then to $1.55, and on Saturday was quiet at $1.50. With the opening of the week, however, the stock has steadily improved, and to-day is quoted at $1.70. Sales for the week amounted to about 8,100 shares.

Montrose was weaker this week and had hut little life. Opening at 27½c., the stock quickly sold down to 25c. and later plenty could be bought at 20c. To-day the stock is slightly stronger at 21¼c. During the week several fair sales were made, amounting in all to ahout 2,800 shares.

A single trade in a long neglected stock was made at the beginning of the week, 600 shares of St. Louis & Aspen selling at 4½@4c.; after the sale the stock again dropped out of sight and was not heard of for the rest of the week.

Small Hopes was one of the few stocks to rise in value, and from an opening of 66½c. closes at 71¼c., with sales for the week of 500 shares, the greater part going at 72½@73¼c. This stock appears very firm.

Silver Age followed the lead of Elizaheth and Granite Mountain and declined several cents. It opened firm at 85c. and sold on the following day at 83¾c.; later 70c. was the hest figure obtainahle, while to day's figure is 67½c. Sales amounted to 400 shares only.

American & Nettie rose 7½c. from the opening figure and closes at 47½c. Sales amounted to 600 shares, of which the greater part sold at 45@47c.

Mickey Breen, with a decline of 2¼ to 37½c.; Central Silver at 3½c.; Yuma, with a strong market of 36¼c., were unheard of during the latter part of the week and had no trading whatever.

Adams and Bi-metallic are both firm at $1.20 and $32, respectively, with no sales and very little demand.

The story that the Granite Mountain Company as negotiating with Mexican mine owners for a certain large property is pronounced a fake and has been officially denied.

The Mining Exchange election takes place in a few days.

MEETINGS.

Colorado Central Consolidated Mining Company, at the office of the company, Rooms 28 and 29 No. 48 Exchange place, New York, November 12th, at 11:30 A. M.

Everett Mining Company, at the office of the company, No. 53 Devonshire street, Boston, Mass., November 4th, at 12 o'clock noon.

Niagara Mining and Smelting Company, at the office of the company, No. 218 Southeast Temple street, Salt Lake City, Utah, November 11th, at 2 P. M.

Virginia Consolidated Mining and Milling Company, at Grass Valley, Cal., October 28th at 7:30 P. M.

ASSESSMENTS.

Company.	No.	When levied.	D'l'nq't in office.	Day of sale.	Am't per share.
Alta, Nev	40	Oct. 6	Nov. 11	Dec. 2	.30
American Gulch, Mont		Sept. 18	Oct. 26	Nov. 16	.00¾
Bodie Con. Cal	13	Sept. 22	Nov. 5	Dec. 9	.25
Brunswick Con., Col.	2	Sept. 11	Oct. 15	Nov. 9	.02
Butte King, Cal	2	Sept. 21	Oct. 31	Nov. 18	.10
Combination, Mont.		Sept. 19	Oct. 24	Nov. 21	.03
Con. New York., Nev.	6	Sept. 28	Nov. 2	Nov. 24	.15
Con. St. Gothard, Cal.	3	Sept. 10	Oct. 14	Oct. 31	.05
Del Monte, Nev	5	Sept. 28	Nov. 3	Nov. 30	.10
Equitable, S. Dak	4	Sept. 9	Nov. 7	Nov. 20	.025
Garden Gravel, Cal.	..	Sept. 17	Oct. 17	Nov. 17	.10
Goodyear, Mont	..	Sept. 29	Oct. 28	Nov. 14	.01
Hale & Norcross, Nev					.50
Imperial, S. Dak	..	Sept. 16	Oct. 20	Nov. 7	.0015
Keystone, Cal	1	Sept. 16	Oct. 21	Nov. 23	2·50
King of the West, Ida	4	Oct. 10	Nov. 10	Nov. 30	.10
Kingman, Ariz	1	Sept. 30	Nov. 12	Dec. 1	.05
Mammoth No. 2, Utah	1	Sept. 25	Nov. 10	Dec. 10	.015
McDonnell, S. Dak.	5	Sept. 16	Nov. 2	Nov. 21	.005
Mono	31	Sept. 17	Oct. 27	Nov. 30	.25
Morning Star, Nev.	9	Aug. 14	Sept. 30	Oct. 30	.01
Mount Terry, S. Dak	3	Aug. 31	Oct. 8	Oct. 29	.001½
North Belle Isle, Nev	18	Aug. 28	Oct. 2	Oct. 30	.25
Ophir, Nev	57	Oct. 2	Nov. 4	Nov. 24	.50
Overman, Nev	62	Sept. 26	Oct. 30	Nov. 20	.50
Peerless, Ariz	17	Sept. 17	Oct. 21	Nov. 15	.10
Pennsylvania, Cal.	10	Sept. 10	Oct. 11	Oct. 29	.05
Silver King, Ariz	7	Aug. 29	Sept. 29	Oct. 27	.20
Sierra Nevada, Nev.	100	Oct. 6	Nov. 11	Dec. 1	.50
Siskiyou Con. Quicksilver, Cal	1	Oct. 9	Nov. 12	Dec. 4	.04
Taylor Plumas, Cal.	4	Sept. 5	Oct. 5	..	.05
Union, Nev	44	Aug. 31	Oct. 5	Oct. 2	.25
Utah Cons	..	....	....	....	.25
Yellow Jacket, Nev.	49	Aug. 31	Oct. 2	Nov. 7	.50

DIVIDENDS.

Boston & Moutana Consolidated Copper and Silver Mining Company, dividend No. 14 of $1 per share, $125,000, payable Novemher 20th.

Champion Mining Company, dividend No. 17 of 10 cents per share, $3,400, payable October 19th at the office of the company, No. 320 Sansome street, San Francisco, Cal.

Daly Mining Company, dividend No. 56 of 25 cents per share, $37,500, payable October 31st., at the office of Messrs. Lounsbery & Co., Mills Building, New York City. Transfer books close Octoher 26th.

Homestake Mining Company, dividend No. 159 of 10 cents per share, $12,500, payable October 26th at the office of Messrs. Lounsbery & Co., transfer agents, Mills Building, New York City. Transfer hooks closed October 20th.

Mollie Gibson Consolidated Mining and Milling Company, dividend No. 14 of 5 cents per share, $50,000, payable October 25th at the office of the company, Colorado Springs, Colo. Transfer hooks closed October 20th and reopen October 26th.

Ontario Silver Mining Company, dividend No. 184, of 50 cents per share, $75,000, payable Octoher

31st at the office of Messrs. Lounsbery & Co., transfer agents, Mills Building, New York City. Transfer-books close October 24th.

PIPE LINE CERTIFICATES.

(Specially reported by Watson & Gibson.)

The oil market continues in the same old rut, and does not attract a particle of speculative interest. The Standard Oil Company, during the first six months of this year, had about the most satisfactory business it ever had during any corresponding period. It now has tank steamers and foreign companies in various countries of Europe, and is in entire control of the Ohio field, and is, therefore, as completely master of the situation as it ever has been in the past. There is no market for Ohio oil, though some trifling sales have been made at 11½@12c.

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales
Oct. 17.....	....	....	....	....	.....
19.....	60¾	61	60	60⅞	61,000
20.....	60¾	61	60½	60⅝	15,000
21.....	60⅝	60⅝	59	59½	81,000
22.....	59¾	60	59¼	59⅝	40,000
23.....	59⅞	60⅝	59⅞	60⅜	85,000
Total sales in barrels.....					282.000

NEW YORK STOCK EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Oct. 17.....	....	....	....	....	.....
19.....	60	60	60	60	5,000
20.....	....	....	....	....	.....
21.....	60	60	59½	59½	28,000
22.....	....	....	....	....	.....
23.....	....	....	....	..	.....
Total sales in barrels.....					33,000

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Oct. 23

STATEMENT of shipments of anthracite coal (approximated) for the week ending October 17th, 1891, compared with corresponding periods of last year:

Regions.	Oct. 17, 1891.	Oct. 18, 1890.	Difference.	
Wyoming Region. Tons	504,605	474,291	Inc.	30,314
Lehigh Region "	138,902	150,151	Dec.	11,249
Schuylkill Region "	341,252	273,355	Inc.	67,897
Total.....Tons	984,759	897,797	Inc.	86,962
Total for year to date Tons	30,613,313	27,682,342	Inc.	2,930,971

STATEMENT of anthracite coal shipments for month of September, 1891, compared with the corresponding period last year. (Compiled from the returns furnished by the mine operators.)

	Sep., 1891.	Sep., 1890.	Difference.	
	Tons.	Tons.	Tons.	
Wyoming Region	1,741,272·0	1,788,650·14	Dec.	47,378·06
Lehigh "	531,507·09	585,488·04	"	53,980·95
Schuylkill "	1,060,624·13	1,053,939·02	Inc.	6,685·11
Total.....	3,333,403·30	3,428,077·20	Dec.	94,673·90

	For year 1891.	For year 1890.	Difference.	
	Tons.	Tons.	Tons.	
Wyoming Region	15,020,092·01	13,151,724·07	Inc.	1,868,367·94
Lehigh "	4,514,357·11	4,627,318·09	Dec.	112,960·18
Schuylkill "	8,701,823·11	7,616,719·15	Inc.	1,085,103·96
Total.....	28,236,272·23	25,395,761·31	Inc.	2,840,510·32

The stock of coal on hand at tidewater shipping points, September 30th, 1891, was 568,233 tons; on August 31st, 1891, 648,900 tons; December, 80,067 tons. Stocks on September 30th, 1890, were 676,318 tons.

PRODUCTION OF BITUMINOUS COAL, for week ending October 17th, and year from January 1st.

EASTERN AND NORTHERN SHIPMENTS.

	1891. Week.	1891. Year.	1890. Year.
Phila. & Erie R.R.....	1,521	135,350	106,338
Cumberland, Md.....	80,364	3,277,034	3,052,407
Barclay, Pa.....	4,261	148,602	122,134
Broad Top, Pa.....	10,671	333,754	408,143
Clearfield, Pa.....	95,029	3,142,079	2,972,836
Allegheny, Pa.....	22,920	1,003,823	1,016,330
Beach Creek, Pa.....	49,267	1,904,948	1,497,590
Pocahontas Flat Top.....	42,861	1,820,298	1,503,996
Kanawha, W. Va.....	40,965	2,115,220	1,651,076
Total	347,859	13,941,108	12,330,850

WESTERN SHIPMENTS.

	1891. Week.	1891. Year.	1890. Year.
Pittsburg, Pa.....	25,465	987,724	653,291
Westmoreland, Pa.....	33,546	1,538,907	902,530
Monongahela, Pa.....	3,789	464,066	416,349
Total	62,800	2,990,697	1,972,170
Grand total.....	410,659	16,931,805	14,303,020

PRODUCTION OF COKE on line of Pennsylvania R. R., for the year ending October 17th, 1891; and year from January 1st, in tons of 2,000 lbs.: Week, 100,396 tons; year, 3,297,731 tons; to corresponding date in 1890, 4,239,860 tons.

Anthracite.

From the preceding tables it will be seen that the output for the month of September was 3,333,404·10 tons, a decrease as compared with the corresponding period last year of 94,673·10 tons. The increase for the year to October 1st is 2,840,510.12 tons. Notwithstanding this enormous increase stocks at tide-water have decreased steadily. On September 30, 1890, they were 676,318 tons; on August 31st, 1891, they were 648,900 tons, and on September 30th, 1891, they were 568,833 tons.

The output for the week ending the 17th inst. was 984,759 tons, which when averaged with the previous week's output of 936,761 tons would give a production at the rate of 4,330,000 tons for the month, against an allotment of 3,750,000 tons. The companies made shipments as follows for this week: Philadelphia and Reading, 238 524 tons; Lehigh Valley, 175,430 tons; Jersey Central, 133,579 tons; Delaware, Lackawanna & Western, 152,874 tons; Delaware & Hudson Canal Company, 92,272 tons; Pennsylvania Railroad Company, 115,511 tons; Pennsylvania Coal Company, 33,442 tons; New York, Lake Erie & Western, 24,499 tons; New York, Ontario & Western, 18,628. The Philadelphia and Reading leads with the largest excess, it amounting to about 64,035 tons. The Delaware, Lackawanna & Western exceeded its allotment by 27,569 tons, and the Lehigh Valley by 22,474 tons.

This very heavy output is finding an avenue of consumption in the line trade and Western market. The companies have not been called to account for their excesses owing to the fact that there has been no sales agents' meeting. However, inquiries instituted elicit the fact that the coal is demanded at full circular prices, and so long as the demand keeps up the producers propose to make hay while the sun shines by meeting it. Navigation to almost all lake ports will continue two weeks longer—a sufficient time in which to supply the Western market with all the additional tonnage it demands. Because of this Western movement there is little or no company coal seeking a market in the East. It is only shipped to tide water on order, and these shipments are said to be exceedingly light. Circular rates, it is claimed, are being maintained by the companies, even at the cost of orders.

The independent operators continue in possession of the market. We learn from them that prices have stiffened materially in a week, owing to an increased demand. As one operator expresses it: "Colder weather—more life—new orders—higher prices." The ruling market quotations given wholesale men are about as follows: Broken, $3.60, egg, $3.90; stove, $4.10@$4.15; chestnut, $3.80. The movement of stocks from the yards of the consumers is brisk, and about the time the local market has crystallized into the stern reality of firm prices, the retailer will be a heavy buyer of stock.

The war clouds seem to be gathering in the none too clear sky of the coal world. The Coxe Bro. & Co., Interstate Commerce, Lehigh Valley coal case is set for a hearing in Philadelphia on the 27th inst., it having been postponed to that date from to-day. The month of November approaches, and with it will come the transfer of 1,000,000 tons of Coxe Bro. & Co.'s tonnage. There has been no action on the part of the association in reference to this change. Nevertheless, the members appreciate the fact that the situation is very critical, and requires the most diplomatic treatment. In the meantime the companies interested are known to be sharpening their axes.

Bituminous.

The soft-coal trade has entered upon the third quarter of the year under the most favorable conditions. Contracts are large; deliveries up to the present time have been far in excess of those of last year; transportation facilities, considering the season, are unusually good, and, more than all else, prices are firm. This has been the history of the trade for six months, and it bids fair to repeat itself during the ensuing winter and spring.

Immediate conditions have changed very little in a week. The car supply is reported a trifle easier, but by no means adequate to meet all demands. New York harbor freights are high, owing to a marked scarcity of vessels; 22½c. is quoted from the Amboys to New York. Ocean freights continue firm at 80@90c. from Philadelphia and Baltimore to Boston. Small vessels to shoal-water ports are in great demand and readily command 20c. above these figures.

Boston. Oct. 22.

(From our Special Correspondent.)

The anthracite market continues to move in a steady manner. Most of the agents report a fair business and say that the present demand is sufficient to keep their supply down to moderate proportions. The outlook is promising and agents hope to see the market continue in its present good condition for some time. Buyers have acknowledged the firm tone of the market and are trading as required. Egg coal continues in short supply and is very firm. Stove is in fair demand and offers rather freely. Broken and chestnut are slow to move in the market. Prices are ruling steady.

The bituminous situation is improving if anything. The supply remains short and the demand is improving. The old contracts are being cared for, and this keeps many of the companies busy. Coal is coming forward very slowly and is commanding full prices.

The freight situation may be said to be in somewhat better condition than it has been. The recent storms have been effective, and rates have moved up a little. From New York 50@60c. is quoted; from Baltimore 75@85c., and from Philadelphia 70@80c.

The retail trade is brisk, and good demand has made it necessary for dealers to buy. The retail price is firm and bids fair to remain so.

The receipts of coal at this port for the week ending October 17th were 42,505 tons of anthracite and 17,174 tons of bituminous, against 33,900 tons of anthracite and 11,954 tons of bituminous for the same week last year. The total receipts thus far this year have been 1,546,342 tons of anthracite and 908,959 tons of bituminous, against 1,364,978 tons of anthracite and 883,992 tons of bituminous for the same time last year.

Buffalo, N. Y. Oct. 22.

(From our Special Correspondent.)

Trade in anthracite coal is fairly active at unchanged quotations. Bituminous coal is in good demand, and dealers are firm at nominally full quoted rates; cars sold on arrival, as a rule, and demurrage charges were of little or no account. The supply is about adequate for trade requirements, both for manufacturing and steamboat purposes. Cool weather has set in at last, and therefore coal will be in demand henceforward for some months for all purposes. Coke met with the average demand, and the trade is without special features.

Navigation has been resumed in Sault Ste. Marie Canal. Vessels pass slowly and at last accounts over 40 were awaiting their turn.

Mr. Joseph E. Gavin, the well-known coal dealer of this city, is the nominee of the Democratic party for the office of City Comptroller.

It is possible that the original plan of extending the Low Grade Division of the Allegheny Valley will be carried out by the new owners, lessening the distance between the anthracite coal regions and Buffalo and other Lake Erie ports.

There has been a good demand for vessels for coal the past week; freights have been firm. The quantity of coal shipped by lake westward from Buffalo, from October 15th to 21st, both days inclusive, was 63,870 net tons, distributed about as follows: 28,250 to Chicago, 16,300 to Milwaukee, 1,150 to Racine, 4,200 to Duluth, 3,350 to Detroit, 3,150 to Toledo, 2,700 to Superior, 200 to St. Clair, 700 to Marquette, 1,820 to Fort William, 660 to Bay Mills, 350 to Green Bay, 240 to Port Colborne and 800 to Menominee.

The rates of freight were 40c. to Chicago, Milwaukee, Marquette, Port Arthur, Green Bay, Escanaba and Saginaw; 50c. to Racine, St. Clair, Mackinaw and Menominee; 20c. to Toledo and Detroit; 25c. to Duluth, Ashland, Washburn and Superior; 45c. to Marine City and 25c. to Bay Mills. Closing firm, with fair inquiry for vessels.

The shipments of coal by canal for the third week in October were 1,493 net tons.

Chicago. Oct. 22.

(From our Special Correspondent.)

Vessel coal is again coming forward quite freely, but so far is readily absorbed at docks, though in several instances we hear of tight squeezing. Under these circumstances it would be perfectly preposterous to expect prices on dock to be maintained, though we do know of one instance this last week, at the close, when a dealer paid $5.25 for 150 tons of dock coal which he required for delivery sure on Saturday. Small egg continues very scarce and many of the larger shippers and wholesalers are instructing western agents and yards to accept no further orders for this grade except at an advance over current rates. All-rail coal is in very light supply, back orders taking all that is coming forward. Car shortage is more acutely felt, there being about three offering where ten or fifteen are required. This refers to both eastern as well as western shipments. New business is comparatively light, and the activity noticed is on back orders. This in point of fact comprises the bulk of the trade at this point. We hear of one shipper who states he is actually 25,000 tons short, and is doubtful as to whether he will be able to fill his yards before close of navigation. Numerous small country orders are reported, but the tonnage is light. Taken as a whole, trade is really better than would be expected from the present weather conditions. The retail trade is fair only, and price is unchanged at $5.75, although concessions are made according to circumstances.

Bituminous coal is fairly active, and shippers are filling orders for Indiana block with reasonable promptness considering the poor car service. It must be said that new business from the country trade and industrial consumers is a trifle light, on account of the unusual large purchases and stocking up during the latter part of last month in expectation of higher values in October. Hocking is in fair demand, and prices are steady. The same may be said of smithing coal, and supplies more plentiful than they have been of late.

Coke is in fair demand; shipments are promptly made, and there is little if any surplus on track. Domestic coke is steadily increasing in favor and demand is rapidly growing both locally and at outside points.

Prices of anthracite per ton of 2,000 pounds f. o. b. Chicago are: Lehigh lump, $6.75; large egg, $5; small egg, range, and chestnut, $5. Retail prices per ton are: Large egg, $5.75; small egg, range, and chestnut, $5.75.

Prices of bituminous per ton of 2,000 pounds f. o. b. Chicago are: Pittsburg, $3.25; Hocking Valley, $2.95; Youghiogheny, $3.40; Indiana block, $2.40; Illinois block, $1.90@$2.

Connellsville coke, 72-hour, per ton f. o. b. Chicago. $5.05; crushed, $4.75; Walston, $5; New River, $5; West Virginia, $4.25@$4 50.

Pittsburg. Oct. 22.

(From our Special Correspondent.)

Coal.—The situation on the river is without change. The mines in the pools will continue to work as long as there are empties to load. From all that can be learned the railroad miners will be allowed to go it alone; the miners are beginning to discover that strikes are a costly proceeding. Most of the railroad miners are out, but do not seem to be making much headway, and are beginning to weaken. A break occurred on Tuesday. The men at Scott's No. 2 mine at West Newton resumed work at the old price. Their action has caused some excitement, and others may follow their example, though the leaders will do all they can to avert it.

Connellsville Coke.—The week's shipments show a slight improvement. The eastern and western consignments fell off, but the Pittsburg shipments increased 150 cars and overbalanced the decrease to other points—41 cars. The H. C. Frick Coke Company is operating about 65% of its ovens four and five days per week, and the McClure Coke Company is running 52% of its ovens full time. The Southwest Coal and Coke Company and several "independents" are on full time. Cars never were so plentiful at this time of the year, and the continued dullness is the result of light demand. New ovens building and repairing those idle continues despite the bad condition of the trade.

The week's shipments amounted to 6,757 cars, the increase over preceding week being 41 cars. They were distributed as follows: To points west of Pittsburg, 3,557 cars; points east of Pittsburg, 1,100; to Pittsburg, 2,100. Prices remain unchanged. Furnace coke, $1.90; foundry, $2.30; crushed, $2.65; all f. o. b. cars at ovens. The output in tons was 121,636.

FREIGHTS.

From Philadelphia to: Alexandria, †85c.; Baltimore, †60c.; Boston, 60@75c.; Bridgeport, *70c.; Charleston, 70c.; Galveston, $2.15; Lynn, $1.00@$1 05; New Orleans, $2.00; New York, †90c; Providence, 55@65c.; Richmond, 70@75c.; Savannah, 70c.; Washington, †85c.

*And discharging. †Alongside.

METAL MARKET.

NEW YORK, Friday Evening, Oct. 23, 1891.

Prices of Silver Per Ounce Troy.

Oct.	Sterling Exch'ge	Lond'n Pence.	N. Y. Cts.	Oct.	Sterling Exch'ge.	Lond'n Pence.	N. Y. Cts.
17	4.83	44 5/16	96¼	21	4 83	44 5/16	96¼
19	4.83	44 5/16	96⅜	22	4.83¼	44 5/16	96¼
20	4.83	44½	96¼	23	4.83¾	44¼	95¾ / 95¼

The Government having been out of the market this week, silver has been absorbed on London account, but owing to lack of orders from India the price has receded, and the market is dull. The United States Assay Office at New York reports the total receipts of silver for the week to be 101 000 ounces.

Silver Bullion Certificates.

	Price. H.	Price. L.	Sales.
Oct. 17	96¼	96¼	70,000
Oct. 19	96⅜	96⅜	126,000
Oct 20	96⅜	96⅜	45,000
Oct. 21	96⅜	96⅜	40,000
Oct. 22	96¾	96⅜	88,000
Oct. 23	96⅞	96	25,000
Total sales			394.000

Domestic and Foreign Coin.

The following are the latest market quotations for American and other coin:

	Bid.	Asked.
Trade dollars	$ .74	$ .76
Mexican dollars	.74¼	.75¼
Peruvian soles and Chilian pesos	.70	.72½
English silver	4.75	4.85
Five francs	.93	.95
Victoria sovereigns	4 83	4.86
Twenty francs	3.84	3.88
Twenty marks	4.74	4.76
Spanish doubloons	15.55	15.70
Spanish 25 pesetas	4.78	4.83
Mexican doubloons	15.50	15.70
Mexican 20 pesos	19 50	19.60
Ten guilders	3.96	4.00
Fine silver bars	.95½	.96

Copper.—The week has been rather an eventful one in the history of copper, and the fluctuations were heavy, the principal interest being centered in the speculative market in London, which we left last week at £49 12s. 6d.@£49 15s. for spot. It will be interesting to note the fluctuations on the different days of the week, the figures being those at the close of the first exchange in London, for spot copper: October 19th, £49 2s. 6d.@£49 5s.; October 20th, £48 15s.@£48 17s. 6d.; October 21st, £49 10s.@£49 12s. 6d.; October 22d, £48 7s. 6d.@£48 10s.; 23rd, £46 2s. 6d.@£46 5s.; to-day's closing price being £46 10s.@£46 12s. 6d. The business done during the week was very large, and whatever copper was offered found ready buyers, the public at large evidently being under the impression that the postponement of the opening at Anaconda was indefinite, but it is very probable that the insiders made good use of the opportunity.

The opening of the Anaconda has now been decided on, and will take place at once. In any case the course of the market indicates that there is very little confidence just now, and that the increased production consequent upon the opening at Anaconda will swell the stocks of the world is without question. But there is one thing which has evidently been overlooked by the operators, and that is that the stocks have come down very much indeed, and that for Europe they are only 61,000 tons, representing but five months' supplies. From the reports received it is evident that consumption has not been brisk in Europe for the last two months, but taking it altogether, the consumption of the metal is a very satisfactory one, and is without doubt on the increase, and it looks to us as if prices for the metal have come down too much, but that this will be rectified before long. Supplies of the new products of the Anaconda company cannot reach Europe before the end of January, and until then there will no doubt be a quite considerable demand for furnace material, which in England is already scarce.

Considering the heavy fluctuations which have taken place during the week, we omit giving the prices for refined sorts, which, we are cabled, are rather irregular and more or less nominal. We also hear that consumers in Europe are buying quite heavily.

Our market was much steadier, and there has not been a great deal of pressure to sell, principally because the available supplies of copper are very low indeed. We have for some time past reported that there are practically no stocks of casting copper, or Arizona copper, and that the works smelting the former are shipping the copper as quickly as it comes out of the furnaces, and nevertheless are behindhand in deliveries. Lately the consumption of Lake copper has also been better, and the larger companies, being well sold out, could afford to be rather independent. During the week some of the smaller companies have sold at about 12⅛c., but only small quantities, as in the meantime some second-hand lots were pressed for sale, and some of the operators at the Metal Exchange were offering small quantities of ingot copper at 11¾c., without finding buyers, but this was evidently done more with the object of reducing prices than of making sales. For casting copper we still have to quote 11⅜@11½c. At the close the market is quite nominal, buyers and sellers alike awaiting developments The shipments to Europe continue heavy.

The exports of copper from the port of New York during the past week were as follows:

To Antwerp—	Copper.	Lbs.	
S. S. Friesland	30 casks	37,500	$5,000
To Havre—	Copper.	Lbs.	
S. S. La Bretagne	611 plates	35,229	$4,500
To Liverpool—	Copper Matte.	Lbs.	
S. S. Gallia	4,176 bags	459,360	$30,000
To Hamburg—	Copper.	Lbs.	
S. S. Wieland	180 barrels	225,000	$28,025

Tin.—Tin has ruled rather quiet, and there has not been much desire to operate shown. If anything, prices have eased off a little. In the beginning of the week business was done at 20·15@20·20c. and afterward at 20·10c., at about which figure we close. Transactions were for wholesale quantities.

The London market was rather spasmodic, considerable business being done at the advance of 10s., but prices here did not respond, and the market closes at £90 7s. 6d. to £91 for spot and £91 10s. to £91 12s. 6d. for three months.

Lead.—Lead has experienced a rather sharp decline, there being but few orders in the market, and pressure from all sides, especially from the speculators holding metal here. From the closing point of last week, 4¾c., the market has been hammered down from day to day in such a manner as to frighten off the few buyers, and we close flat at 4¼c. This heavy decline has evidently taken the Western smelters by surprise, but still quotations there could not be upheld and have also gone down proportionately.

In London Spanish is quoted at £12. 2s 6d. and English 5s. higher.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: "The lead market here is demoralized, and prices are declining rapidly. Lead has been offered down to 4c., and even at that figure only one such sale has been effected."

Spelter.—Business generally has been of a quite retail character, and does not call for much comment. Prices are more or less nominal at 5c. New York.

In England the market is lower, ordinaries being quoted at £23 10s. and specials at £23 12s. 6d.

Antimony.—Antimony has again advanced quite considerably, there being hardly any stocks here, and some of the dealers appear to have oversold themselves, and are compelled to cover. Our advices from England are that makers are almost entirely sold out until the end of January, and are holding for much higher prices. We have to advance quotations for Cookson's to 13¾c., for L. X. to 12¼c., and for Hallett's to 11¼c.

Quicksilver.—The London market, which is being forced up by the Rothschilds, has reached £8. The American market in sympathy quotes $45.50@$46. A further advance is expected.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Oct. 23.

The history of the week's market is a story which has not differed in its material points from that of the past month. Reports of a good Western business, especially in car irons, are met with on every side, and serve to indicate what the market would be were there a general railroad demand.

American Pig Iron.—Locally the demand for Northern pig is very light. There seems to be an upward movement in Southern pig, brought about by Western buying. Furnacemen are not as anxious to make sales as they were a month ago, the feeling being that the future has higher prices in store. We quote prices as follows: Northern, No. 1 X, $17 @$18; No 2 X, $16@$16.50. Southern No. 1 X, $16.50@$17.50; No. 2 X, $15.50@$16.50.

Spiegeleisen and Ferro-manganese.—There has been quite a movement in spiegeleisen, sales being for the most part for future delivery. We quote for 20%, $27.50@$28. It is reported that during last week the ferro-manganese combination controlling the European output had officially agreed to disagree. As a result the brand dropped off to $63@$64. The stocks on hand in this country are said to be ample.

Steel Rails.—The Eastern mills have received several good-sized orders during the week at combination prices. Official returns show that on October 1st sales aggregated 976,536 tons of 50-lb. rails and over, as compared with 894,755 tons on September 1st. Deliveries up to September 1st were 699,027 tons; October 1st, 799,956 tons. Both orders, outstanding and deliveries, show a marked improvement, and one which was hardly expected. It has been so gradual that its permanency is almost assured. The railroads generally have not attempted as yet to enter the market, nor will they until the present rush of business is over. Their earnings will go largely toward the payment of fixed charges, and the money for the purpose of maintenance of way and extension must come from bonds which cannot now be floated advantageously. Early in 1892 there is apt to be a general revival in the steel-rail world. Prices are $30 at mill and $30.75 at tidewater.

Rail Fastenings.—Business is light at the following prices: fish and angle plates, 1·75@1·80c.; spikes, 2·10@2·15c.; bolts and square nuts, 2·75@2 80c.; hexagonal nuts, 2·80@2·85c.

Tubes & Pipe.—Business is light, prices are cut in certain quarters to secure orders. A special meeting of the manufacturers' association was held on the 20th inst., at which the following discounts were ratified: Butt, black, 57½%; butt, galvanized, 47%; lap, black, 67½%; lap, galvanized, 55%; boiler tubes under 3 in., and over 6 in., 55%; 3 in. to 6 in., 60%.

Merchant Steel.—The trade seems to be looking for improved conditions and higher prices, and the consumers are buying in anticipation thereof. Stocks in second hands are low, and considerable buying must take place before they reach their usual standard. Prices are unchanged and firm. We quote: R. Mushet's special, 48c.; English, tool, 15c., net; American tool steel, 7@8c.; special grades, 13@20c.; crucible machinery steel, 4·75c.; crucible spring, 3¾c.; open-hearth machinery, 2·50c.; open-hearth spring, 2·50c.; tire steel, 2·50c.; toe calks, 2·50c.; first quality sheet, 10c.; second quality sheet, 8c.

Structural Iron and Steel.—Business is reported in fair volume and of a general character. Prices remain as follows: Universal plates, $2.20; bridge plates, $2.10; beams, $3.10.

NOTES OF THE WEEK.

The sales of pig iron by the Tennessee Coal and Iron Company for September were 33,000 tons, against 10,000 tons the previous month. During the first half of the present month the sales were 27,000 tons.

Chicago. Oct. 22.

(From our Special Correspondent.)

The event last week in iron interests here was the shut-down of the large rolling-mill plant South Chicago, belonging to the Calumet Iron and Steel Company, and it will not resume until prices and demand are better than they are just now. Thus another competitor for business offering in this district is out of the market. The National Forge and Iron Company's rolling mill at East Chicago is being offered for sale by the receiver to-day; the result is not yet at hand. It will be remembered that this mill was shut down by the creditors several months ago.

There is a quiet agitation going on in building-

trades organizations, in the direction of a closer union, with a view of making some strong demands early in the spring. In structural lines and allied branches contractors are giving the matter close attention, as it may have considerable influence in figuring on their work.

The condition of the iron market shows little change from that of the previous week, excepting that the demand for coke was a little less active, though it is regarded as a lull only. Lake Superior charcoal iron shows no improvement and values continue to sag. Several small orders are noted for cars, though the demand generally from railroad circles for equipment of all kinds is slow. Finished iron, with few exceptions, is less active than it has been. Plates are in light request, but more inquiry is reported for black sheets, and the demand for galvanized sheet iron is excellent. The demand for old material and scrap is exceedingly dull, with large offerings.

Pig Iron.—Some good-sized orders for local and southern coke iron were closed last week, and others are still pending. It is not expected that the volume of business for crude iron will be much augmented until the opening of the new year, though trade will continue to be fair for coke iron with values unchanged. As most of the malleable iron concerns have placed season's contracts, it is not expected that demand for Lake Superior charcoal iron will appreciate to any extent until car-wheel manufacturers come in for supplies, and that will in a very great measure depend upon the railroads. Sales are mostly confined to small lots, with some at less than $17 Chicago. Southern charcoal is in moderate demand only and prices are easy. Tennessee and Alabama coke iron is in better demand and some furnace companies are declining further orders for long scattered deliveries, though others are booking all they can get at concessionary rates. Competition keeps prices on a low level.

Quotations per gross ton f. o. b. Chicago are: Lake Superior charcoal, $17.00@$17.50; Lake Superior coke, No. 1, $15.25@$15.75; No. 2, $15@$15.25; No. 3, $14@$14.50; Lake Superior Bessemer, $17; Lake Superior Scotch, $17@$17.50; American Scotch, $17.75@$18.25; Southern coke, Foundry No. 1, $15.75; No. 2, $15.25; No. 3, $14.50; Southern coke, soft, No. 1, $15.50; No. 2. $14.50; Ohio silveries, No. 1, $18 00; No. 2, $17; Ohio strong softeners, No. 1, $18; No. 2, $17; Tennessee; charcoal, No. 1, $18; No. 2, $17.50; Southern standard car wheel, $20@$21.

Structural Iron and Steel.—There is still quite a good deal of business in sight which hangs fire, although all the figures are in. Several more steel structures are on the "hoards," specifications of which will be ready shortly.

Quotations for car lots f. o. b. Chicago are as follows: Angles, $2@$2.10; tees, $2.50@$2.60; universal plates, $2.35@$2.45; sheared plates, $2.20@$2.30; beams and channels, $3.20.

Plates.—Warehouse business is moderately fair only and mill orders are also somewhat light. Trade is not nearly as active as it was a year ago, besides being considerably cut up into small lots. Steel sheets 10 to 14, $2.50@$2.60; iron sheets, 10 to 14, $2.60@$2.70; tank iron or steel, $2.25@$2.30; shell iron or steel, $3@3.25; firebox steel, $4.25@$5.50; flange steel, $3.25@$3.40; boiler rivets, $4.25; boiler tubes, 2¼ in. and smaller, 55%; 3 to 6 in., 60%; 7 in. and upward, 55%.

Merchant Steel.—Additional contracts are reported for merchant steel from the implement trade, evidencing a desire to cover all probable and possible requirements before prices are further advanced. Best grades of tool steel are in good demand at $6.75@$7 and upward: tire steel, $2.30@$2.50; toe calk, $2.50@$2.65, Bessemer machinery, $2.20@$2.30; Bessemer bars, $2@$2.10; open-hearth machinery, $2.60@$2.75; open-hearth spring, $2.75@$3; crucible spring, $3.75@$4.

Steel Rails.—The market is void of new features. Small orders continue to come forward and inquiry is fair in a general way. A significant features is that several railroads are preparing new bond issues; the money so raised will be used for new equipment of all kinds, which the rigid economies of the past year have made absolutely necessary. Steel rails are firm at $31.50@$33. Other track supplies are in proportionate demand with rails. Regular quotations are: $1.95@$2 for steel, and $1.85@$1.90 for iron; spike at $2 15@$2.20 per 100 lbs.; track bolts, hexagonal nuts, $2.80.

Galvanized Sheet Iron.—Demand is fully as heavy as it has been, and stocks in large warehouses are so badly broken that numerous small orders are forwarded to mills to be filled. Discounts are very firm at 67½% off on Juniata and 67½% and 5% off on charcoal in large lots. Smaller quantities are quoted at 62½%@65% from list.

Black Sheet Iron.—There is a better demand for mill shipments, the trouble being to find a mill which can accept business for prompt or even November shipments. Quotations remain steady at 2 75@2·80c. mill for No. 27 common. Dealers quote 3·10c. for same gauge from stock.

Bar Iron.—Demand is fair and some Valley mill agents are taking orders for deliveries extending to the end of the year at 1·57½c., but on all business for 1892, they are holding firm at 1·60c., and though in one instance a merchant-iron order went in at lower figures, the market is as we quote it. The shut-down of another local mill should have a tendency to strengthen prices. Mills in this neighborhood quote 1·70c. Dealers' prices are 1·85@1·95c. according to quality.

Nails.—Wire nails are still weak, and the situation offers little encouragement to manufacturers as there is an apparent pressure to sell almost regardless of price. Orders are light at $1.80, at mill, though this rate is cut. Dealers quote $2.05 from stock. Steel-cut nails of Wheeling make are not selling in this market. Local makes are quoted at $1.65 regular average and jobbers quote $1.75 from stock in small lots.

Scrap.—Outside of carloads there is nothing doing, and mixed is perfectly flat. Stocks are steadily accumulating and dealers much discouraged. Prices are merely nominal. Last week the offerings of railroads were upward of 6,000 tons. Dealers quote: No. 1 railroad, $18 50; No. 1 forge, $18; No. 1 mill, $13.50; fish plates, $22.50; axles, $22; horseshoes, $18.50; pipes and flues, $11; cast borings, $7.50; wrought turnings, $9.50; axle turnings, $12.50; machinery castings, $12; stove plates, $7.50; mixed steel, $10.50; coil steel, $14.50; leaf steel, $15; tires, $15.50.

Old Rails and Wheels.—Consumers of iron rails would probably pay $22 for such quantities as they required. We hear of a sale of 1,000 tons at $22.25. Old steel rails are lifeless at $13@$15, according to length. A sale of 300 tons of old car wheels is reported at $16. Offerings of everything on the list are very large.

Louisville. Oct., 17.

(Special Report by HALL BROTHERS & CO).

There have been considerable inquiry and a fair volume of business during the past week, and if all the deals now pending are consummated, there will be some round orders placed in the next few days. Locally buying has been light, most of the business being from distant points. Charcoal irons have been in fair request but the inquiry and largest business are in coke metals. There is no material change in the general situation. We quote:

Hot Blast Foundry Irons.—Southern Coke, No. 1, $14.25@$14.50; No. 2, $13.50@$14.00; No. 3, $13@$13.25; Southern Charcoal No. 1, $16@$17; No. 2, $15.50@$16; Missouri Charcoal No. 1, $17@$17.50; No. 2. $16.50@$17.

Forge Irons.—Neutral coke, $12.50@$12.75; Cold short, $12.25@$12.50; Mottled, $11.75@$12.

Car Wheel & Malleable Irons.—Southern standard brands, $19@$19.50; other brands, $17@$18; Lake Superior, $20@$21.

Philadelphia. Oct. 22.

(From our Special Correspondent.)

Pig Iron.—There is a certain undertone of confidence in the pig-iron market which leads makers of standard brands to hesitate a little in accepting large orders for delivery during the first quarter of next year at the lowest market rates now prevailing. Most makers are willing to sell iron as they make it at current rates, but not to sell winter iron if there is a possibility of stronger prices. A good week's business has been done, but there has not been as much of an improvement as many looked for. The increased output has not affected sales, excepting in some inferior brands. Parties who have iron on hand, and who can obtain only inferior brands for prompt delivery, are inclined to let such brands go and wait their chances for better brands. There has been no actual advance, and just at this writing no improvement is assured. No. 1 Foundry ranges from $17.50 to $18; No. 2, $16.50 for standard makes. Forge, $14 to $15, although $14.50 is the average price.

Nails.—There has been a steady movement in nails for some time past, but buyers have been about supplied, and from this time on makers do not count on heavy transactions.

Skelp Iron.—Quotations for grooved are $1.70.

Wrought Iron Pipe.—The only business worth noting is in small sizes.

Sheet Iron.—Winter deliveries are being placed at pretty strong prices, considering the heavy orders. A good deal of galvanized is being ordered for winter delivery. Buyers evidently have confidence in the future of the market.

Ferro-Manganese.—Business has been quite active at $64.

Steel Billets.—Large buyers have made offers for a good deal of material, but their offers are from 25 to 50 cents below what makers believe they can obtain, and hence the week's business has been rather trifling; still there is a strong tone in the market; consumption is heavy, and that counts for a good deal.

Muck Bars.—Business has been light on a basis of $26.50.

Merchant Iron.—The same condition of things is reported this week that has been reported for several weeks past. Business ranges from $1.60 to $1.75, and no change looks probable.

Plate and Tank Iron.—Concessions continue to be the order of the day on large lots. Mill men are looking for large winter orders, and are sacrificing margins for the sake of good winter business. All buyers are looking around for supplies, but the placing of orders is rather disappointing.

Structural Material.—Large orders have been placed this week. The Reading Company, it is said, will be in the market shortly for additional supplies for other work outside of its present terminal. Late last week negotiations were finally completed for the construction of the elevated road, which the Phœnix Iron Company will supply with material.

Steel Rails.—A large amount of business has been done in steel rails in Pennsylvania mills during the past few days. Reports show a difference in the estimated business; the aggregate given here, by a local authority, foots up some 20,000 tons, but a good many more rails have doubtless been sold. Quotations, $30 at mill.

Old Rails.—Quotations are $21 for iron, and $17.50 for steel. Very little doing.

Scrap.—Good railroad scrap offered at $20.50 is picked up quickly, delivery price.

Pittsburg. Oct. 22.

(From Our Special Correspondent.)

Business since our last shows no signs of improvement so far as relates either to prices or demand. In regard to values of raw material Pittsburg prices are relatively lower than any other market in the country. At the same time few dealers imagine that this is anything more than a temporary reaction, although it must be conceded that it will require a heavy demand to give prices an upward turn. The output is so large and there are so many on the lookout for business that it seems almost hopeless to attempt anything of this sort at the present.

Furnace men in this vicinity are not inclined to make any further concessions; in fact some of them have withdrawn from the market, refusing to accept even present rates for Bessemer and grey forge. These parties have an abiding faith that prices will certainly rule higher in the near future, although even those who were the most conservative have been under the necessity of readjusting their ideas in regard to dates.

Reports from the Shenango and Mahoning valleys indicate that business is moderately active. Many of the furnaces are employed in filling contracts that were made during July and August at higher prices than those current at the present time. The Southern furnaces are reported to have disposed of large blocks of pig iron for Western delivery, on the basis of $10 at the furnace for grey forge; add to this the freight and the cost will be above the cost of the same description of iron selling at Pittsburgh. The demand for manufactured iron continues fair for most descriptions; prices are weak, but not quotably lower. There have been no large sales of steel rails; business for this year's delivery has not been large; report says buyers would take next year's delivery at present prices, but makers want more money. Muck bar is weak, buyers offering lower prices. Steel slabs and billets are weak, but are held at last week's figures. Certain descriptions of scrap material are in good request at fair prices.

Coke and Coal Smelted Lake and Native Ores.

1,500 Tons Grey Forge, Nov., Dec.	$13.70 cash.
1,500 Tons Bessemer	15.65 cash.
1,000 Tons Bessemer, Nov., Dec	15.25 cash.
1,000 Tons Grey Forge	13.75 cash.
750 Tons Bessemer, Oct., Nov	15.30 cash.
750 Tons Grey Forge, Nov., Dec	13.60 cash
500 Tons Bessemer, Oct	15.35 cash.
500 Tons Grey Forge, Nov., Dec.	13.70 cash.
500 Tons Grey Forge	13.75 cash.
250 Tons White Iron	13.25 cash.
250 Tons No. 2 Foundry	14.75 cash.
100 Tons White	13.25 cash.
100 Tons Open Mill	14.00 cash.
100 Tons Silvery	16.75 cash.
100 Tons No. 2 Foundry	15.25 cash.
100 Tons Grey Forge	14.00 cash.
100 Tons Grey Forge	13.85 cash.
100 Tons No. 1 Foundry	16.25 cash.

Charcoal.

800 Tons Cold Blast, Southern	25.50 cash.
420 Tons Cold Blast Southern	26.00 cash.
100 Tons No. 2 Foundry	21.00 cash.
100 Tons Warm Blast	20.00 cash.

Steel Slabs and Billets.

1,200 Tons Billets f. o. b. Mill	24.50 cash.
1,000 Tons Billets at Wheeling	24.25 cash.
500 Tons Billets, Pittsburg	24.75 cash.
500 Tons Billets	25.00 cash.
500 Tons Billets	25.00 cash.
300 Tons Billets	25.00 cash.

Muck Bars.

1,000 Tons Neutral, Nov., Dec.	26.75 cash.
750 Tons Neutral	26.50 cash.
500 Tons Neutral	26.75 cash.
400 Tons Neutral	26.50 cash.
300 Tons Neutral	26.35 cash.

Ferro-Manganese.

150 Tons 80%, imported	66.40 cash.
45 Tons 80%, domestic	66.20 cash.

Bloom, Rail and Crop Ends.

1,250 Tons Bloom, Beam and R Ends, Nov., Dec., Jan	16.75 cash.
200 Tons Bloom Ends	17.25 cash.

Skelp Iron.

1,600 Tons Narrow Grooved	1.72½ 4 m.
1,200 Tons Wide Grooved	1.75 4 m.
750 Tons Sheared iron	1.95 4 m.

Old Iron and Steel Rails.

500 Tons American Ts	23.70 cash.
300 Tons " "	23.75 cash.
200 Tons Old Steel Rails, long pieces	18.50 cash.

Steel Wire Rods.

600 Tons American fives at Mill	33.75 cash.

Scrap Material.

375 Tons Leaf Steel, gross	20.00 cash.
200 Tons No. 1 R. R. scrap, net	20.00 cash.
200 Tons Leaf Spring Steel, gross	20.50 cash.
100 Tons Leaf Spring Steel, gross	20.00 cash.
100 Tons Cart Borings, gross	12.00 cash.
50 Tons Hammered Iron Axles, net	27.00 cash.

NEW YORK MINING STOCKS QUOTATIONS.

DIVIDEND-PAYING MINES.

Name and Location of Company.	Oct. 17.		Oct. 19.		Oct. 20.		Oct. 21.		Oct. 22.		Oct. 23.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Adams, Colo.	1.95												150
Alice, Mont.	1 65												100
Argenta													
Atlantic, Mich.													
Belcher, Nev.													
Belle Isle, Nev.													
Bodie Cons., Cal.	.45												300
Bos. & Mont. Mont													
Breece, Colo.	.47												200
Bulwer, Cal.	.30												200
Caledonia, S. Dak.							.70				.70		300
Catalpa													
Chrysolite, Colo.									.20				100
Colorado Central, Colo.													
Commonwealth, Nev.													
Comstock T. bonds, Nev.													
" scrip., Nev.													
Cons. Cal. & Va., Nev.	5.00	4.90	5.00	4.75					5 00				375
Crown Point, Nev.	1 30						1.50		1.70		1.50		500
Deadwood, Dak.							2.10		2 00				200
Eureka Cons., Nev.											1.50		200
Father de Smet, S. Dak.													
Franklin, Mich.													
Freeland, Colo.					.11								700
Gould & Curry, Nev.			1.75						1.85				210
Granite Mountain, Mont.													
Hale & Norcross, Nev.	1.25										1.30		200
Homestake, Dak.									11.50		3.50	3.45	25
Horn-Silver, Utah.	3.50				3 55	3.45							1,700
Independence, Nev.													
Iron Hill													
Iron Silver													
Leadville Cons., Colo.			.14		.14		.14		.15	.14	.15	.13	3,900
Little Chief, Colo.					.30								500
Martin White, Nev.													
Mono, Cal.													
Mt. Diablo, Nev.													
Navajo, Nev.													
N. Belle Isle, Nev.	.60												200
Ontario, Utah					40.00				40 25				120
Ophir, Nev.									3.45		3.45		300
Osceola, Mich.													
Plymouth, Cal.	3.10		3.05	3.00			2.50						400
Quicksilver, Pref., Cal.									23.00				100
" Com., Cal.									5.00	4.75			300
Quincy, Mich.													
Robinson Cons., Colo.	.50	45											500
Savage, Nev.									2.60				100
Sierra Nevada, Nev.	2.00								2.30				300
Silver Cord, Colo.													
Silver King, Ariz.													
Silver Mg. of L. V., N.M.	.50	.45											500
Small Hopes, Colo.													
Standard					1.35				1.30				900
Yellow Jacket, Nev.	1.55						1.80		1.85		1.80		400

NON-DIVIDEND-PAYING MINES.

Name and Location of Company.	Oct. 17.		Oct. 19.		Oct. 20.		Oct. 21.		Oct. 22.		Oct. 23.		Sales
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alpha, Nev.													
Alta	.50				.55		.50				.48		600
American Flag, Colo.													
Andes, Cal.													
Astoria, Cal.					.01				.01		.01		3,500
Augusta, Ga.													
" bonds													
Barcelona, Nev													
Belmont, Cal.	.75		.75		.75		.75		.75		.75		1,400
Best & Belcher, Nev.	2.55		2.60						2.45		2.85		325
Bonanza King, Cal.													
Brunswick, Cal.	.12						.10		.10				1,700
Bullion, Nev.													
Butte & Bost., Mont.													
Castle Creek, Idaho	.03		.03										3,000
Challar							1.30		1.35		1.40		300
Comstock T., Nev.			.17						.17				3,200
Con. Imperial, Nev.													
Con. Pacific, Cal.													
Crescent, Colo.													
Del Monte, Nev.													
El Cristo, Rep. of Col.			.58										100
Emmett													
Exchequer, Nev.													
Hollywood, Cal.													
Huron, Mich.													
Julia													
Kossuth													
Lacrosse, Colo.													
Lee Basin, Colo.													
Mexican, Nev.	2.20		2.30				2.25		2.50		2 50		700
Middle Bar, Cal.													
Monitor, Colo.													
Mutual S. & M. Co., Wash.													
Nevada Queen, Nev.													
N. Standard, Cal.													
N. Commonwealth, Nev.													
Occidental, Nev.	.75	.70											300
Overman													
Phœnix Lead, Colo.													
Phœnix of Ariz.	.42	.38			.35		.43	.40			.14		300
Potosi, Colo.	2.15												800
Rappahannock, Va.													100
S. Sebastian, S. Sal.													
Santa Fe, N. M.													
Scorpion, Nev.													
Seg. Belcher, Nev.													
Shoshone, Idaho.													
Silver Queen													
Sullivan Con., Dak.													
Sutro Tunnel, Nev.													
Syndicate													
Tornado Con., Nev.													
Union Cons., Nev.	2.10		2.10										300
Utah, Nev.	.50		.55				55		.55		65		1,400

*Ex. dividend. †Dealt in in the New York Stock Ex. Unlisted securities. ‡Assessment paid. §Assessment unpaid. Dividend shares sold, 13,990. Non-dividend shares sold, 18,325.
Total shares sold 32,315.

BOSTON MINING STOCK QUOTATIONS.

Name of Company.	Oct. 16.		Oct. 17.		Oct. 19.		Oct. 20.		Oct. 21.		Oct. 22.		Sales.
Atlantic, Mich.									13.13		13.00		395
Bodie, Cal.													
Bonanza Development.											.50		100
Bost. & Mont., Mont.	44.75	44.37			44.50	44.00	44.00		44.75	44.50	44.63	43.50	2,874
Breece, Colo.													
Calumet & Hecla, Mich.					260	258	258	256	255		255		47
Catalpa, Colo.													
Central, Mich.													
Cœur d'Alene, Id.													
Con. Cal. & Va., Nev.													
Dunkin, Colo.													
Eureka, Nev.													
Franklin, Mich.									17.00		17.00	16.50	130
Honorine, Utah.													
Horn Silver, Utah.													
Kearsarge Mich.					14.00		14.00		14.00		11.00		260
Little Chief, Colo.													
Little Pittsburg, Colo.													
Minnesota Iron.													
Napa, Cal.					4.50	4.00							200
Ontario, Utah.													
Osceola, Mich.	34.75	34.50	35.00		35.00		35.00	34 25	34.50	34.00	34.00	32.00	2,280
Quincy, Mich.													
Ridge, Mich.													
Sierra Nevada, Nev.													
Silver King, Ariz.													
Stormont, Utah.													
Tamarack, Mich.	172		170				170		170	167	167	165	246
Tecumseh, Mich.													

Name of Company.	Oct. 16.		Oct. 17.		Oct. 19.		Oct. 20.		Oct. 21.		Oct. 22.		Sales
Allouez, Mich.	2.13										2.00	1.87	1,150
Arnold, Mich.											1.75	.90	60
Aztec, Mich.													
Brunswick, Cal.													
Butte & Boston, Mont.					16.50		17.00	16.50	16.50		16.75	16.50	16.50	15.50	2,180
Centennial, Mich.							15.50	15.00			15.50		15.00	14.50	580
Comstock, T., Nev.													
Copper Falls, Mich.													
Crescent, Colo.													
Dana, Mich.													
Don Enrique, N. M.													
El Cristo, S. A.													
Hanover, Mich.													
Humboldt, Mich.													
Hungarian, Mich.													
Huron, Mich.	.25					.25	.12½	.12½	.10	.12½		.15	.10	4,510
Mesnard, Mich.													
National, Mich.													
Native, Mich.													
Oriental & M., Nev.													
Phœnix, Ariz.													
Pontiac, Mich.													
Rappahannock, Va.													
Santa Fe, N. Mex.	.40	.37½						.35		.37½				1,200
Shoshone, Idaho.													
South Side, Mich.													
Star, Mich													
Washington, Mich.													
Wolverine					4.50	4.00	4.00				4.50		5.00	4.00	512

Dividend shares sold, 6,532. Non-dividend shares sold, 10,042. Total shares sold, 16,574.

COAL STOCKS.

Name of Company.	Oct. 17.		Oct. 19.		Oct. 20.		Oct. 21.		Oct. 22.		Oct. 23.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
American Coal.													
Cambria Iron.													
Cameron Coal & I. Co.													
Ches. & O. R. R.													
Chic. & Ind. Coal R. R.													
Do. pref.													
Col. C. & I.	38¾	38½	38¼	38	38⅛	37⅞	38⅛	38	38¼	37⅝	38	37⅝	2,885
Col. C. & Hocking C. I.	15⅞				16¼	15	16⅛	16¼					700
Consolidation Coal.													
Del. & H. C.	135⅞	135¼	134⅞	134¼	135	134⅛	135¾	135	135⅛	134⅛	134⅛	134¼	3,680
D., L. & W. R. R.	143½	143	143¾	142⅝	143	142⅝	144⅛	143	144	142⅞	143⅝	143	42,110
Hocking Valley	33⅛	32⅞	33	32¼	33	32⅛	33⅛	32¼	33	32⅝	33		3,035
Hunt & Broad Top.	25½				25⅝								140
Do. pref.			47½	47			47½		47				148
Illinois C. & Coke Co.													
Lehigh C. & N.	49⅝	49⅛	49¼		49⅝		50	49⅝	50¼	49⅝			3,361
Lehigh Valley R. R.	50¾		50⅝		50¾		51	50¾	50⅝	50⅛			1,023
Lehigh & Wilk. Coal.													
Mahoning Coal.													
Do. pref.													
Maryland Coal.											21⅛	21	300
Morris & Essex.			142½								144		189
New Central Coal.													
N. J. C. R. R.			117				117¾	117	118		117⅜		1,510
N. Y. & S. Coal.													
N. Y., Susq. & West.	10¼	10			10¼	10	10¼	10			10		1,635
Do. pref.			39										10
N. Y. & Perry C. & I.													
Norfolk & West. R. R.			18										100
Do. pref.			53⅜	53¼									200
Penn. Coal.											270		12
Penn. R. R.	55⅜	55¼	55¼	55	55¼	55	55⅜	55⅜	55⅝	55⅝			17,619
‡Ph. & R. R. R.	41⅞	41½	41	40⅝	41¼	41	42	41¾	41⅜	41⅛	42¼	41⅝	70,914
Sunday Creek Coal.													
Do. Pref.													
Tennessee C. & I. Co.	41				40¾	40	40⅝	40⅛	40⅜	40	40¾	40	2,850
Do. pref.													
Westmoreland Coal.													

Total shares sold, 152,416.

San Francisco Mining Stock Quotations.

Names of Stocks.	Closing Quotations. Oct. 16.	Oct. 17.	Oct. 19.	Oct. 20.	Oct. 21.	Oct. 22.
Alpha						
Alta	.40	.45	.45	.40	.40	.40
Belcher						
Belle Isle	.50	.50	.50			.40
Best & Belcher	2.45	2.50	2.50	2.45	2.25	2.40
Bodie	.40	.40	.35	.35	.35	.35
Bulwer	.20	.20	.20	.15	.20	.20
Challar	1.20	1.15	1.15	1.15	1.20	1.25
Commonwealth	.30	.25	.25	.25	.25	
Cons. Cal. & Va	4.70	4.55	4.45	4.45	4.75	5.13
Cons. Pacific						
Crown Point	1.25	1.50	1.40	1.35	1.40	1.35
Del Monte, Nev.						
Eureka C						1.00
Gould & C	1.60	1.60	1.60	1.55	1.65	1.65
Hale & Norcross	1.15	1.15	1.15	1.15	1.20	1.15
M. White						
Mexican	2.10	2.15	2.20	2.00	2.05	2.35
Mono	.10	.15	.20	.30	.35	.35
Mt. Diablo						
Navajo	.10	.10	.15			
Nev. Queen	.25	.20	.20	.20	.25	.20
N. Belle Isle	.50	.50	.45	.40	.35	.40
N. Commonwealth						
Ophir	2.95	2.95	2.95	2.85	3.00	3.20
Potosi	2.05	2.05	1.90	1.90	2.10	1.90
Savage	2.45	2.40	2.25	2.25	2.40	2.35
Sierra Nev.	2.00	1.95	1.80		1.90	2.00
Union Con.	2.00	1.95	2.05	2.10	2.20	2.15
Utah	.45	.45	.50	.45	.45	.50
Yellow Jack	1.55	1.70	1.65	1.65	1.70	1.65

DIVIDEND-PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Par	Assessments. Total levied.	Date and amount of last			Dividends. Total paid.	Date & amount of last.		
1	Adams, s. l. c.	Colo.	$1,500,000	150,000	$10	*	...	...	...	$607,500	Sept.	1891	.05
2	Alice, s.	Mont.	10,000,000	400,000	25	*	...	...	...	945,000	Aug.	1891	.06¼
3	Alma & Nel Wood., g.	Idaho	300,000	30,000	10	*	...	...	...	60,000	Jan.	1889	.50
4	Amador, g.	Cal.	1,250,000	250,000	5	*	...	...	...	31,250	Aug.	1890	.12½
5	American Belle, s.g.c	Colo.	2,000,000	400,000	5	*	...	...	...	50,000	April	1891	.12½
6	Americ'n & Nettie, g.s	Colo.	...	300,000	...	...	...	...	...	150,000	Nov.	1889	.10
7	Amy & Silversmith, s.	Mont.	...	341,419	...	...	...	...	...	247,530	Aug.	1887	.12½
8	Atlantic, c.	Mich.	1,000,000	40,000	25	$280,000	April	1875	$1.00	700,000	Feb.	1891	1.00
9	Argenta, s.	Nev.	10,000,000	100,000	100	335,000	July.	1889	.10	40,000	Feb.	1880	.20
10	Aspen Mg. & S., s. l.	Colo.	2,000,000	200,000	10	*	...	...	...	660,000	May.	1891	.10
11	Aurora, i.	Mich.	2,500,000	100,000	25	...	...	...	...	155,000	April	1891	1.00
12	Badger, s.	Ont.	250,000	50,000	5	...	...	...	...	37,500	Mar.	1890	.25
13	Bangkok Cora Bell, s.	Colo.	600,000	600,000	1	*	...	...	...	44,510	Aug.	1890	.00⅛
14	Belle Isle, s.	Nev.	10,000,000	100,000	100	190,000	Dec.	1889	.15	300,000	Dec.	1879	.25
15	Belcher, s. g.	Nev.	10,400,000	104,000	100	2,978,000	Feb.	1891	.50	15,397,000	April	1876	1.00
16	Bellevue, Idaho, s. l.	Idaho	1,250,000	125,000	10	120,000	Dec.	1889	.25	200,000	Jan.	1890	.10
17	Bi-Metallic, s. g.	Mont.	5,000,000	200,000	25	...	...	...	...	760,000	June	1891	.35
18	Bodie Con., g. i.	Cal.	10,000,000	100,000	100	550,000	June	1890	.25	1,602,572	April	1885	.50
19	Boston & Mont., g.	Mont.	2,500,000	250,000	10	*	...	...	...	520,000	June	1886	.15
20	Boston & Mont., c. s.	Mont.	2,500,000	100,000	25	*	...	...	...	1,950,000	Aug.	1891	1.00
21	Breece, i.	Colo.	5,000,000	200,000	25	*	...	...	...	2,000	Feb.	1880	.01
22	Brooklyn Lead, l. s.	Utah	500,000	50,000	10	...	...	...	...	127,000	July.	1887	.05
23	Bulwer, g.	Cal.	10,000,000	100,000	10	130,000	Aug.	1889	.25	175,000	Jan.	1884	.10
24	Bunker Hill & S. s.l.	Idaho	3,000,000	300,000	10	*	...	...	...	150,000	Oct.	1883	.06¼
25	Caledonia, g.	Dak.	10,000,000	100,000	100	505,000	May.	1885	.15	192,000	Oct.	1890	.08
26	Calliope, s.	Colo.	1,000,000	1,000,000	...	...	...	...	...	140,000	Jan.	1891	.00½
27	Calumet & Hecla c.	Mich.	2,500,000	100,000	25	1,200,000	...	...	...	36,350,000	Sept	1891	5.00
28	Catalpa, s. l. i.	Colo.	3,000,000	300,000	10	*	...	...	...	270,000	May.	1884	10
29	Centen'l-Eureka, s.l	Utah.	1,500,000	30,000	50	...	...	...	...	442,500	Oct.	1891	1.00
30	Central, c.	Mich.	500,000	20,000	25	100,000	Oct.	1861	.65	1,970,000	Feb.	1891	1.00
31	Chrysolite, s. l.	Colo.	10,000,000	200,000	50	*	...	...	...	1,650,000	Dec.	1884	.25
32	Clay County, g.	Colo.	200,000	200,000	1	*	...	...	...	44,000	Aug.	1891	.02
33	Cœur D'Alene, s. l.	Idaho	5,000,000	500,000	10	...	...	...	...	310,000	Nov.	1891	.02
34	Colorado Central, s.l.	Colo.	2,750,000	275,000	10	*	...	...	...	406,250	Aug.	1889	.05
35	Commonwealth, s.	Nev.	10,000,000	100,000	100	170,000	Nov.	1888	.50	20,000	Nov.	1890	.20
36	Confidence, s. l.	Nev.	...	24,960	...	328,880	May	1890	.75	199,680	April	1889	1.00
37	Cons. Cal. & Va., s.g.	Nev.	21,600,000	216,000	100	108,000	Jan.	1885	.20	3,682,800	Aug.	1891	.50
38	Contention, s.	Ariz.	12,500,000	250,000	50	...	...	...	...	†2,587,500	Dec.	1884	.25
39	**Cop. Queen Con., c	Ariz.	1,400,000	140,000	10	...	...	...	...	210,000	Feb.	1889	.50
40	Cortez, s.	Nev.	1,500,000	300,000	05	*	...	...	...	481,000	Feb.	1891	.46
41	Crescent, s. l. g.	Utah	15,000,000	600,000	25	*	...	...	...	228,000	Oct.	1888	.03
42	Crown Point, g. s.	Nev.	10,000,000	100,000	100	2,425,000	Sept.	1889	.50	11,588,000	Jan.	1875	2.00
43	Cumberland, l. s.	Mont.	5,000,000	500,000	10	*	...	...	...	15,000	Nov.	1889	.03
44	Daly, s. l.	Utah	3,000,000	150,000	20	...	...	...	...	2,100,000	Sept.	1891	.25
45	Deer Creek, s. g.	Idaho	1,000,000	200,000	5	*	...	...	...	20,000	June	1889	.05
46	Deadwood-Terra, g.	Dak.	5,000,000	200,000	25	*	...	...	...	1,030,000	Oct.	1891	.05
47	DeLamar, s. g.	Idaho	2,000,000	400,000	5	...	...	...	...	72,000	July	1891	.13
48	Derbec B. Grav., g.	Cal.	10,000,000	100,000	100	90,000	Dec.	1881	.10	240,000	Oct.	1890	.10
49	Dunkin, s. l.	Colo.	5,000,000	200,000	25	*	...	...	...	390,000	Oct.	1889	.05
50	Dunstone, g. s. l.	Mont.	1,000,000	200,000	5	*	...	...	...	6,000	Nov.	1888	.03
51	Eclipse, l. s.	Colo.	100,000	100,000	1	...	...	...	...	20,000	Nov.	1887	10
52	Elkhorn, s. l.	Mont	1,000,000	200,000	5	*	...	...	...	¶396,000	June	1891	1.00
53	Enterprise, s.	Colo.	100,000	10,000	10	*	...	...	...	40,000	May.	1888	1.00
54	Eureka Con., s. l. g.	Nev.	5,000,000	50,000	100	550,000	June	1889	.50	4,892,500	Oct.	1890	.25
55	Evening Star, s. l.	Colo.	500,000	50,000	10	*	...	...	...	1,450,000	Dec.	1889	.25
56	Father de Smet, g.	Dak.	10,000,000	100,000	100	200,000	Nov.	1878	1.00	1,125,000	Dec.	1885	.20
57	Franklin, c.	Mich.	1,000,000	40,000	25	220,000	June	1871	...	1,040,000	July.	1891	2.00
58	Freeland, s. g.	Colo.	5,000,000	200,000	25	*	...	...	...	190,000	July.	1886	.10
59	Garfield Lt., g. s.	Nev.	500,000	100,000	5	...	...	...	...	90,000	April	1888	.12½
60	Gould & Curry, s. g.	Nev.	10,800,000	108,000	100	3,988,800	Sept.	1890	.25	3,826,800	Oct.	1870	10.00
61	Grand Prize, s.	Nev.	10,000,000	100,000	100	785,000	Jan.	1890	.30	495,000	Mar.	1884	.25
62	Granite, s. l.	Idaho	500,000	500,000	1	*	...	...	...	28,400	Oct.	1889	.02
63	Granite Mountain, s.	Mont.	10,000,000	400,000	25	...	...	...	...	11,400,000	Oct.	1891	.25
64	Green Mountain, g.	Cal.	1,250,000	125,000	10	*	...	...	...	212,000	Nov.	1881	.07½
65	Hale & Norcross, g. s.	Nev.	11,200,000	112,000	100	5,142,800	April	1890	.50	1,822,000	Aug.	1888	.50
66	Hecla Con., s. g. l. c.	Mont.	1,500,000	30,000	50	...	...	...	...	1,680,000	Aug.	1891	.50
67	Hel'a Mg. & Red, s.l.g.	Mont.	3,315,000	663,000	5	*	...	...	...	197,975	July.	1886	.06
68	Holmes, s.	Nev.	10,000,000	100,000	100	370,000	May.	1890	.25	75,000	April	1886	.25
69	Homestake, g.	Dak.	12,500,000	125,000	100	200,000	July.	1878	1.00	4,731,750	Aug.	1891	.10
70	Honorine, s. l.	Utah	500,000	250,000	2	37,500	April	1889	.05	125,000	Sept.	1887	.05
71	Hope, s.	Mont.	1,000,000	100,000	10	*	...	...	...	233,252	April	1888	.25
72	Horn-Silver, s. l.	Utah	10,000,000	400,000	25	*	...	...	...	4,300,000	Sept.	1891	.12½
73	Hubert, g.	Colo.	1,000,000	1,000,000	1	*	...	...	...	247,000	Dec.	1889	.00½
74	Idaho, g.	Cal.	310,000	3,100	100	...	...	...	...	2,325,450	Oct.	1891	2.00
75	Illinois, s.	N. M.	100,000	100,000	1	*	...	...	...	45,000	April	1889	.20
76	Iron Hill, s.	Dak.	2,500,000	250,000	10	134,000	July.	1888	.05	156,250	Nov.	1887	.07½
77	Iron Mountain, s.	Mont.	500,000	500,000	1	*	...	...	...	120,000	Feb.	1891	.05
78	Iron-Silver, s. l.	Colo.	10,000,000	500,000	20	*	...	...	...	2,500,000	April	1889	.20
79	Jackson, g. s.	Nev.	5,000,000	50,000	100	237,500	Nov.	1888	.20	60,000	Jan.	1891	.10
80	Jay Gould, g. s	Mont	2,000,000	40,000	5	*	...	...	...	459,000	May	1890	.04
81	Kearsarge, c.	Mich.	1,000,000	40,000	25	190,000	Oct.	1887	1.00	80,000	Jan.	1890	2.00
82	Kentuck, s. g.	Nev.	3,000,000	30,000	10	417,43	Dec.	1890	.3	1,350,000	Dec.	1886	.10
83	La Plata, s. l.	Colo.	2,000,000	200,000	10	*	...	...	...	610,000	Sept.	1882	.30
84	Leadville Con., s. l.	Colo.	4,000,000	400,000	10	*	...	...	...	423,000	April	1887	.05
85	Lexington, g. s.	Mont.	4,000,000	40,000	100	*	...	...	...	565,000	Jan.	1885	2.00
86	Little Chief, s. l.	Colo.	10,000,000	200,000	50	*	...	...	...	820,000	Dec.	1890	.05
87	Little Rule, s.	Colo.	500,000	500,000	...	...	...	...	...	19,000	Sept.	1891	.02
88	Mammoth, s. l. c.	Utah	10,000,000	400,000	25	119,000	...	1882	.25	960,000	June	1891	.10
89	Martin White, s.	Nev.	10,000,000	100,000	100	1,225,000	Oct.	1890	.25	140,000	Dec.	1886	.25
90	Mary Murphy, s. g.	Colo.	350,000	3,500	100	*	...	...	...	175,000	May.	1888	5.00
91	Matchless, s. l.	Colo.	500,000	500,000	...	*	...	...	...	15,000	Feb.	1890	.00½
92	May Mazeppa, s. l.	Colo.	1,000,000	100,000	...	...	...	...	...	168,000	July.	1891	.01¼
93	Minas Prietas, g. s.	Mex.	1,000,000	100,000	10	*	...	...	...	350,000	Dec.	1890	.50
94	Minnesota, c.	Mich.	1,000,000	40,000	25	420,000	April	188	1.00	1,820,000	Mar.	1876	...
95	Mollie Gibson, s.	Colo.	5,000,000	1,000,000	...	*	...	...	...	650,000	Oct.	1891	.05
96	Monitor, g.	S. Dak	2,500,000	250,000	...	...	...	...	...	45,000	Oct.	1890	.03
97	Mono, g.	Cal.	5,000,000	50,000	...	763,000	Sept.	189	.2	12,500	Mar.	1886	.25
98	Montana, Lt., g. s.	Mont	3,300,000	660,000	...	*	...	...	...	2,619,07	June.	1891	.12½
99	Morning Star, s. l.	Colo.	1,000,000	100,000	...	...	...	...	...	925,000	April	1891	.25
100	Moulton, s. g.	Mont	2,000,000	400,000	...	*	...	...	...	380,000	Dec.	1887	.07½
101	Mount Pleasant, g.	Cal.	150,000	150,000	...	*	...	...	...	150,000	Feb.	1887	.30
102	Mt. Diablo, s.	Nev.	5,000,000	50,000	...	137,500	June	188	2.00	180,000	Sept.	1890	.40
103	Napa, q.	Cal.	700,000	100,000	...	...	...	...	...	430,000	Oct.	1891	.10
104	Navajo, g. s.	Nev.	10,000,000	100,000	...	500,000	April	1890	.1	229,950	April	1889	.10
105	New California, g.	Colo.	800,000	160,000	...	*	...	...	...	48,800	May.	1890	12½
106	New Guston, s.	Colo.	550,000	110,000	...	...	...	...	...	995,000	Oct.	1891	1.00
107	N. Hoover Hill, g. s.	N. C.	300,000	120,000	2½	*	...	...	...	30,000	Dec.	1885	.06½
108	Northern Belle, s.	Nev.	5,000,000	50,000	100	425,000	Jan.	1884	8.00	2,400,000	April	1883	.50
109	North Belle Isle, s.	Nev.	10,000,000	100,000	100	395,000	April	1890	.20	230,000	May.	1888	.50
110	North Star, g.	Cal.	1,000,000	100,000	10	...	...	...	...	300,000	April	1889	.50
111	Ontario, s. l.	Utah	15,000,000	150,000	100	...	...	...	...	12,2[illegible]0,000	Sept.	1891	.50
112	Ophir, g. s.	Nev.	10,000,000	100,000	100	4,210,64	April	1890	.50	1,595,800	Jan.	1880	1.00
113	Original, s. c.	Mont	1,500,000	60,000	25	*	...	...	...	138,000	Jan.	1889	.05
114	Oro, s. l. g.	Colo.	500,000	100,000	...	...	...	...	...	95,000	July.	1890	.20
115	Osceola, c.	Mich.	1,250,000	50,000	25	480,000	April	1876	1.6	1,547,500	Oct.	1891	1.00
116	Parrot, c.	Mont.	1,800,000	180,000	10	...	...	...	...	850,000	May.	1891	.10
117	Peacock, s. g. c.	N. M.	2,000,000	200,000	10	*	...	...	...	60,000	Nov.	1886	...
118	Plumas Eureka, g.	Cal.	1,406,250	140,625	10	...	...	...	...	2,548,000	Oct.	1889	.37½
119	Plymouth Con., g.	Cal.	5,000,000	100,000	50	*	...	...	...	2,280,000	Feb.	1888	.40
120	Quicksilver, pref., q.	Cal.	4,300,000	43,000	100	...	...	...	...	1,770,161	Jan.	1891	1.50
121	" com., q.	Cal.	5,700,000	57,000	100	...	...	...	...	643,867	July.	1882	.40
122	Quincy, c.	Mich.	1,000,000	40,000	25	200,000	Dec.	1862	...	5,970,000	Aug.	1891	5.00
123	Reed National, s. g.	Colo.	500,000	500,000	1	*	...	...	...	50,000	Dec.	1890	.01
124	Rialto, g.	Colo.	300,000	300,000	1	*	...	...	...	21,000	Oct.	1891	.01¼
125	Richmond, s. l.	Nev.	1,350,000	54,000	25	*	...	...	...	4,332,88	Jan.	1891	.62½
126	Ridge, c.	Mich.	500,000	20,000	25	219,[illegible]	Mar.	1886	.5	99,78	Feb.	1880	.50
127	Robinson Con., s. l.	Colo.	10,000,000	200,000	50	*	...	...	...	585,000	Mar.	1886	.05
128	Running Lode, g.	Colo.	1,000,000	1,000,000	1	*	...	...	...	20,000	Aug.	1891	.00½
129	Savage, s.	Nev.	11,200,000	112,000	100	6,604,000	Nov.	1889	.50	4,460,000	June	1869	3.00
130	Sheridan, s. g.	Colo.	300,000	3,000	100	*	...	...	...	225,000	Dec.	1890	3.33⅓
131	Shoshone, g.	Idaho	150,000	150,000	...	...	...	...	...	7,500	April	1883	.01
132	Sierra Buttes, g.	Cal.	2,225,000	122,500	10	...	...	...	...	1,492,55	April	1888	.12½
133	Sierra Nevada, s. g.	Nev.	10,000,000	100,000	100	6,296,910	May.	1890	.50	102,000	Jan.	1871	1.00
134	Sierra Nevada, s. l.	Idaho	1,000,000	1,000,000	1	*	...	...	...	40,000	May.	1889	.02
135	Silent Friend	Colo.	500,000	500,000	1	...	...	...	...	47,500	Aug.	1891	.03
136	Silver Cord, s. l. g.	Colo.	4,500,000	450,000	10	...	...	...	...	265,000	April	1889	10
137	Silver King, s.	Ariz.	10,000,000	100,000	100	130,000	Nov.	1890	.30	1,950,000	July	1887	.25
138	Silver Mg. of L. V., s.l.	N. M.	500,000	500,000	1	*	...	...	...	375,000	May	1891	.05
139	Small Hopes Con., s.	Colo.	5,000,000	250,000	20	*	...	...	...	3,162,500	Oct.	1890	.10
140	Spring Valley, g.	Cal.	200,000	200,000	1	50,000	Oct.	1886	.25	56,000	Jan.	1881	.25
141	Standard, g. s.	Cal.	10,000,000	100,000	100	100,000	June	1890	.50	3,605,000	Oct.	1891	.10
142	Stormont, s.	Utah	500,000	500,000	1	*	...	...	...	155,000	Nov.	1881	.05
143	St. Joseph, l.	Mo.	1,500,000	150,000	10	*	...	...	...	1,974,000	Dec.	1890	.02
144	Tamarack, c.	Mich.	1,250,000	50,000	25	520,000	April	1885	3.00	2,290,000	Nov.	1891	4.00
145	Tombstone, g. s. l.	Ariz.	12,500,000	500,000	25	*	...	...	...	1,250,000	April	1882	.10
146	United Verde, c.	Ariz.	3,000,000	300,000	10	*	...	...	...	127,500	May.	1890	.10
147	Viola Lt., s. l.	Idaho	750,000	150,000	5	...	...	...	...	337,500	Nov.	1888	.37½
148	Ward Con., s.	Colo.	2,000,000	200,000	10	...	...	...	...	20,000	Dec.	1889	.05
149	Woodside, s. l.	Utah	100,000	100,000	1	...	...	...	...	25,000	Oct.	1889	.25
150	W. Y. O. D.	Cal.	30,000	15,000	2	11,250	Feb.	1890	.10	4,500	May.	1891	.10
151	Yankee Girl, s.	Colo.	2,500,000	250,000	10	...	...	...	...	1,405,000	April	1891	.50
152	Yellow Jacket, g. s.	Nev.	12,000,000	120,000	100	5,508,000	Mar.	1889	.50	2,184,000	Aug.	1871	2.50
153	Young America, g.	Cal.	...	...	...	...	...	...	...	175,000	Jan.	1889	.10

NON-DIVIDEND PAYING MINES.

	Name and Location of Company.		Capital Stock.	Shares. No.	Par	Assessments. Total levied.	Date and am't of last.		
1	Allegheny, s.	Colo.	$5,000,000	500,000	$10	*	...	...	...
2	Alliance, s. g.	Utah.	100,000	100,000	1	$120,000	Feb.	1891	.20
3	Allouez, c.	Mich.	2,000,000	80,000	25	737,000	Jan.	1890	.70
4	Alpha Con., g. s.	Nev.	3,000,000	30,000	100	112,500	Sept.	1890	.25
5	Alta, s.	Nev.	10,080,000	100,800	100	3,359,800	Sept.	1890	.50
6	American Flag, s.	Colo.	1,250,000	125,000	10	300,000	June	1887	...
7	Amity, s.	Colo.	250,000	250,000	1	...	...	...	...
8	Anchor s. l. g.	Utah.	3,000,000	150,000	20	410,000	June	1890	.20
9	Anglo-Montana, Lt.	Mont.	600,000	120,000	5	...	...	...	...
10	Astoria, g.	Cal.	200,000	100,000	2	...	...	...	...
11	Barcelona, g.	Nev.	5,000,000	200,000	25	*	...	...	...
12	Bechtel Con., g.	Cal.	10,000,000	100,000	100	173,500	...	1883	.10
13	Belmont, g.	Cal.	500,000	500,000	1	*	...	...	...
14	Belmont, s.	Nev.	5,000,000	50,000	100	735,000	April	1886	.10
15	Best & Belcher, s. g.	Nev.	10,080,000	100,800	100	2,279,275	Aug.	1890	.25
16	Black Oak, g.	Cal.	3,000,000	300,000	10	*	...	...	...
17	Boston Con., g.	Cal.	10,000,000	100,000	100	170,000	Nov.	1883	.25
18	Bremen, s.	N. M.	5,000,000	500,000	10	*	...	...	...
19	Brownlow, g.	Colo.	250,000	250,000	1	...	...	...	...
20	Brunswick, g.	Cal.	2,000,000	400,000	5	*	...	...	...
21	Buckeye, s. l.	Mont.	1,000,000	500,000	2	...	...	...	...
22	Bullion, s. g.	Nev.	10,000,000	100,000	100	2,790,000	Dec.	1889	.25
23	Butte & Boston, c. s.	Mont.	5,000,000	200,000	...	...	...	...	.25
24	Calaveras, g.	Cal.	500,000	500,000	1	*	...	...	...
25	Carisa, g.	Wy.	500,000	100,000	5	*	...	...	...
26	Carupano, g. s. l. c.	Ven.	200,000	100,000	2	*	...	...	...
27	Cashier, g. s.	Colo.	500,000	250,000	2	*	...	...	...
28	Cherokee, g.	Cal.	1,500,000	150,000	10	...	...	...	...
29	Chollar, s. g.	Nev.	11,200,000	112,000	100	1,540,000	Nov.	1889	.50
30	Cleveland, t.	Dak.	1,000,000	500,000	2	*	...	...	...
31	Colchis, s. g.	N. M.	500,000	50,000	10	...	...	...	...
32	Colorado Silver	Colo.	1,625,000	325,000	5	...	...	...	...
33	Comstock Tun.	Nev.	10,000,000	100,000	100	35,000	Mar.	1887	.15
34	Con. Imperial, g. s	Nev.	5,000,000	50,000	100	1,875,000	July.	1890	.05
35	Con. New York, s. g.	Nev.	5,000,000	100,000	50	70,000	Nov.	1890	.15
36	Con. Pacific, g.	Cal.	6,000,000	60,000	100	198,000	June	1890	.10
37	Con. Silver, s.	Mo.	2,500,000	250,000	10	...	...	...	...
38	Crescent, s. l.	Colo.	3,000,000	300,000	10	*	...	...	...
39	Crocker, s.	Ariz.	10,000,000	100,000	100	150,000	June	1890	.15
40	Crowell, g.	N. C.	500,000	500,000	1	...	...	...	...
41	Dahlonega, g.	Ga.	250,000	250,000	1	*	...	...	...
42	Dandy, s.	Colo.	5,000,000	500,000	10	...	...	...	...
43	Decatur, s.	Colo.	1,500,000	300,000	5	*	...	...	...
44	Denver City, s.	Colo.	5,000,000	500,000	10	*	...	...	...
45	Denver Gold, g.	Colo.	300,000	60,000	5	...	...	...	...
46	Dickens-Custer, s.	Idaho	2,100,000	420,000	5	...	...	...	...
47	Durango, g.	Colo.	500,000	500,000	1	*	...	...	...
48	Eastern Dev. Co., Lt.	N. S.	1,500,000	150,000	10	990,000	Mar.	1886	1.00
49	El Cristo, g. s.	U.S.C.	1,000,000	500,000	2	...	...	...	...
50	El Dorado, g.	Cal.	1,000,000	250,000	4	*	...	...	...
51	El Talento, g.	U.S.C.	1,000,000	500,000	2	...	...	...	...
52	Emmons, s. l.	Colo.	2,000,000	2,000,000	1	...	...	...	...
53	Empire, s.	Utah	10,000,000	100,000	100	...	...	...	...
54	Eureka Tunnel, s. l.	Nev.	10,000,000	100,000	100	*	...	...	...
55	Exchequer, s. g.	Nev.	10,000,000	100,000	100	865,000	July.	1890	.25
56	Found Treasure, g. s.	Nev.	10,000,000	100,000	100	81,500	May.	1890	.25
57	Gogebic I. Syn., i.	Wis.	5,600,000	200,000	25	...	...	...	...
58	Gold Cup, s.	Colo.	500,000	500,000	1	*	...	...	...
59	Golden Era, s.	Mont.	2,000,000	200,000	10	*	...	...	...
60	Gold Rock, g.	Cal.	1,000,000	500,000	2	*	...	...	...
61	Goodshaw, g.	Cal.	10,000,000	100,000	100	*	...	...	...
62	Grand Belt, c.	Tex.	12,000,000	120,000	100	...	...	...	...
63	Grand Duke	Colo.	800,000	80,000	10	...	...	...	...
64	Great Remance, g.	U.S.C.	1,000,000	500,000	2	*	...	...	...
65	Gregory Con., g.	Mont.	3,000,000	300,000	10	...	...	...	...
66	Harlem M. & M. Co., g.	Cal.	1,000,000	200,000	5	...	...	...	...
67	Hartery Con., g.	Cal.	1,000,000	100,000	10	22,000	Oct.	1890	.05
68	Head Cent. & Tr., s. g.	Ariz.	10,000,000	100,000	100	...	...	...	...
69	Hector, g.	Cal.	1,500,000	300,000	5	45,000	Jan.	1888	.15
70	Highland, c.	Mich.	500,000	25,000	20	...	...	...	...
71	Holywood	Cal.	200,000	100,000	2	...	...	...	...
72	Hortense, s.	Colo.	2,000,000	200,000	10	...	...	...	...
73	Huron, c.	Mich.	1,000,000	40,000	25	280,900	May.	1887	3.00
74	Iron, Gold & Silver, s.	N. M.	2,000,000	200,000	10	*	...	...	...
75	Ironton, i.	Wis.	1,000,000	40,000	25	...	...	...	...
76	Iroquois, c.	Mich.	1,250,000	50,000	25	...	...	...	...
77	J. D. Reymert, s.	Ariz.	10,000,000	100,000	100	...	...	...	...
78	Julia Con., g. s.	Nev.	11,000,000	110,000	100	1,463,000	Jan.	1889	.10
79	Lacrosse, g.	Colo.	1,000,000	100,000	10	*	...	...	...
80	Lee Basin, s.	Colo.	5,000,000	500,000	10	...	...	...	...
81	Madeleine, g. s. l.	Colo.	750,000	750,000	1	*	...	...	...
82	Mammoth Gold, g.	Ariz.	245,000	49,000	5	*	...	...	...
83	Mayflower Gravel, g.	Cal.	1,000,000	100,000	10	585,000	Mar.	1890	.56
84	Medora, g.	Dak.	250,000	250,000	1	...	...	...	...
85	Merrimac Con., g. s.	Colo.	5,000,000	500,000	10	*	...	...	...
86	Mexican, g. s.	Nev.	10,000,000	100,000	100	2,791,96	Oct.	1890	.25
87	Middle Bar, g.	Cal.	400,000	200,000	2	*	...	...	...
88	Mike & Starr, s. c.	Colo.	1,000,000	200,000	5	*	...	...	...
89	Milwaukee, s.	Mont.	500,000	500,000	1	12,500	May.	1891	.01
90	Monitor, g.	Colo.	100,000	1,000,000	1	...	...	...	...
91	Mutual Mg. & Sm.	W'sh.	100,000	100,000	1	*	...	...	...
92	Native, c.	Mich.	1,000,000	40,000	25	...	...	...	...
93	Neath, g.	Colo.	1,000,000	100,000	10	...	...	...	...
94	Nevada Queen, s.	Nev.	10,000,000	100,000	100	200,000	Oct.	1889	.25
95	New Germany, g.	N. S.	100,000	100,000	1	*	...	...	...
96	New Pittsburg, s. l.	Colo.	2,000,000	200,000	10	*	...	...	...
97	N. Commonw'h, s.	Nev.	10,000,000	100,000	100	85,000	April	1890	.25
98	North Standard, g.	Cal.	10,000,000	100,000	100	20,000	Nov.	...	...
99	Noouday	Cal.	600,000	60,000	10	208,000	Dec.	1881	.10
100	Oneida Chief, g.	Cal.	500,000	125,000	10	*	...	...	...
101	Oriental & Miller, s.	Nev.	10,000,000	400,000	25	...	...	...	...
102	Osceola, g.	Nev.	5,000,000	500,000	10	*	...	...	...
103	Overman, g. s.	Nev.	11,520,000	115,200	100	3,832,800	Dec.	1889	.25
104	Park, s.	Utah	2,000,000	200,000	10	...	...	...	...
105	Peer, s.	Ariz.	10,000,000	100,000	100	165,000	Oct.	1890	.10
106	Peerless, s.	Ariz.	10,000,000	100,000	100	405,000	Oct.	1890	.15
107	Phœnix	Ariz.	500,000	500,000	1	*	...	...	...
108	Phœnix Lead, s. l.	Colo.	100,000	100,000	1	*	...	...	...
109	Pilgrim, g.	Cal.	600,000	300,000	2	*	...	...	...
110	**Pioche M.&R., s.g.l.	Utah.	20,000,000	2,000,000	10	...	...	...	...
111	Potosi, s.	Nev.	11,200,000	112,000	100	1,573,000	Mar.	1890	.50
112	Proustite, s.	Idaho	250,000	250,000	1	*	...	...	...
113	Puritan, s. g.	Colo.	1,500,000	150,000	10	*	...	...	...
114	Quincy, c.	Colo.	3,000,000	300,000	10	...	...	...	...
115	Rappahannock, g. s.	...	250,000	250,000	1	*	...	...	...
116	Red Elephant, s.	Colo.	500,000	500,000	1	*	...	...	...
117	Red Mountain, Ltd., s	Colo.	300,000	60,000	5	*	...	...	...
118	Ropes, g. s.	Mich.	2,000,000	80,000	25	147,200	July.	1887	.50
119	Ruby & Dun., s. l. g.	Nev.	25,300	506	50	*	...	...	...
120	Russell, g.	N. C.	1,500,000	300,000	5	...	...	...	...
121	Sampson g. s. l.	Utah.	10,000,000	100,000	100	288,157	July.	1888	1.08
122	San Sebastian, g.	San S.	1,600,000	320,000	5	*	...	...	...
123	Santa Fe, g.	N. M.	5,000,000	500,000	10	...	...	...	...
124	Santiago, g.	U.S.C.	400,000	200,000	2	...	...	...	...
125	Silver Age, s. l. g.	Colo.	2,000,000	200,000	10	...	...	...	...
126	Silver Queen, c.	Ariz.	5,000,000	200,000	25	*	...	...	...
127	South Bulwer, g.	Cal.	10,000,000	100,000	100	100,000	May.	1881	.25
128	South Hite	Cal.	10,000,000	100,000	100	195,000	Jan.	1883	.05
129	South Pacific	Cal.	500,000	100,000	5	...	...	...	...
130	Stanislaus, g.	Cal.	2,000,000	200,000	10	...	...	...	...
131	St. Kevin, s. g.	Colo.	100,000	100,000	1	*	...	...	...
132	St. Louis & Mex., s.	Mex.	,000,000	500,000	10	*	...	...	...
133	St. Louis & St. Elmo.	Colo.	000,000	200,000	10	...	...	...	...
134	St. L. & St. Felipe, g.s.	Mex.	,500,000	150,000	10	...	...	...	...
135	St. L. & Sonora, g. s.	Mex.	1,500,000	150,000	10	...	...	...	...
136	St. Louis-Yavapai	Ariz.	3,000,000	300,000	10	*	...	...	...
137	Sunday Lake, i.	Mich.	,250,000	50,000	25	...	...	...	...
138	Sullivan Con., g.	Dak.	600,000	200,000	3	*	...	...	...
139	Sylvanite, s.	Colo.	5,000,000	500,000	10	*	...	...	...
140	Taylor-Plumas, g.	Cal.	1,000,000	200,000	5	10,000	Feb.	1888	.10
141	Tioga Con., g.	Cal.	10,000,000	100,000	10	295,000	May.	1888	.25
142	Tornado Con., g. s.	Nev.	100,000	100,000	1	*	...	...	...
143	Tuscarora, s.	Nev.	10,000,000	500,000	20	15,000	Oct.	1889	.10
144	Union Con., g. s.	Nev.	10,000,000	100,000	100	2,310,000	July.	1890	.25
145	Utah, s.	Nev.	10,000,000	100,000	100	245,000	Aug.	1890	.25
146	Ute & Ulay, s. l.	Colo.	500,000	100,000	5	*	...	...	...
147	Whale, s.	Colo.	500,000	500,000	1	...	...	...	...
148	Washington, c.	Mich.	1,000,000	40,000	25	...	...	...	...
149	West Granite Mt., s.	Mont.	5,000,000	500,000	10	*	...	...	...
150	Yuma, c. s. g.	Ariz.	10,000,000	400,000	25	...	...	...	...
151	Zelaya, g. s.	C. A.	600,000	300,000	2	*	...	...	...

G. Gold. S., Silver. L., Lead. C., Copper. * Non-assessable. † This company, as the Western, up to December 10th, 1881, paid $1,400,000. ‡ Non-assessable for three years. § The Deadwood previously paid $275,000 in eleven dividends and the Terra $75,000. Previous to the consolidation in August, 1884, the California had paid $31,320,000 in dividends, and the Con. Virginia 40,000,000. ** Previous to the consolidation of the Copper Queen with the Atlanta, August, 1885, the Copper Queen had paid $1,350,000 in dividends. ¶ This company paid $190,000 before reorganization in 1890. **This company acquired the property of the Raymond & Ely Company which had paid $3,075,000 in dividends.

STOCK MARKET QUOTATIONS.

Aspen. Oct. 17.

The closing quotations were as follows:

	H.	L.
Argentum Juniata	$1.30	$1.15
Aspen Deep Shaft	....	.15
Aspen Favorite	....	....
Best Friend	.26	.20
Bushwacker	.36	.34
Della S.	...	....
Homer & Alta	....	...
Justice	.20	....
Little Annie	.17	.15
Mollie Gibson	6.50	6 00
Nolan Creek	.10	....
Park, Mamie & Queen	....	....
Pontiac	.12½	.12½
St. Joe & Mineral Farm	.20	.15

Baltimore, Md. Oct. 22.

Company.	Bid.	Asked.
Atlantic Coal	$ ...	$1.30
Balt. & N. C.	.01	.02
Big Vein Coal	....	....
Conrad Hill	....	....
Cons. Coal	.27@.28	.29
Diamond Tunnel	....	....
George's Creek Coal	....	1.10
Lake Chrome	.10	....
Maryland & Charlotte	....	...
North State	....	....
Silver Valley	.50	.60@.70

Birmingham, Ala. Oct. 21.

Company.	Bid.	Asked.
Ala. Coal & Iron Co	$102	$102½
Ala. Con. C. & C. Co.	....	$23
Ala. Roll. Mill Co.	$100	$105
*Alice Furnace	$100	$105
Anna Howe G. Mg. Co.	$⅜	$⅝
Bessemer Land	$26½	$29
Bir. Mg. & Mfg.	....	$35
Cababa Coal Mg. Co.	...	$61
Camille Gold Mg. Co.	$¾	$1
De Bardeleben Coal & Iron Co.	$8½	$9½
Decatur L. & Imp. Co.	$8¾	$9½
Decatur Min. L.	....	$19
Ensley Land	$7½	$10
*Eureka	....	....
Florence L. & Mg. Co.	$14¾	$16½
Gadsen Land	$3⅜	$4
Hecla Coal Co.	....	....
Hen. S. & M. Co.	$2¾	$4¼
Jagger-Towni'y C. & C. Co.	$8½	$10
Mag-Ellen	$100	$110
Mary Lee C. & R. Co.	....	$25
Sheffield C. & I. Co.	$52½	$55
Sloss I. & S	$19	$23
†Sloss I. & S	$85	$87
‡‡ Sloss I. & S.	$49	$52½
Ten. C. & I. Co.	$40½	$41½
" pref.	$86	$88
Tuscaloosa Coal, Iron & Land Co.	$23	$25
Vulcan C. & C. Co.	$5	$7½
Woodstock Iron Co.	$28	$29

* Bonds. † First mortgage bonds. ‡‡ Second mortgage bonds.

Pittsburg, Pa. Oct. 22.

Company.	Bid.	Asked.
Allegheny Gas Co.	$.....	$. ...
Bridgewater Gas Co.	....	....
Chartiers Val. Gas	5.00	6.00
Columbia Oil Co	....	....
Consignee Mining Co.	....	....
Consolidated Gas Co.	....	....
East End Gas Co	....	....
Forest Oil	....	....
Hazlewood Oil Co	....	....
Hidalgo Mining Co.	3.25	4.00
La Noria Mining Co.	.25	.35
Luster Mining Co.	11.63	12.50
Mansfield C. & C. Co.	....	...
Manufacturers Gas Co.	....	25.50
Nat. Gas Co. of W. Va	....	....
N. Y. & Clev. Gas Coal Co.	39.00	41.00
Ohio Valley Gas Co	....	....
Pennsylvania Gas Co.	....	....
People' Natural Gas Co.	....	....
People's N. G. & P. Co.	7.50	....
Philadelphia Co	11.50	11.75
Pine Run Gas Co.	....	....
Pittsburg Gas Co.	....	....
Red Cloud Mining Co	....	....
Silverton Mining Co.	....	....
South Side Gas Co.	....	....
Sterling Silver Mining Co.	....	....
Tuna Oil Co	....	....
Union Gas Co.	....	....
Washington Oil Co.	....	....
W'moreland & Camb.	....	....
Wheeling Gas Co.	20.00	21.50

Trust Receipts.

Sales at the New York Stock Exchange for week ending Oct. 23:

	Sales.	Price H.	Price L.
American Cotton Oil	....	....	....
National Lead	4,355	16½	15⅞

Trust Stocks. Oct. 23.

Special report by C. I. Hudson & Co., members New York Stock Exchange. The following are the closing quotations:

Certificates.		
Am. Cotton Oil, Com.	$21⅞	@$25
" " Pfd.	46½	@ 48
Am. Sugar Refineries, Com.	85⅝	@ 85⅞
" " Pfd	93½	@ 94
Distillers' & Cattle Feeders'.	51⅜	@ 51½
Linseed Oil	20	@ 23
National Cordage, Com.	91¾	@ 92
" " Pfd.	99	@100
National Lead	16	@ 16⅛
Standard Oil	157½	@158½
W. U. Beef Co.	12	@ 14

St. Louis. Oct. 21.

CLOSING PRICES.

Company.	Bid.	Asked.
Adams, Colo.	$1.85	$1.95
American & Nettie, Colo	.51¼	.52½
Aztec, N. Mex	....	.07
Bi-Metallic, Mont.	34.00	35.00
Central Silver	.04	.05
Elizabeth, Mont.	1.57½	1.60
Granite Mountain, Mont.	20.00	20.50
Hope, Mont.	....	1.50
Leo	....	.06
Little Albert	.00½	.01
Montrose Placer, Colo.	.20	.21¼
Mickey Breen	....	...
Pat Murphy, Colo.	.02½	.05
Small Hopes, Colo.	....	...
Silver Age	.61¼	.75
Yuma, Ariz.	.35	.41¼

Foreign Quotations.

London. Oct. 10.

Company.	Highest.	Lowest.
Amador, Cal.	4s. 3d.	3s. 9d.
American Belle, Colo.	9s.	8s. 6d.
Appalachian, N. C.	2½d.	1d.
Colorado, Colo.	2s. 6d.	1s. 6d.
Cons. Esmeralda, Nev.	1s. 3d.	9d.
De Lamar, Idaho	£1 3-16	£1⅛
Dickens Custer, Idaho.	1s. 9d.	1s. 6d.
East Arevalo, Idaho.	1s. 3d.	9d.
Elkhorn, Mont.	£1	£¾
Elmore, Idaho	9d.	6d.
Emma, Utah	1s. 6d.	1s.
Flagstaff, Utah	5s. 6d.	5s.
Garfield, Nev	1s.	6d.
Golden Feather	17s. 6d.	16s. 6d.
Golden Gate, Cal.	17s.	16s.
Golden Leaf, Mont	4s. 3d.	3s. 9d.
Golden River, Cal.	....	....
Jay Hawk, Mont.	3d.	....
Josephine, Cal.	....	....
Kohinoor, Colo.	1s. 3d.	9d.
La Luz, Mex.	2s. 3d.	1s. 9d.
La Plata, Colo.	1s. 3d.	1s.
La Valera, Mex.	3s. 6d.	2s. 6d.
Maid of Erin, Colo.	£1⅝	£1⅛
Mammotb Gold, Ariz.	2s. 1½d.	2s. 1½d.
Montana, Mont.	8s. 6d.	7s. 6d.
New California, Colo.	2s. 9d.	2s. 3d.
New Consolidated	1s.	6d.
New Eberhardt, Nev.	1s. 3d.	9d.
New Gold Hill, N. C.	1s. 6d.	1s.
New Guston, Colo.	£3½	£3¼
New Hoover Hill, N.C.	6d.	3d.
New Russell, N. C.	10½d.	7½d.
New Viola, Idaho	1s.	6d.
Old Lout, Colo	£⅜	£⅛
Parker Gold, N. C.	9d.	3d.
Pittsburg Cons., Nev.	4s.	3s.
Richmond Con., Nev.	£1½	£⅞
Ruby, Nev.	6d.	3d.
Sam Christian, N C.	....	....
Sierra Buttes, Cal.	6s.	5s.
" Plumas Eur., Cal.	13s.	11s.
United Mexican, Mex.	£5-16	£3-16
U. S. Placer, Colo.	....	....
West Argentine, Colo.	1s.	6d.
Yankee Girl, Colo.	15s.	14s. 6d.

Paris. Oct. 8.

	Francs.
East Oregon, Ore.	4.00
Forest Hill Divide, Cal.	60.00
Golden River, Cal.	130.00
" " parts	30.00
Laurium	700.00
Lexington, Mont	90.00
" parts	2.50
Nickel	805.00
Rio Tinto, Spain	545.00
" " obllg.	510.00
" " "	512.50
Tharsis, Spain	152.50
Vieille-Montagne	512.50

CURRENT PRICES.

Those quotations are for wholesale lots in New York unless otherwise specified.

CHEMICALS AND MINERALS.

Acid—Acetic, No. 8, pure, 1,040, ℔ lb. .05
Commercial, in bbls. and chys. 01¾@.02¼
Carbonic, liquefied, ℔ lb. .30
Chromic, chem pure .90
for hatteries .40
Hydrobromic, dilute, U. S. P. .25
Hydrocyanic, U. S. P. .45
Hydrofluoric .20
Alcohol—95%, ℔ gall. $2.30@$2.40
Absolute $3.80
Ammoniated $2.80
Alum—Lump, ℔ lb .016@.017
Ground, ℔ lb .0165@.0175
Powdered .01½@.05
Lump ℔ ton, Liverpool £5
Aluminum—℔ lb. .50
Aluminum Chloride—Pure, ℔ lb. $1.25
Amalgamating solution, ℔ lb. .60
Sulphate .01¾@.03
Ammonia—Sul., in bbl. lots, ℔ lb 03 1-16
Carbonate, ℔ lb. .14
Muriate, white, in bbls., ℔ lb. .08¼
Aqua Ammonia—(in cbys) 18° ℔ lb .03¾
20°, ℔ lb. .04¾
26°, ℔ lb .07½
Antimony—Oxymur, ℔ lb. .04¾
Ore, Hallett's, ℔ lb. .1075
Cookson s, ℔ lb. .1325
Regulus, Hallett's, ℔ ton, London. £42 10
Argols—Red, powdered, ℔ lb. .15
Arsenic—White, powdered ℔ lb. 02⅞@.03
Red ℔ lb. .05@.06½
Yellow .08@.09
White at Plymouth, ℔ ton £12 2 6
Asbestos—Canadian, ℔ ton $50@$300
Italian, ℔ ton. c. i. f. L'pool £18@£60
Ashes—Pot, 1st sorts, ℔ lb. .0475@.05
Pearl .06@.06¼
Asphaltum—
Prime Cuban, ℔ lb. .04@.05¼
Hard Cuban, P ton $28.00
Trinidad, refined, ℔ ton $30.00
Egyptian, ℔ lb. .08@.09
Californian, at mine, ℔ ton $12.00
at San Francisco, ℔ ton. $15.00
Barium—Carbonate, pure, ℔ lb. .45
Carbonate, commercial, ℔ lb .05@.10
Chlorate, crystal. ℔ lb. .75
Chloride, commercial, ℔ lb. .05@.10
pure, ℔ lb. .16
Iodide, ℔ oz. .40
Nitrate, powdered, ℔ lb. .15
Sulph., Am. prime white, ℔ ton. $21@$23
Sulph., foreign, floated, ℔ ton $21.50@$23.50
Sulph., off color, ℔ ton. $11.50@$14.00
Carb., lump, f. o. b. L'pool, ℔ ton £6
No. 1, Casks, Runcorn, " " £4 10 0
No. 2, bags, Runcorn, " " £3 15 0
Bauxite—℔ ton $10.00
Bichromate of Potash—Scotch, ℔ lb .10@.12
American, ℔ lb. .09½@.10
Bichromate of Soda—℔ lb. .08¼@.11½
Borax—Refined, ℔ lb., in car lots,
San Francisco .08
Concentrated, in car lots .08
Refined, Liverpool ℔ ton £29
Bromine—℔ lb. .40
Cadmium Minion—℔ lb. $2.00
Cadmium Iodide—℔ lb. $5.50
Chalk—℔ ton $1.75
Precipitated, ℔ lb. .05@.06
China Clay—Englisb, ℔ ton $13½@$21.00
Southern, ℔ ton $13.50
Chlorine Water—℔ lb. .10
Chrome Yellow—℔ lb. .10@.25
Chrome Iron Ore—℔ ton, San Francisco $10.00
Chromalum—Pure, ℔ lb. .40
Commercial, ℔ lb. .12
Cobalt—Oxide, ℔ lb. $2.50@$2.90
Copper—Sulph. English Wks. ton £20@£21
Vitriol (blue), ordinary. .03¼@.03⅝
" " extra .01
Nitrate, ℔ lb. .40
Copperas—Common, ℔ 100 lbs. .85
Best, ℔ 100 lbs. .85@$1.00
Liverpool, ℔ ton, in casks £2
Corundum—Powdered, ℔ lb. .01½@.09
Flour, ℔ lb. .03
Cryolite—Powdered, ℔ lb., bbl. lots. .08
Emery—Grain, ℔ lb. (℔ kg.) .01½@.05
Flour, ℔ lb. .02½@.10
Epsom Salt—℔ lb. .01¼
Feldspar—Ground, ℔ ton $20.00
Fluorspar—Powdered, No. 1, ℔ ton. $30.00
French Chalk—
Fuller's Earth—Lump, ℔ bbl. .90@.95
Glauber's Salt—in bbls., ℔ lb. .0075
Glass—Ground, ℔ lb. .10
Gold—Chloride, pure, crystals, ℔ oz. $12.00
pure, 15 gr., c. v., ℔ doz. $5.40
liquid, 15 gr., g. s. v., ℔ doz. $5.50
Chloride and sodium, ℔ oz. $6.00
15 gr., c. v., ℔ doz. $2.88
Oxide, ℔ oz. $27.25
Gypsum—Calcined, ℔ bbl. $1.25@$1.50
Land Plaster
Iodine—Resublimed . $3.35@$4.00
Iron—Nitrate, 40°, ℔ lb. .01½
47°, ℔ lb. .02½
Kaolin—*See China Clay.*
Kieserite—℔ ton $9@$10
Lead—Red, ℔ lb. .06¾@.07¼
White, American, in oil, ℔ lb. .05½@.07¼
White, English, ℔ lb. .08¾@.09
Acetate, or sugar of, white .12@.13
Granulated
Nitrate .09@.10
Lime Acetate—Am. Brown. $1.10@$1.20
Gray. $2.00@$2.15
Litharge—Powdered, ℔ lb. .06½@.07¼
English flake, ℔ lb. .09@.09½
Magnesite—Crude, ℔ ton of 1,015 kilos $14 75
Calcined, ℔ ton of 1,015 kilos. $23.75
Brick, ℔ ton of 1,015 kilos. $50.00
Manganese—Ore, per unit. .23@.28
Oxide, ground, per lb. .02½@.06½
Marble Dust—℔ bbl $1.25
Mercuric Chloride—(*Corrosive Sublimate*) ℔ lb. .84
Powdered, ℔ lb. .94
Metallic Paint—Brown ℔ ton. $20@$25
Red. $20@$25
Mineral Wool—Ordinary slag. .01¼
Ordinary rock .02½
Ground, ℔ ton
Mica—In sheets according to size.
1st quality, ℔ lb. .25@$6.00
Naphtha—Black
Nitre Cake—℔ ton $10.00
Ochre—Rocbelle, ℔ lb. $1.35@$1.81
Washed Nat Oxf'rd, Lump, ℔ lb. 06¼@.06¾
Washed Nat Oxf'rd, Powder, ℔ lb. 07@.07½
Golden, ℔ lb. .03¾@.04
Domestic, ℔ lb. .03¾@.01½
Oils, Mineral—
Cylinder, light filtered, ℔ gal. .15@.20
Dark filtered, ℔ gal. .11@.15
Extra cold test, ℔ gal. .18@.20
Dark steam refined, ℔ gal. 1C@.18
Phosphorus—℔ lb. .55@.60
Precip., red, ℔ lb. .88
white, ℔ lb. .93
Plumbago—Ceylon, ℔ lb. .01@.05
American, ℔ lb. .05@.07
Potassium—Cyanide, ℔ lb., C. P. 67%, ℔ lb. .70
50%, ℔ lb. .45
Bromide, ℔ lb. .40
Chlorate, English, ℔ lb. .24@.25
Chlorate, powdered, ℔ lb. .10½@.11
Carbonate, ℔ lb., by casks, 82% .13@.14
Caustic, ℔ lb., pure slick .05½
Iodide, ℔ lb. .35@.40
Nitrate, refined, ℔ lb. $2.58@$2.62
Bichromate, ℔ lb. .06@.08
Yellow Prussiate, ℔ lb. .095@.10
Red Prussiate, ℔ lb. .23¾@.24¼
Pumice Stone—Select lumps, ℔. .40
Original cks., ℔ lb. .04
Powdered, pure, ℔ lb. .01¾@.02
Pyrites—Non-cupreous, p. units. .02@.02½
Quartz—Ground, ℔ ton. .15@.16
Rotten Stone—Powdered, ℔ lb. .03½
Lump, ℔ lb. .05½@.15
Original cks., ℔ lb. .01½@.05½
Rubbing stone, ℔ lb .07
Sal Ammoniac—in bbls., ℔ lb. .10¼
Salt—Liverpool, ground, ℔ sack. .70
Domestic, fine, ℔ ton. $7@$7.50
Common, fine, ℔ ton. $4.50@$5
Turk's Island, ℔ bush. .26@.28
Salt Cake—℔ ton $10 00
Saltpeter—Crude, ℔ lb. .03¾@.04½
Soapstone—
Sodium—Prussiate, ℔ lb. 17½@.18
Phosphate, ℔ lb. .07@.18
Stannate, ℔ lb. .08@.15
Tungstate, ℔ lb.
Caustic, ℔ lb.
Hyposulphite, ℔ lb., in casks .024
Strontium—Nitrate, ℔ lb. .09½@.10
Sulphur—Roll, ℔ lb. .02½
Flour, ℔ lb. .02½@.02¾
Sylvinit, 23@27%, S. O. P., per unit. 40@.42½
Talc—Ground French, ℔ lb. .01¼@ 01¾
Terra Alba—French. .90@$1.00
English. .75@.80
American, No. 1.
American, No. 2. .40@.50
Domestic, ℔ ton. $18@$20
c. l. f. Liverpool, ℔ ton. £4 5s.
Tin—Crystals, in kegs or bbls. .14@.15
feathered or flossed. .25
Muriate, single .07
Double or strong, 54° B. .09
Oxy. or nitro .10
Tin Plates, ℔ box, Swansea, best charcoal .18@.19
best coke .15@.16
Vermillion—Imp. Englisb. .90 @ .95
Am. quicksilver, bulk .67 @—
Am. quicksilver, bags .68 @ .71
Chinese .95@$1.00
Trieste .90 @ .95
American .11½@ .12
Artificial .08 @ .35
Zinc White—Am., Dry, ℔ lb .04½
Antwerp, Red Seal, ℔ lb. .07½
Paris, Red Seal, ℔ lb .08¼
Muriate solution .06
Sulphate crystals, in bbls., ℔ lb. .03¾

THE RARER METALS.

Arsenic—(Metallic), per lb. .40
Barium—(Metallic), per gram. $1.00
Bismuth—(Metallic), per lb. $2.40
Cadmium—(Metallic), per lb. $1.00
Calcium—(Metallic), per gram. $10.00
Cerium—(Metallic), per gram. $7.50
Chromium—(Metallic), per gram. $1.00
Cobalt—(Metallic), per lb. $6.00
Didymium—(Metallic), per gram. $9.00
Erbium—(Metallic), per gram. $7.50
Gallium—(Metallic), per gram. $140.00
Glucinum—(Metallic), per gram. $12.00
Indium—(Metallic), per gram. $9.00
Iridium—(Metallic), per oz. $7.00
Lanthanum—(Metallic), per gr. $10.00
Lithium—(Metallic), per gram. $10.00
Magnesium—(Powdered), per lb. $4.00
Manganese—(Metallic), per lb. $1.10
Chem. pure, per oz. $10.00
Molybdenum—(Metallic), per gm .50
Niobium—(Metallic), ger gram. $5.00
Osmium—(Metallic), per oz. $65.00
Palladium—(Metallic), per oz. $35.00
Platinum—(Metallic), per oz., $16.50@$20.00
Potassium—(Metallic), per lb. $28.00
Rhodium—(Metallic), per gram. $5.00
Ruthenium—(Metallic), per gm. $5.50
Rubidium—(Metallic), per gram. $2.00
Selenium—(Metallic), per oz. $1.80
Sodium—(Metallic), per lb. $2.50
Strontium—(Metallic), per gm. .60
Tantallum—(Metallic), per gram. $9.05
Telurium—(Metallic), per lb. $5.05
Thallium—(Metallic), per gram. .20
Titanium—(Metallic), per gram. $2.00
Thorium—(Metallic), per gram. $17.00
Tungsten—(Metallic), per lb. $1.00
Uranium—(Oxide), per lb. $5.00
Metallic, per gm. .20
Vanadium—(Metallic), per gm. $22.00
Yttrium—(Metallic), per gram. $9.00
Zirconium—(Metallic), per oz. $65.00

BUILDING MATERIAL.

Bricks—Fronts, nominal, ℔ 1,000.
Croton 14.00@.....
Wilmington 20.00@21.00
Philadelphia @22.00
Trenton @22.00
Baltimore @35.00
Building Stone—Amherst freestone, ℔ cu. ft. .95@1.00
Brownstone, ℔ cu. ft. 1.00@1.35
Granite, rough, ℔ cu. ft. .45@1.25
Granite, Scotch, ℔ cu. ft. 1.00@1.15
Cement—Rosendale, ℔ bbl. .85@1.10
Portland, American, ℔ bbl 2.25@2.45
Portland, foreign, ℔ bbl. 2.40@2.50
Portland, " special brands 2.60@2.85
Roman, ℔ bbl. 2.75@2.90
Keene's coarse, ℔ bbl. 4.50@5.50
Keene's fine, ℔ bbl. 7.25@8.50
Slate—Purple and green roofing, ℔ 100 ft. 7.00@7.50
Red roofing, ℔ 100 sq. ft. 12.00
Black roofing, ℔ 100 sq. ft. 4.25@5.50
Lime—St. Johncom and finisb., ℔ bbl. .90@.95
Glens Falls, com. and fin., ℔ bbl. 85@1.10