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CONTENTS.

THE COPPER AND LEAD PRODUCTION AND STOCKS.

The announcement of such an enormous increase in the production and stocks of copper and lead in this country not unnaturally has caused among many in the trade who do not know the care with which these statistics have been collected, some incredulity as to the accuracy of the figures we published last week. In the case of copper production the publication of the full details of output left little room for any doubt, though, as the amount credited to Colorado, for instance, is more than three times what the Colorado papers claim, even they might be incredulous. The returns they published not only ignored all the copper that left the State in the form of ore, but it ignored what went into bluestone manufacture, and which was nearly twice as much as they reported as the production of the State. We need only add that our figures as to production and stocks of copper are all from direct returns by producers or those who hold the stocks, and extreme care has been taken to avoid duplication of accounts. We may have "bored" some of our copper works by the number and insistance of our requests for further information as to whence their copper came and where it went to, but it is only by the exercise of this care, and by the courtesy of those who frankly gave us unreservedly the fullest information, that it was possible to arrive at figures which can be relied on as substantially full and accurate. The supplementary corrections of the estimates made by the producers of their December output, which we are now obtaining, will enable us to make even these trifling corrections.

In the case of our lead production and stocks the case is somewhat different, because the refiners object to the publication of their figures of production, and as there are more refiners of lead than of copper, it requires still more care to be exercised in sifting the returns. In the pressure of getting out such an immense work as that contained in the JOURNAL last week and in the brief time allowed for the collection of the statistics, it was not possible to devote much space to an explanation of how the figures were arrived at.

The total production of lead as reported by us was obtained from returns made directly to us by all the refineries and by nearly all the soft lead producers. Out of the total of 189,000 tons only about 3000 tons is allowed for a few known producers whose returns had not been received in time, and that this allowance was fully justified will, we are confident, be shown in the supplementary figures we are obtaining to correct the estimates made by the works on their output of a portion of December.

The distribution of this lead among the States as given by us is admittedly only "approximate." The whole production is obtained correctly, but the sources from which it came can not be determined with accuracy. Thus Wells-Fargo Company report the production of Utah; the Colorado papers report the production of Colorado smelters, which also all report to us but do not in all cases state fully the amount of lead received from other sources than their own State.

This distribution is not of any great importance, however; the vital facts are total production and stocks on hand.

Eight of our lead refiners produced nearly 155,000 tons, and Missouri and Kansas soft lead producers returned through Messrs. John Wahl & Sons, of St. Louis, more than 29,000 tons, making in these few items no less than 184,000 tons, and leaving but 5000 for all the other producers.

With regard to the stocks, our figures of what is "in warehouse" at the three principal markets is necessarily "estimated" to some extent, but this is done with great care, and is, we believe, confirmed by the data in the hands of many in the trade. The 19,000 to 20,000 tons held by smelters throughout the country is made up from the direct returns to us of smelters and refiners, with the exception of a very small proportion of the whole, which is "estimated" as the stock in different stages of production at a few of the works, whose figures had not been received in time, though promised. When it is considered that every refining works must carry a certain amount of stock to insure steady work, and that every smelter, even where it ships "hot," as some of them have been doing, must have some "on hand," the amount arrived at, which is scarcely more than 10 per cent of the year's production, would not appear unreasonable, even if it had been "estimated" instead of having been taken from direct returns.

There is, however, a possibility (pointed out to us since our figures appeared) that a few thousand tons of the stocks reported by smelters as on hand may have been included in the warehoused stocks. In some instances the works reported where their stocks were held and the proper deductions were then made; but in a few instances this information was not given, and it is possible a slight duplication may have been overlocked. Since the greater part of the stock is unrefined lead, this possible duplication could not be a very important amount. Our supplementary reports will, we trust, enable us to get this item with almost absolute accuracy.

EXAMINATIONS IN EDUCATION.

Examinations are as much (and no more) a part of the process of education as indicator-diagrams are a part of the performance of a steam-engine. Correctly taken and correctly interpreted, they afford a test of a certain value; that is all. What they really tell as to the system of instruction pursued may easily be misunderstood by the superficial critic.

"The Young Idea," an amusing little volume, just published in New York, and containing a large selection of the blunders of children under written examination in the common schools, is extensively quoted by the newspapers, with the humorous comments which are so easy, and the equally easy judicial conclusion, "Seriously, what is the value of an educational system which produces such results?" etc., etc. It seems not to have occurred to the critics that these funny mistakes are the results, not of the operation of a system fairly tested, but of a deliberate selection of instances of a certain class out of a vast total of all classes. We do not undertake to say that the methods of our common schools are not defective, though our own observation has given us, on the whole, a

favorable impression concerning them. But we do say that these exceptional samples culled from examination-papers certainly do not, as one of the newspaper experts declares, "show conclusively what the current educational methods are producing." They prove no more than a particularly poor sample of ore, picked out of a dump as the worst that could be found, would prove as to the average quality of the mass.

But an examination of the lists themselves throws new light on the subject. They fall into several classes, such as:

1. Ordinary clerical errors. For example,

"The Romans made no conquest, because they possessed no feet."
"A factor is sometimes a faction."
"The Indians are of a weak constitution, and morality was great among them."

It is absurd to attach importance to such obvious slips of the pen. There is no reason to doubt that in these cases the youthful writer's meaning was correct and consciously clear.

2. Mistaken use of words, occasioned by their similarity of sound. For example,

"A raffle is a kind of gun."
"Turbot is a kind of rhetorical style."
"A pulley is a sort of chicken."
"A termagant is a kind of goose."
"The cotton-gin was invaded by Whitney."

We could cite many more of these; but what do they show? Exactly what would be exhibited by a foreigner of the most exalted genius, and matured and trained powers, learning a new language. They are the necessary incidents—even, in a certain sense, the very proofs—of progress. The sapient critic thinks they show the folly of using words to children that are above their comprehension. But every practical educator knows better. Baby-talk is not good, even for babies. The process of continually grasping, however awkwardly, after new words and ideas, is nature's own method of mental growth and discipline.

3. Attempts to make up for ignorance by the desperate use of analogy or inference. For example:

"Repugnant, one who repugs."
"Monastery, a place for monsters."
"Ironical, something very hard."
"Tocsin, something to do with getting drunk."
"Headstrong is to drink too much whiskey."
"A protuberance is an effervescence."

The last of these is merely a rash generalization from the protuberant results of effervescence. All of them are simply specimens of what everybody does, when suddenly brought face to face with a new term, in trying to divine its meaning by its relation to known terms. And they indicate a reasoning process which is far from stupidity.

4. Blunders in geography, history, etc. One critic asks with portentous emphasis, "What shall be thought of the value of common school teaching when a scholar solemnly sets down that 'the United States is almost as big as England'?" To which we reply that the use of the word England to designate the British Empire, by one pupil out of hundreds, need not oblige the critic to think about the common school system at all. Evidently he has not thought about it to any alarming extent. Perhaps his patriotic soul will find consolation in the answer of a pupil of a select school, who, being asked, "What does history principally teach?" responded promptly, "That the United States never was licked, and never will be!"

We need not cite examples of these commonplace errors. They are, in the main, merely the work of scholars who did not know their lessons, and undertook to "chance it" on examination. Such things are produced in abundance, and will always be produced, under any system of education that can be devised.

Without continuing this analysis further, we may say that even if the list of errors were, as it certainly is not, a fair average sample of the answers actually given by the scholars under examination, we should still prefer it, as an indication of the value of the system employed, to a list of absolutely correct statements, without a flaw. That would be clearly artificial and unnatural. This is clearly natural. That would indicate a final state; this expresses a transient one. The old adage, "Not how much but how well," is not a formula of universal application. In the learning of language, particularly, it is a pedantic hindrance. The way to learn a language, native or foreign, is to blunder along, and keep at it, using words not perfectly understood until they come to be understood by use, correcting mistakes patiently and with endless iteration, but never for a moment regarding them as proofs of present, or omens of ultimate, failure. The critic who argues from these things to the disparagement of the education of which they are incidents would condemn MICHEL ANGELO upon an inspection of his chips. *

LIGHT WANTED UNDERGROUND.

The New York Board of Electrical Control appends to its last report certain affidavits, presented in a recent proceeding, in opposition to a motion for an injunction made by one of the electric light companies. Among the questions involved was the existence at this time of any safe, practicable system for underground electric currents of high tension, the plaintiff offering to prove not only that the system of the New York Board was impracticable, but that no satisfactory plan had been perfected anywhere, to meet all the conditions of the case.

The board publishes the counter-affidavits on its own side; but suppresses the others. This we regret, for our curiosity is aroused by the opinion of the Court, which finally refused the injunction sought by the plaintiff, declaring that the opinions of numerous and eminent experts on one side had been met with equally numerous and eminent authorities on the other, and it could not undertake to decide between them.

The only light to be now had must come from an examination of the one half of the case with which the Board has favored the public. Their nine experts may be classified as follows: Four persons, whose experience has been exclusively with telegraphs and telephones; one civil engineer; one inventor of a patent conduit; one manufacturer of a patent cable; one president of an arc-light company; and one "city electrician."

As to the question here concerned, the last three only need to be considered. They comprise the numerous and eminent whole; they all live in Chicago; they will probably all figure at the approaching annual convention of the National Electric Light Association; and the convention ought to do, in friendly debate, what the Court was not able to do, have them cross-examined.

Mr. PATTERSON is the cable-manufacturer, and highly praises the Patterson cable, which he says the Western Electric Company habitually guarantees, "for periods of three years or more." Let him tell the convention of a Patterson cable that has been in constant use, carrying a stated number of volts underground, for two years; and he will have added to this discussion a fact which we do not find in his affidavit, and have not found anywhere else.

Mr. SUNNY is the arc-light president. His electrical practice up to January 1st, 1888, was exclusively with the telephone. A month ago, he resigned the presidency of the arc-light company. At the Pittsburg convention in 1888, if we remember correctly, Mr. SUNNY declared that he did not pretend to be an electrician. At the New York convention, later in the year, he explained his success with underground cables so clearly that after hearing all he had to say, the convention adopted a resolution declaring that "no commercially practical method" had "ever been brought to their notice"—which was rough on Mr. SUNNY, although, to do him justice, he made no pretences, frankly said what he he had to say, and frankly owned his ignorance on many important points.

But Mr. SUNNY has done harm by putting into an "expert" affidavit the conclusions he bases upon "nine or ten months' experience," without the further facts which a polite cross-examination might elicit. The convention ought to ask him whether all the cables used by his arc-light company underground, up to the time he became president, had not failed; whether he did not leave "dead" cables in the conduits when he left the company; above all, what tests of insulation, daily or other, were made during the period of which he speaks when he says "There is nothing to show that the cables have deteriorated"; how many megohms of resistance were really accepted as satisfactory from the Patterson cable guaranteed to give 300; in short, whether, if that cable had failed at the end of nine months, Mr. SUNNY or his company would have had a single definitely-measured electrical fact concerning it, as the fruit of their experiment. At the New York convention, he intimated that he did not worry about such matters; because he had a guaranty. That is well enough for Mr. SUNNY, as a genial, frank and honest business man; but it does not become him in his new character as an expert.

Finally, Mr. BARRETT, the City Electrician of Chicago, needs to be cross-examined. Mr. BARRETT is quoted everywhere to prove that all these troublesome questions have been solved without any difficulty, under his administration, in Chicago. He is an efficient public officer, and having had the power to put the city telegraph wires underground, he has pursued the steady policy of requiring private wires and poles to be removed from each street, just as fast, and no faster, than the city wires have been thus taken care of. The result is that, after twelve years, one ward of the twenty-three in the city has been nearly cleared; and that is in the business center of the city, where the benefit is greatest. Outside of that section, little or nothing has been done. Chicago has a trifle of 15,000 miles of overhead wires still, notwithstanding its "complete solution" of all problems.

Mr. BARRETT'S duties have not included the supervision of any details outside of the city lines. He had not, up to Christmas last, lit a single street of Chicago through underground arc-light conductors. The vague statements of his affidavit are (unintentionally, no doubt) calculated to mislead the uninformed reader. He declares what "we" are doing, meaning sometimes his own department, and sometimes only hearsay reports as to the doings of companies over which he exercises no control. Thus he says that, in several instances, low- and high-tension currents "have and are working to-day perfectly satisfactorily" in the same conduit, and adds, in "fact, we are now working high-tension currents and telephone wires in the same conduit, and they are working perfectly."

Mr. BARRETT ought either not to have made that statement, or he ought to have made it much plainer. Who are "we"? Do our telephone wires and our high-tension currents work perfectly *at the same time*, or do we go home after office-hours and not use our city telephones after the electric lights are running? From a careful scrutiny of Mr. BARRETT'S affidavit, it seems that, with the possible exception of a line along the bank of the Chicago River, he has really no direct management for the city of any underground high-tension conductors. Consequently, the successful operation of high- and low-tension conductors together, to which he refers, is most probably his inference from the fact that at some point a separate duct of the same conduit-system carries for a short distance only, both his telephone wire and somebody else's real or supposed, "dead" or alive, high-tension conductor. Whether this be so or not, Mr. BARRETT owes complete details to the world—even to the New York Board, the first of whose six fundamental principles is, that "electric light and power conductors should, as a matter of precaution if not of necessity, be operated separately, and as far as possible from those for the transmission of currents of lesser intensity."

There are a number of other important questions upon which Mr. BARRETT could enlighten the approaching convention. Is it true that everybody in Chicago employs any underground system he chooses? Can a man, standing in the reformed district, see nineteen man-holes within a couple of hundred feet? Are they constantly ventilating these man-holes, for fear of gas-explosions? Has the City Electrician any record of the number of these explosions? If so, will he produce it? If not, will he kindly tell the convention whether he thinks it probable, as reported, that the average is about one to a fortnight? Is it true that hardly anything has been done for a year in the way of putting wires underground in Chicago? If so, what is the matter? What is going to be done with the 15,000 miles still above ground, and especially with the business streets in which double lines of poles, the largest and handsomest, we are told, in this or any other country, carry more wires to-day than anybody can count?

In short, the City Electrician of Chicago has accomplished a good deal, in a very sensible way; but he has neither created a comprehensive system for Chicago, nor "solved the problem" for other places; and his *ex parte* affidavit does not deserve the rank to which the newspapers have promoted it, as a conclusive authority. *

CORRESPONDENCE.

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

The Statistics of the Copper Trade.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I feel that I must congratulate you very heartily on the very interesting and in every respect excellent annual market report published in to-day's ENGINEERING AND MINING JOURNAL. I heard it commended on every side as a complete and masterly production. * * *

NEW YORK, Jan. 12. J. LANGELOTH, Manager American Metal Co., L'd.

EDITOR ENGINEERING AND MINING JOURNAL.

SIR: I want to thank you for the information given to the metal trade in your issue of January 12th. You may well congratulate yourself on the confidence shown you by the mining and smelting companies in trusting you with their official figures, and I am sure that in the future you will have less and less trouble in getting the figures, as we must all recognize the great importance to us of knowing accurately the facts.

Thanking you once more for the trouble you have taken, believe me, etc., ROBERT THOMPSON, President Orford Copper Co.

NEW YORK, Jan. 16.

EDITOR ENGINEERING AND MINING JOURNAL.

SIR: Allow me to congratulate you on the note of warning you sound in your exceedingly able article in this week's journal on the "Copper Industry."

You may be assured that your figures will attract great attention in Europe, where those interested in the industry have been unable to follow the stocks accumulating.

Nothing can be more to the mark than when you say, "*That the Syndicate's abnormal profits are being secured by too heavy a discount of the future, and the greater they now are and the longer they continue, the severer will be the reaction and the longer the period in which the producers will go in sackcloth and ashes.*"

Investors in copper shares in England should study your figures and note that the stock of copper exceeds 140,000 tons; that in 1887, when supply and demand were allowed to regulate the market, copper was selling at an average of £39 17s. 6d. per ton, with stocks standing at 42,000 tons.

It was then generally hoped that as the stocks had been somewhat lowered during 1887, an advance of a few pounds would legitimately have occurred; but through the Syndicate's action the value of copper shares and copper are at such fictitious values that many will be ruined when the Syndicate decides to retire from the market.

We often hear it stated that the Syndicate will carry on their operations for the next 10 or 12 years; but that is impossible, as if stocks increase this year as they did last, the copper industry will be ruined for many years to come.

Quite apart from the new ventures, which have scarcely commenced operations, new mines are bound to add to an ever increasing production, and then when the crash comes, for come it must (and whether it is gradual or sudden rests entirely with the Syndicate), those who hold copper shares will find them unsalable, and legitimate mining will receive a blow from which it will not easily recover.

Let us hope, however, that the good sense of the Syndicate will (before the copper industry is quite ruined) see the folly of maintaining such high rates in the face of such figures as you place before your readers, at an evident expenditure of much time, and thought, and if your remarks only carry conviction to others equally with myself we shall see some startling developments in the copper market before the end of this year. THOS. E. CANDLER.

NEW YORK, Jan. 19, 1889.

The Influence of High Prices in Copper on the Brass Trade.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I have read with great interest your "Review of the Copper Industry" in the issue of the JOURNAL of January 12th, and think your inferences and conclusion as to the ultimate outcome of the copper corner, unanswerable and inevitable, but in one particular, I desire to call your attention to what I think a grave error, that is, as to the effect upon the copper consuming industries of this country. You say, in summing up, that these operations "have not materially injured our manufacturers." Whereas, from information obtained from 75 per cent of a very large copper consuming industry and from personal experience, the *exact opposite* is the fact. When the "French Syndicate" began manipulating the copper market copper was low and the consumption rapidly increasing because of its low price, and all the copper consuming industries of the country were in a condition based upon the soundest principles of business prosperity, namely, an increasing and legitimate demand growing out of low prices and very moderate profits. Brass workers all over the country were fully employed at good wages, and while the demand for goods may not have kept up at all times with the same vigor, yet as the price of the raw material was such as to afford a living profit to the copper producer only with careful management, the manufacturers had in this fact a guarantee that the price would scarcely go lower, hence they were free buyers, and did not hesitate to go on manufacturing and to stock up their warehouses with finished goods, without regard to any temporary decline in consumption; but what is the condition of this industry to-day, with the large advance brought about by the French Syndicate in the price of copper, and the consequent advance in finished goods. Consumption at once began to fall off. Dealers and jobbers who take most of the product of the manufacturers had no faith in the permanency of the "corner." They began to buy "from hand to mouth," while the manufacturers, seeing the demand for his wares lessening every day, and having as little faith as the jobber in the prevailing price of copper, wisely resolved to diminish his output rather than pile up goods on his shelves, with the certainty of a heavy decline sooner or later in their value—as a direct result of the operations of the French Syndicate upon the brass industries of this country, thousands of industrious mechanics and laborers have been thrown out of employment, and it can be truly said, that this branch of industry is in the worst condition experienced for ten years. The consumption of brass goods for steam, water and gas has fallen off from twenty-five to forty per cent, with no immediate prospect of an improvement. No one believes that the inflation can last for the period claimed by the French syndicate, and in conclusion it may be stated that the manipulation of this "combine" has been the most disastrous calamity for the general copper consuming industries of this country that has ever befallen it. It will require years to repair the damage inflicted, after the inevitable collapse shall come.

JAMES POWELL, President Union Brass Company.

CINCINNATI, Jan. 14, 1889.

The Electrolytic Extraction of Sodium and Chlorine from Sea Salt.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: Your No. 25, of December 22d, 1888, contains an article about the electrolytic extraction of sodium and chlorine from sea salt, according to the process of Mr. N. N. Beketov. A force of 5 volts and 1 ampère will decompose 180,560 pounds of salt in 24 hours. You say, in other words, it requires in 24 hours 16,000 ampères at 5 volts, or the work of 80,000 volt ampères. Now, I laid your calculation before an electrician, and he could not understand how you arrived at those figures. I have for a couple of years decomposed salt in state of fusion, and it seems to me that the figures given by Mr. N. N. Beketov are rather high in the output of sodium and chlorine. Will you please explain to me how you arrive at your calculation? We have steam boilers, engines and dynamos of 2000 ampères by 5 volts now idle, and I am willing to give the experiment my time and attention. Latterly I did not pay any attention to it. WM. LICHTENBERGER.

SYRACUSE, N. Y., Jan. 9, 1889.

Mexican Mining Law.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: A, B and C own a mine jointly in the Republic of Mexico, each being the possessor of one third. The company is not incorporated. A claim adjoining that of the mine proper is denounced in the name of the "socios" of the X mining company. After the denouncement of this adjoining claim, and before possession of the same is given, A sells his third in the X mining company to B. A now claims his share of ownership in the new claim or location as if he were still a part owner of the X company. B claims that A's right or title in the new claim or annex ceased when he sold his third in the X, or original company, as it was denounced in the name of the "socios" of the X company, and as A is no longer a "socio" of this company he has no share in the new location or annex.

If you, or any of the readers of the ENGINEERING AND MINING JOURNAL, versed in the mining laws of Mexico, can decide the above question, you will oblige a SUBSCRIBER.

Henderson Gas Furnace.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: My furnace for heating by radiated heat, which you illustrated in your issue of December 18th, 1886, has recently been practically tested at McKeesport, Pa., and has given satisfactory results.

I use measured gas and measured air. The air is cold and the gas is heated to probably 3000 degrees Fahrenheit in the furnace by the radiated heat of that preceding it. It enters cold and travels 5 feet in the furnace before it meets the air. The combustion is perfect within a foot of where they meet, so that 250 pound piles are heated to roll in 5 minutes, and as the furnace has four doors, it will heat 1000 pounds every 5 minutes, or 12,000 pounds per hour, and upwards of 140 tons in 24 hours. In 10 minutes after charging wrought-iron begins to melt. The heat is radiated from a column of flame 18 inches thick, 3 feet wide passing, 2 feet 6 inches above the hearth, and one foot below the roof, the effect of which is to heat without waste of metal or wear of roof. This furnace nearly doubles the capacity of a works making 150 tons of muck bars a day by heating scrap. The heat is uniform all over the furnace. It heats as soon at the uptake as where the combustion takes place 20 feet away. It will create a revolution in the arts.

The same patent includes an exhaust apparatus to exhaust gas and measure it and at the same time measure the proper amount of air to burn it. It relieves manufacturers of trouble arising from shortages of gas, as the exhaust will suck it to where it is wanted. The combustion is so perfect that there is no smoke, as is now so usual with natural gas. Only radiated heat passes out of the chimney, resembling the outer air in a hot day. A 50 H. P. Galloway boiler when set on end will serve for a chimney and absorbs all the heat of the spent gases.

The furnace hearth is 20 feet long and the furnace exclusive of chimney 30 feet; it requires 37,000 pounds cast-iron plates, 9000 fire-brick and 20,000 red brick and a No. 4 Sturtevant blower.

Where there is no natural gas I used 40 pounds of gas coal to make 1000 feet of combustible gas in my combined blast-furnace and retort, which is also the equivalent of 6 gallons of petroleum vaporized. There are no regenerators; this illusion is dispelled. JAMES HENDERSON.

CHARLES STEWART STONE.

By the death, on Friday the 11th instant, of Professor Stone, of the Cooper Union in this city, a quiet, faithful, useful life was brought to a close. I cannot justly call this termination premature: for Professor Stone was in his seventy-third year, and had been continually engaged in teaching (principally in chemistry and mineralogy) for nearly half a century. I am not even certain that, if he could have foreseen the end, he would have deemed it a misfortune to die with the harness on, and to miss that period of final repose, the *otium cum dignitate* of old age, to which so many active men look forward, and which the few who attain it so seldom enjoy; for he was, both by temperament and by training, a man who found his regular routine of work not specially burdensome; carried it patiently and comfortably, without intense delight or disgust, and would have been unhappy without it. I fancy that in all such lives of loyal, uncomplaining discharge of duty, in which ambition seems to have disappeared, and conscience itself has become habit, we may find, if we look further, the real sustaining and refreshing element in some occupation, of which the public or the employer sees little—domestic pleasure; the passive enjoyment of literature; the practice of some accomplishment; or the pursuit of some favorite object, which atones for the relative monotony of daily employment. If such persons are simply appreciative, not aggressive and self-asserting, they receive less credit than is due, either to their usefulness or to their acquirements. It may be unjust to the subject of this sketch to say that he was one of that class; but such was certainly my earliest impression of him; and such it remains, after more than thirty years.

Professor Stone was born in Maine, in 1815; graduated at Yale in 1842; immediately began his career as a teacher, and was thus engaged at various schools in Maryland and Pennsylvania until 1847, when he became for four years principal of the Trenton Academy, at Trenton, N. J. Removing thence to Brooklyn, he opened there a private school, which he conducted until he became, in 1856, Professor of Natural Sciences in the Brooklyn Collegiate and Polytechnic Institute. This position he retained until 1863, when he was appointed Professor of Chemistry and Geology in the Cooper Union—a position which he held more than twenty-five years.

It was at the Brooklyn Polytechnic that I knew him first; and I can well remember that, although a relatively young man, he impressed the boys as old. To my eyes, he never grew any older, but remained always the same steady, patient, unenthusiastic, industrious incarnation of duty. He was not one of those teachers who fascinate and inspire the *indifferent* pupil. If a boy really wanted to learn, Professor Stone was glad to help him; if not, the Professor didn't worry about it. He was a good demonstrator in experimental physics and chemistry, and his explanations were clear and simple. If any student wanted more, he could have it for the asking; but it would not be forced upon him.

But whoever would get behind this mask, and find the living man, had only to exhibit a real or feigned interest in the Professor's collection of minerals. This was his pride and joy. He loved it as a gardener loves his flowers; and through it one might go straight to his heart.

For such a temperamant, a sphere much more appropriate than the Polytechnic was presented by the Cooper Union. In the former school, he encountered boys not wildly desirous of learning anything in particular, or (if they had passed that stage of immaturity, and begun, as the saying is, to "wake up") enthusiastic in some other department of study, where emulation, fed by "sums" and problems, furnished more excitement. But in the Cooper Union, that wonderful great college of which New Yorkers boast so much and know so little, there are no careless pupils, sent by their parents and anxious only for marbles at "recess." I know of no other place where thousands of students gather nightly, all intensely eager for the privilege of learning; not one needing to be coaxed or stimulated or disciplined; not one to whom the loss of the knowledge for which he is so hungry would not be a punishment more severe than reproof or rod. To such receptive minds Professor Stone became a valued instructor. The thing he did not care to do, namely, labor with the heedless and indifferent, was not requisite. What he loved to do, namely, impart knowledge to earnest inquirers, was exactly what the place demanded. He studied with minute perseverance the compact and accurate presentation of the themes which, over and over again, he had to present to fresh classes. The symbols, formulas and calculations which he expected to employ were elaborately blazoned upon great charts; and so methodical was his preparation that he knew for weeks in advance on what day he would reach a certain topic and require certain charts, prepared for its illustration, which lay, duly labeled, awaiting their turn. The hundreds of experiments involved in his courses were similarly systematized. Professor Robert Spice of Brooklyn, who has been engaged to finish the courses for this season, says that he finds the apparatus for each experiment—down to the bits of glass tube, just long enough and bent to just the right angle, or the rubber pipes that exactly fit, or the beaker that holds precisely enough—all adjusted, ticketed and set apart for that special purpose and no other.

After such methodical preparation, it followed, as a matter of course, that Professor Stone's experiments always succeeded, without waste of time; while his charts not only saved him much labor, but protected his students against liability to clerical errors in taking notes. At the close of a lecture or recitation, there was always a group lingering to ask questions, and receive the additional information which he was glad to give, though slow to volunteer.

Thus carried on, the work was not only congenial to him, but satisfactory to his pupils. They sought the facts of science, not brilliant oratory about science; and what they wanted was a teacher who "knew it like a book"—a book in good clear print, with pictures, and possessing also the great advantage, not found in any ordinary book, that, on being pressed with a question, it would produce an explanatory foot-note!

And these nightly duties being discharged, he was free to spend as many hours as he chose in his cabinet, collecting, classifying, labeling, examining and re-examining, or in "exchanging"—with a sigh over what he gave and a smile for what he got in return—in short, to revel in the joys of a true collector.

He was a first-rate mineralogist, although he published nothing, so far as I know, on that subject. In chemistry—a science which was completely reconstructed while he was teaching it—he kept up with the times, modifying his instruction to suit established modern theories and notations, yet avoiding a too hasty adoption of proposed novelties. During the last few years, his failing strength did not permit him to take personal charge of all the departments for which he was responsible, and for some courses of lectures he engaged competent assistants at his own expense. As a member of his family once said, he had so fitted himself to his regular routine that he would rather have hired others to do all the work, retaining for himself the mere care of the apparatus, than let go entirely.

Of his intellectual life, and of his home-circle, I will say no more than this: that they were evidently elements of a refined culture, confirming him in a seclusion that would have seemed, otherwise, almost monastic. And so, preferring inconspicuous peace to the fierce delights of competition, and turning from the noise of men to the silence and purity of crystals and books and home, he passed, almost without counting them, and neither hasting nor resting, the uneventful years. Among his pupils there may be many who will turn to profit of fame the knowledge he first gave them; but not one will tread the way of duty with more faithful foot, or earn more truly the rewarding sentence, "Well done."

R. W. RAYMOND.

PARSONS'S COMPOUND STEAM TURBINE.*

The compound steam turbine has now been developed into a motor which utilizes steam with a high degree of economy. It possesses considerable simplicity, and its speed of revolution is high; and as dynamos working at a high speed combine cheapness and efficiency, the application of the steam turbine for driving them is at first sight a good one.

The first turbo-electric generator, completed about four years ago, ran at 18,000 revolutions per minute, and gave six electrical horse-power; it has been in almost constant use since that time, and has done a large amount of work. The second, made shortly afterwards, runs at 10,000 revolutions per minute; it was placed on the Tyne Steam Shipping Company's steamer Earl Percy, and has worked her 60 lamps ever since to entire satisfaction; the cost of fuel and maintenance is very small, and the light remarkably steady. Generators were then made for supplying up to 250 lamps, and a large number of installations were carried out, which have given excellent results; the consumption of steam was about equal to that of a good high-pressure engine with single slide when working with the same steam pressure and driving a good dynamo; but so marked has been the economy realized in regard to lamp renewals, oil, attendance, and other items, that the generators have almost without exception given great satisfaction. It became essential, however, if these generators were to be successfully adopted for large installations, that higher degrees of economy should be realized, more nearly approaching those of the best compound engines. Theory based on the authenticated performances of water turbines and the laws of the flow of steam and gases, showed that the turbo-electric generator possessed the elements of the highest economy; not merely comparable with the best-known performances, but even superior to them. How far practice has come up to theory may be judged by the results given at the end of this paper, which it will be seen approach nearly the best results of ordinary engines working with the same steam pressures.

Compound Steam Turbine.—The compound steam turbine consists of two series of parallel-flow or Jonval turbines, set one after the other on the same spindle, so that each turbine takes steam from the one before and passes it on to the one following. In this way the steam entering all around the spindle from the central inlet *O*, Fig. 2, passes right

* Extract from paper read before the Institution of Mechanical Engineers o England by Hon. C. A. Parsons.

and left through the whole of each series of turbines to the exhausts *P P* at each end. The steam expands as it loses pressure at each turbine; and by successive steps the turbines are increased in size or area of passage-way, so as to accommodate the increase of volume, and to maintain a suitable distribution of pressure and velocity throughout the whole series of turbines. The areas of the successive turbines are so arranged that the velocity of the flow of steam shall bear throughout the series about the same ratio to the speed of the blades; and as far as possible this ratio of velocity is so fixed as to give each turbine of the series its maximum efficiency. The two equal series of turbines on each side of the central steam inlet *O* balance each other as regards any end pressure on the spindle of the motor, and thus remove any tendency to undue wear on the collars of the bearings.

Bearings.—In Fig. 3 is shown one of the bearings enlarged. As it is impossible to secure absolute accuracy of balance, the bearings are of special construction so as to allow of a certain very small amount of lateral freedom. For this purpose the bearing is surrounded by two sets of steel washers of different diameters, the larger fitting close in the casing and clear of the bearing, and the smaller fitting close on the bearing and clear of the casing. These are arranged alternately, and are pressed together by the spiral spring *N*, Fig. 3. Consequently any lateral movement of the bearing causes them to slide mutually against one another, and by their friction to check or damp any vibrations that may be set up in the spindle. The tendency of the spindle is then to rotate about its axis or mass, or principal axis, as it is called; and the bearings are thereby relieved from excessive pressure, and the machine from undue vibration. The automatic oiling of the bearings by the screw *I* almost entirely prevents friction and wear. The circulation is continuous, the oil being used over and over again; and as it deteriorates very slowly, and there is little waste, the consumption may be said to be unusually small. The oil is raised up to the screw *I* by the suction of the fan *K* acting upon its free surface in the standpipe *H*. After passing through the bearings the oil flows back along the pipes *D* and *E* to the reservoir *D*, to be again drawn up by the fan and fed into the bearing by the screw. The throttle valve *V* is worked by the movement of a leather diaphram *L*, which the suction of the fan *K* tends to close against the tension of the spring *M*.

Turbo-Electric Generator.—In Figs. 1 and 2 is represented a turbo generator of 25 horse-power actual. All the turbines are here of the same diameter, and the expansive action of the steam is utilized by varying the depth and pitch of the blades.

In Fig. 6 is shown a 50 horse-power turbo generator, which may be said to be of the triple expansion type, from the fact that it is made with three different diameters of turbines for the purpose of dealing more advantageously with the increasing volume of steam as it expands. The three barrels, *d i k*, of different diameters contain the three successive sizes of turbines. In each barrel the blades are continuously varied in pitch, so that an almost perfect distribution of steam is attained; and each barrel by itself may be compared in some respects with a cylinder in a triple compound engine. In the larger sizes the blades are accurately curved, as in the best water turbines. To prevent end pressure the spaces at the ends of the corresponding barrels are connected by equalizing passages *m*

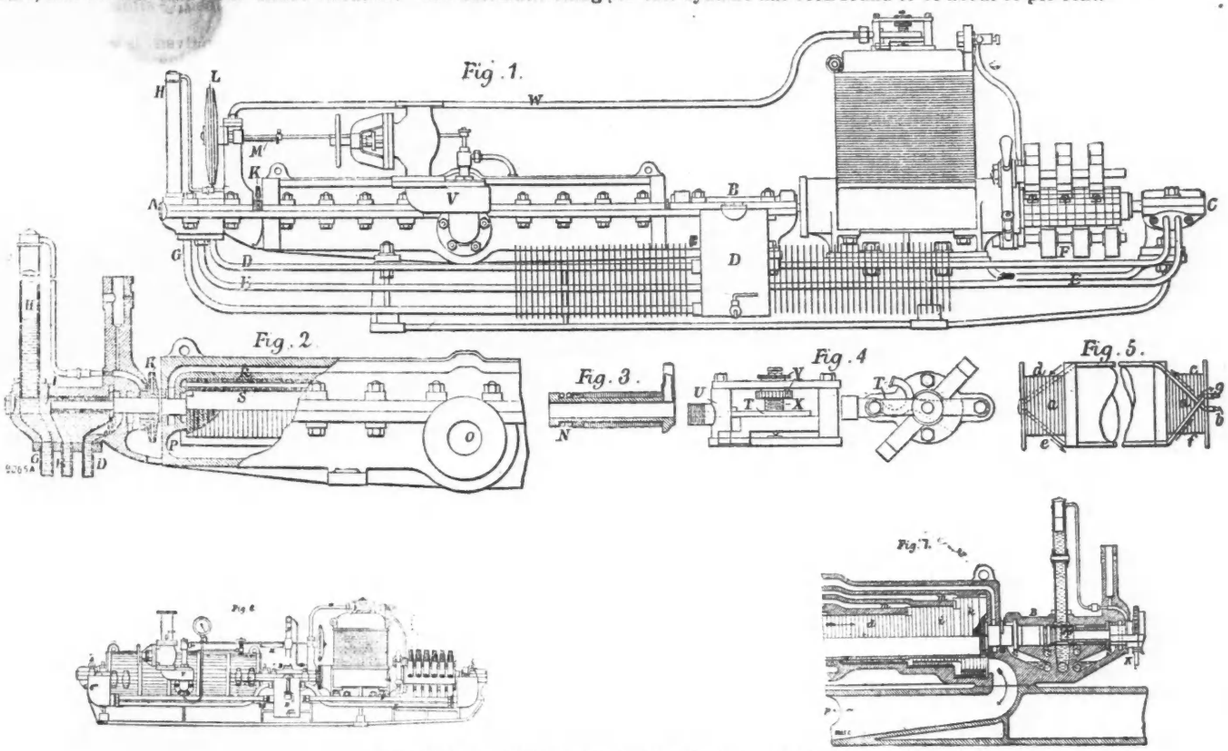
Including fluid friction, the theoretical efficiency of each turbine in the set is about 89 per cent; and the mean efficiency of the whole set is theoretically about 87 per cent of the power which should be given out in the adiabatic expansion of the steam.

With the continuous lubrication and small pressure on the bearings there is no material wear; and as the steam has no cutting action on the turbines, the initial clearances remain the same. Therefore the consumption of steam in the turbo motor does not increase under the conditions of every-day running, and after long periods of work has been found to remain almost the same as on the trial run. The power absorbed in friction in the bearings has been estimated; when they are cold it is considerable, amounting to over one-third of a horse-power per bearing, but when the oil becomes heated to its normal temperature it falls to less than 20 per cent of this amount.

Dynamo.—The motor is coupled to the dynamo by a coupling socket with squared hole, which fits accurately upon the squared ends of the two spindles; this admits of the armature being easily withdrawn. The magnets are entirely of cast-iron, and usually are made with simple shunt-winding only.

The armature is of the drum type. The body is built up of thin iron discs, insulated from each other by tracing paper; it is turned up, and grooves are milled out to receive the conducting wires. For pressures of from 60 to 80 volts, there are usually thirty grooves.

Efficiency of Dynamo.—For a normal output of 400 ampères and 80 volts, the resistance of the armature from brush to brush is only 0.0025 ohm. The resistance of the field magnets is 23 ohms, or an electrical efficiency of just 98 per cent. There are losses due to eddy currents in the core and wire of the armature, and to magnetic retardation resulting from change of polarity of the core. These losses have been ascertained by separately exciting the magnets from another dynamo, and observing the change of steam pressure required to maintain the speed constant the corresponding power was then calculated. The commercial efficiency of this dynamo has been found to be about 95 per cent.



PARSONS' COMPOUND STEAM TURBINE.

Electrical Control Governor.—On the magnet yoke is the electrical control governor, Fig. 4, the movement of which is caused by the attraction of the magnet yoke upon a small iron bar or needle, finely balanced and pivotted on a vertical spindle; a spiral spring *X*, resists this attraction. A double finger or arm *T*, is keyed on the same vertical spindle; the end of each finger is flat, and when opposite the inlet *U*, to the air pipe, closes it. The spiral spring is so adjusted by the movable head *Y*, that the greater the attraction the more is the inlet *U* closed by one of the fingers. When the inlet *U* is open, the inrush of air along the pipe *W* partially neutralizes the suction of the fan *K*, and allows the diaphragm *L* to extend, and so to open the throttle valve *V*. So accurate is the governor that, when the load is gradually varied from nothing up to the maximum, the variation in volts at the terminal is less than 1 per cent.

Steam Consumption.—As the result of careful tests made when exhausting into the atmosphere and giving off 32,000 watts, the consumption of steam per electrical horse-power has been found to be 42 pounds, with a steam pressure of 61 pounds at the inlet, and 35·1 pounds with a steam pressure of 92 pounds at the inlet. Tests made at Portsmouth Dockyard and at Messrs. Weyher and Richmond's, in Paris, have agreed closely with the tests made on the same turbo generators before they left the works at Gateshead. These tests have, therefore, confirmed the accuracy of the figures above given.

Durability.—After three years' working of ten hours daily, the wear on the bearings has been found to be very small, in some cases almost inappreciable. The blades or vanes of the turbines show no cutting action from the steam. The commutators in the larger sizes have stood this amount of work well, and when carefully looked after have suffered very little wear.

Advantages.—The characteristic advantages of the turbo-electric generator may be summed up as follows: Steadiness of the electric current produced, arising from the high speed and the momentum stored in the

moving parts; freedom from accident, on account of symplicity and direct action; small first cost, and small cost of maintenance of machine and lamps; small consumption of oil; little attention required; small size and weight for the power developed, which is about nine watts per pound of weight in the whole machine, including both engine and dynamo.

The number of these generators already supplied for ship and land installations represent an aggregate of more than 2000 electrical horse-power.

NOTES ON THE COAL-FIELD OF SOUTHWEST VIRGINIA.

Written for the Engineering and Mining Journal by J. B. Killebrew.

Recent investigations in the coal-field of Southwestern Virginia have led me to believe that there is no other equal area in the United States that possesses so many seams of valuable coking coals. My investigations were confined mainly to the counties of Wise and Dickenson, in Virginia, but more especially to the former, through which the Norfolk & Western Railroad is now building a branch, extending from Pocahontas along down the Clinch River to a point just below Castlewoods, where it turns in a more westerly direction to Guests' station and thence on to Big Stone Gap.

This section lying northwest of Clinch River and northeast of Guest River is deeply eroded, and its topographical features are very striking, ridges and V-shaped valleys succeeding each other in irregular order, the former rising from five hundred to a thousand feet above the latter. Big Sandy ridge, which separates the waters of Clinch and Big Sandy rivers, or more generally the waters of Tennessee and Ohio rivers, traverses the counties of Wise and Dickenson in a northeasterly direction, nearly parallel with, and about eight miles distant from Clinch River. From this mother ridge, numerous subordinate ridges run out southerly to Clinch River, and northerly to the Breaks of Sandy River, which is a low gap in the Cumberland Mountains, and which furnishes the most available pass for any prospective railroad through this great mountain barrier. The deep gorges which everywhere prevail in this locality make the opening of the coal seams comparatively easy. In many places, four or five seams may be opened one above the other.

The principal stream in this region is Guest River. It heads in the main Cumberland Mountain (which forms the boundary of Kentucky and Virginia) flowing centrally across Wise County to Clinch River. It receives its two main tributaries, known as Bear and Big Tom Creek, from the north, the former heading on Guest Mountain (a part of Sandy Ridge), not far from Gladeville, the county seat of Wise County—the main branch flowing through this town. Big Tom Creek and its tributary, Little Tom Creek, rise in the elevated region known as Sandy Ridge. This ridge proper begins at Cumberland Mountain, where Pound and Guest rivers jointly take their source; thence it pursues a course almost southeast some 20 miles, to a point about midway between the mouths of Bear and Big Tom creeks, where it swings to the left with the general course already indicated.

The tributaries of Clinch above Guest River, heading in Sandy Ridge and within the counties of Wise and Russell, empty into the Clinch in the order as the names are given: Rat Tail branch, Bull Run, Russell, Lick, Dumps, Weavers, Thompsons, Lewis, and Swords Creek.

The streams rising on the opposite side of Sandy Ridge flow into tributaries of the Ohio. Russell Fork of Big Sandy River and its tributaries drain all of Dickenson County and a portion of Wise.

Russell Fork passes through Cumberland Mountain at the Breaks, heretofore mentioned, the only water gap through the mountain until the Tennessee River is reached at Stevenson, Ala.

A view of this region from the narrow part of Sandy Ridge has been graphically described by Professor Stevenson, and by substituting local names can fitly apply to a description of the region in question: "The surface features of the region are due wholly to erosion. The carving is stupendous. Standing on any of the high points of Sandy Ridge and looking into Wise and Dickinson counties on the one side, or into Russell and Wise on the other, one can compare the surface only to that of an ocean petrified at the height of a terrible storm. But this comparison fails. Narrow ridges, rising to a height of 900 to 1000 feet, separate equally narrow valleys, in which flow rapid streams carrying much water, during a great part of the year. The slopes of these ridges are abrupt, sometimes reaching 35 degrees, and are covered by a dense forest of white oak and poplar."

Beginning near the mouth of Bull Creek, a tributary of Clinch River, which point has an elevation of 1400 feet above sea level, I found next above the lower conglomerate rock the following well-defined seams of coal in ascending order:

1. Cannel coal, elevation 1605 ft., 2½ ft. thick.
2. Jawbone, elevation 1710 ft., 6 to 11 ft. thick.
3. Imboden, elevation 1860 feet, 3 ft. 4 in. to 4 ft. 6 in. thick.
4. Widow Kennedy, elevation 2025 ft., 6 ft. thick.
5. Lower Banner, elevation 2080 ft., 3 ft. to 4 ft. 3 in. thick.
6. Upper Banner, elevation 2190 ft., 5 ft. to 6 ft. 2 in. thick.
7. Edwards Bed, elevation 2600 ft., 5 ft. thick.

These seams are almost perfectly horizontal. There is probably another workable seam between 6 and 7.

The cannel coal was worked many years ago, and hauled off in wagons. It comes out in large cubical blocks, and makes a very handsome appearance.

Near Osborne's Ford, some eight or ten miles farther down the Clinch, this cannel coal is over four feet in thickness. It burns with a singularly bright flame, ignites almost as easily as a lightwood knot, and burns without decrepitation. It is thought to be the purest cannel coal yet found in the United States.

The coal in the Jawbone seam is not homogeneous, the upper and lower portions being soft, while the central is hard and bony, though making a most excellent grate coal. The lower portion of the seam makes excellent coke.

The coal of the Imboden seam is lustrous and hard, and singular in the fact that the cleavage planes run at every possible angle with each other, and when heated, the coal drops into an infinitesimal number of amorphous particles, which quickly cohere into a pasty mass. It is probably the best coking coal yet found in the United States, as tests and analyses given below indicate.

The Widow Kennedy has scarcely any lamination. It resembles a mass of pitch. It is hard and lustreless, and pick marks show chocolate-colored streaks. The seam is uniformly from five feet to six feet in thickness, without parting. The coal burns with a pure, bright, white flame, throwing out a great heat and leaving but a very small percentage of red ash. It makes a most excellent coke.

The Lower Banner is a very hard coal, probably the hardest in the field and the seam is without parting. It makes a good coke.

The Upper Banner is one of the best seams in the field. It varies in thickness from 4 feet 10 inches to 6 feet 2 inches. The coal drops into a myriad of small cubical blocks when exposed. It makes a very strong, hard coke, very much brighter than that made at the Pocahontas mines, but equally as strong. The seam has one small sandstone parting one-half inch in thickness seven inches from the top.

The Edwards seam has two partings, but there are three feet of most excellent coal which forms the lower bench. It makes a good, strong, bright coke.

Below may be found analyses of the coal from five of these seams:

	Volatile matter.	Moisture.	Carbon.	Sulphur.	Ash.
Jawbone	30·71	·65	53·13	·73	14·76
Imboden	36·79	·44	58·53	·58	3·75
Widow Kennedy	33·68	·80	61·87	·67	2·98
Lower Banner	34·54	1·16	59·46	·59	4·25
Upper Banner	31·86	·82	64·27	·85	2·13

The sample of the Jawbone of which an analysis is given above included the bony central part of the seam. The lower part, from which the coke was made, as given below, would probably not show over five per cent of ash. It may also be proper to remark that the samples of the Upper Banner and Imboden were taken from the south side of Sandy Ridge for these analyses, while the samples for the coke given below were taken from the same seams on the north side of Sandy Ridge some fifteen miles distant. This will account for any seeming discrepancy in a comparison of the results of the analyses of the coal with the coke.

About the first of November, 1888, Col. A. M. Shook, the present able General Manager of the Tennessee Coal and Iron Company, having become interested in the excellence of the coals in this region, determined to test their coking qualities. Capt. O. Barrett, who may be called the pioneer in the development of the Wise County coals, had samples taken from seven seams and shipped to Tracy City, Tennessee, for the purpose of being coked. The coal was carefully weighed and put in nail kegs, and each keg put into a different coke-oven with the Sewanee coal and coked for forty-eight hours.

The following table gives the weight of the coal, the resulting weight of coke and the percentage of coke made from the coal:

Seams.	Weight of coal. Pounds.	Weight of coke. Pounds.	Percentage of coke.
Jawbone	45	25	56
Imboden	48	38	79
Widow Kennedy	45½	31½	69
Lower Banner	53½	29	54
Upper Banner	44	32	73
Edwards	49	37	76
Hibbitts	33	26	78

Analyses of these specimens of coke were made by Porter and Going, of Cincinnati, as follows:

	Carbon.	Ash.	Sulphur.
Jawbone	91·45	7·32	1·027
Imboden	93·07	5·77	·918
Widow Kennedy	93·73	4·58	1·098
Lower Banner	89·25	8·77	1·16
Upper Banner	90·14	8·55	1·145
Edwards	93·27	5·38	1·087
Hibbitts	86·53	12·00	1·20

Mr. Shook in submitting a statement says of these cokes: The Jawbone is a very dense, dull coke, very heavy and very strong, resembling the Pocahontas.

Of the Imboden, he says: "This is the finest looking sample of coke I ever saw, long, bright and silvery, prismatic, sonorous, very hard and, if no error in weighing samples occurred, the largest yield of coke I ever saw."

The Widow Kennedy coke is pretty, bright, silvery and hard, and much resembles the Imboden in appearance and analysis, though not so bright.

The Lower Banner makes a coke short, heavy and dense, without luster, resembles very much the Pocahontas coke in appearance.

The Upper Banner is an excellent looking coke, bright and shining and of good structure.

The Edwards coke has good structure, a little short, but is far above the average of the Tennessee and Alabama cokes.

The Hibbitt is strong, dense and heavy, and is very far from being a poor coke, though rather worse than any of the other samples.

Such, in substance, is the report on the tests made by Colonel Shook, the best practical expert on the value of cokes in the South. He further says that he does not believe such another coal-field with so many good seams of coking coal can be found in the civilized world.

It may be remarked that the quantity of sulphur in the cokes is greater than it should be in comparison with the amount in the coals. This is readily accounted for by the fact that the coals were coked in kegs, which surroundings prevented the escape of the sulphurous fumes. It is a well-known fact that coke produced in ovens, though usually denser than that produced in heaps or mounds, yet contains a larger amount of sulphur. In fact, any thing which obstructs or retards the free issuance of the gases will prevent the usual partial elimination of sulphur. This coke made in kegs had a double environment, so to speak, and must have retained all, or nearly all, the sulphur originally in the coal.

The analyses of three of three of the most celebrated furnace cokes in

the world are appended below, with the analyses of three of the cokes from Wise County, for the sake of comparison :

	Carbon.	Sulphur.	Ash.
Coke from Durham and Northumberland, Eng.	92·50	1·00	5·00
Coke from Connellsville, Pa.; av. 3 samples	87·69	·977	10·44
Pocahontas coke; av. 3 samples	92·55	·597	5·74
Imoden (Wise County)	93·07	·918	5·77
Widow Kennedy (Wise County)	93·73	1·098	4·58
Edwards (Wise County)	93·27	1·087	5·38

When we institute a comparison of the percentages of coke made from English coals with the Wise County coals, we find that the highest percentage of coke obtained from the best English Newcastle coals is 72·31, while of the Wise County coals, the Imboden reaches 79 per cent, and three others, the Upper Banner, Edwards, and Hibbitts, 73, 76, and 78 per cent respectively. In the Connellsville region 63 per cent is regarded as a good average.

To show the superiority of the cokes made from the Wise County coals over those of the Chattanooga and Birmingham districts, it is only necessary to compare the table below with the table given of the Wise County cokes:

CHATTANOOGA AND BIRMINGHAM COKES.

	Carbon.	Sulphur.	Ash.
Etna coke	85·450	1·451	11·083
Daisy coke	79·839	2·132	16·756
Soddy coke	80·823	2·127	15·780
Dade coke	75·941	·670	21·756
Pratt mines, Birmingham coke	88·875	1·182	8·993
Coalburg coke	84·678	1·879	12·630

The increased calorific value of the Wise County cokes as compared with those given above is very great. One part by weight of carbon gives out 8000 units of heat, so that the loss of 10 per cent of carbon will cause a loss of 800 heat units, as compared with the Wise County cokes. The loss in heat units is still further increased by the larger percentage of ash. The Birmingham coke for instance contains about five (5) per cent more ash than the best of the Wise County cokes, which is equivalent to an additional loss of 500 heat units. The increased freight and handling also makes a considerable extra expense to secure the same furnace results, and in using these inferior cokes there is also a loss in filling up a furnace with inert matter, that does not contribute anything to iron making, but reduces the capacity and efficiency of the furnace and abstracts a large amount of heat to reduce the worthless material. Even the excess of sulphur is largely reduced in the pig-iron, manufactured by the higher grade cokes, as a smaller amount will be required to perform the same duty.

In view of all the facts the possibilities of this region are certainly very great. It is being made accessible by one railroad now building, and two others in prospect. There are notable deposits of iron ores in Western North Carolina and in the Cripple Creek region of Virginia, all lying within one hundred miles of this coal. Pocahontas coke is now in large demand in Chicago, St. Louis, Sheffield, Chattanooga, and other western points. The Wise County coal-field is nearer to all these points by one hundred miles. It is only a question of time when these cokes will be largely employed in the West, and it will be found even profitable to use them, in part at least, in all the Birmingham and Chattanooga furnaces. The great economy of fuel that has been effected in the Cleveland district of England, where the cheapest iron in the world is made, is due in great part to the strength of the coke used, which has sufficient cohesive power to bear the pressure of a column of iron making material of from 80 to 100 feet, a result which can not be obtained elsewhere in England. It is believed that the coke made in Southwest Virgina will bear a burden equal to the Durham coke, which it so much resembles in appearance, strength, structure, hardness, and chemical analysis.

A Large Blast.—A tremendous blast with five tons of gunpowder took place last month at Furnace granite quarry, Lochfyne Side, Scotland. The mine was bored through the solid rock at a height of 45 feet above the quarry floor. The passage reached a chamber containing the five tons of gunpowder, above which rested 150 feet of rock. The blast was successfully exploded by means of an electric battery, when about 75,000 tons of granite of fairly good quality were displaced.

DUNSTAN'S SAFETY CATCH FOR MINE CAGES.

This ingenious safety arrangement is the invention of Captain Dunstan, Superintendent of the Central copper mines, Michigan. The novelty in its construction and arrangement consists in the independent action of each one of two eccentric gripping-dogs, placed upon opposite sides of a railway car or elevator. In the illustrations here given Figure 1 represents the truck of a railway car fitted with this safety catch, and Figure 2 a vertical shaft cage similarly provided.

The importance of the two jaws *C C* and *D D* acting independently of one another has been often exemplified by the failure to act of those dependent on each other, when one of them has come into contact with a fish-plate or other projection on the rail *B*. As will be seen from the illustrations the dogs, or gripping jaws, are arranged in pairs, one pair on each side of the vehicle, the jaws consisting each of an eccentric or cam-shaped block, having its outer face provided with teeth to engage with the sides of the rails or guides in case of an elevator or shaft cage. It will be seen that each pair of jaws is independently connected with the draft rope or cable, so that each is adapted to engage separately with the guide or rail in the event of breakage or sudden slackening of the cable. Very severe tests have been made with this safety catch on the plane of the Central mine, and in every case the catch stopped the car instantly and held it.

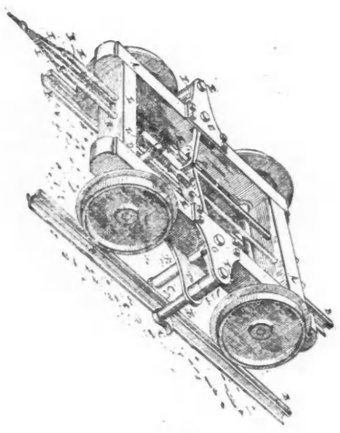
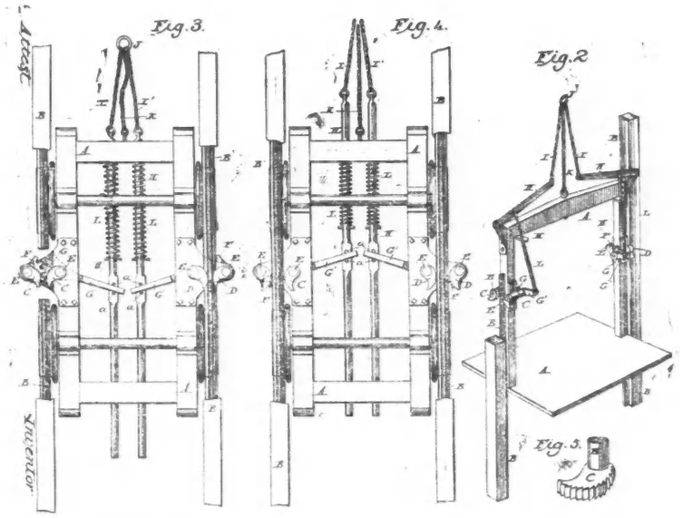


FIG. 1.



DUNSTAN'S SAFETY CATCH.

THE SMELTERS OF UTAH.

Written for the Engineering and Mining Journal by F. Roeser.

The smelters of Utah Territory are all located a short distance south of Salt Lake City; the Hanauer and Germania works within a mile of each other and about seven miles distant; the Mingo Works at Sandy, 13 miles distant.

The Hanauer Works are under the superintendence of Mr. R. H. Terhune, who has been with the company the past nine years. The plant which has been designed and built under his direction consists of four blast-furnaces, 6 feet square and 13 feet high, with adjustable water tuyeres, the distance between the inside extremities of the tuyeres being from 33 inches to 48 inches; three No. 5½ Baker blowers and a sixty 16 candle-power dynamo with incandescent lights; a large automatic crushing plant; a matte roaster building 200 feet by 90 feet, the structure being of brick with an iron roof; the floors paved with hard brick and the flue exterior to the building. In this building are five reverberatory roasters 17 feet by 72 feet, one with a slagging hearth. All the power at the works is derived from three Leffel turbine wheels, 26½ inches in diameter, driven under a 24-foot head of water. This plant seems to be peculiarly fortunate in the matter of water supply, as, besides this water power, they also have an artesian well, which, although only sunk 190 feet, delivers 25 to 35 gallons per minute, and rises 20 feet above the surface.

The yearly record, January 1st, 1888, to January 1st, 1889, the works being closed during August, is 23,544 tons of ore, 3115 tons of matte and 935 tons slagged flue dust, treated, requiring 6285 tons coke, 758 tons charcoal, 8272 tons limestone, 645 tons limonite and 2937 tons of coal and slack. This last item was mainly used in roasting, the coal otherwise consumed aggregating less than 50 tons; 10,152 tons of ore were roasted; 4941 tons base bullion and 613 tons copper matte, containing 522,550 ounces silver and 2363 ounces gold were produced, the copper matte 20 to 40 per cent copper, carrying very little gold. The pay rolls average about $9000 per month. In above statement no account is given of company slag, smelted, which averages about 15 tons daily. The small amount of limonite used is due to the fact that the company controls several low-grade mines of pyrites. The capacity of the furnaces has lately been reduced from 60 to 40 tons per 24 hours, owing to the predominance of zinc in the ores treated, and to its mechanical condition, fineness, etc., thus largely reducing the tonnage. There are never less than 3 and occasionally all 4 are running.

The Germania Lead Works, under the superintendence of Mr. S. James, Jr., is the oldest of the three smelters at present operating here. The plant consists of three blast-furnaces, varying from 42 inches by 60 inches to 42 inches by 80 inches; three Baker blowers, a No. 6, No. 5½

No. 5 and a good-sized dynamo, supplying the arc light. The structure erected for the production of white lead has been converted into a roaster building, and contains three very neat reverberatories, 17 feet by 72 feet, two being furnished with a slagging hearth. Besides these, there is another small roaster, 12 feet by 60 feet, and three Brückner cylinders, a sampling mill and a complete zinc desilverization plant, which, however, is now rarely used, and mainly for the production of litharge and granulated lead, which, for assay purposes, are unexcelled, the litharge carrying but 0·023 ounce silver per ton, and the lead about 0·05 ounce silver.

The Germania record for the past year, being out of blast during the months of August and December and part of the month of July, is as follows: 17,380 tons of ore and 4593 tons of matte smelted, no account given of flue-dust and slag; 6393 tons limestone; 1123 tons iron ore; 4093 tons coke; 525 tons charcoal; 4931 tons coal and slack consumed; 3432 tons base bullion and 620 tons copper matte, 30 to 50 per cent copper, containing 424,515 ounces silver and 2244 ounces gold produced.

The Mingo Furnace Company, Mr. W. J. B. Walker, Superintendent, has four furnaces, one 36 inches by 110 inches, with 11 tuyeres, having a capacity of 80 tons of ore, flux and fuel, in twenty-four hours, the other three being much smaller; five small reverberatory roasters, a neat sampling mill, and fine engine-room. Light is furnished by a dydamo, and the incandescent system used. During the past year the works were seven months in blast and five months out of blast. Fifty-two thousand three hundred and eighty seven dollars' worth of coke, $2932 charcoal, $20,491 coal, $2868 slack, $10,954 limestone, and $16,430 iron ore were consumed; 17,317 tons of ore, roasted matte, flue dust, etc., were smelted, and 5,929,084 pounds of base bullion and copper matte, of which about 600,000 pounds were matte, produced. Prices current at Salt Lake, for fuel and fluxes are: Coke, $11 per ton; limonite, $4.50; limestone, $1.75; charcoal, $13; coal, $4.75; slack, $2.75. Labor, $1.75 to $3.

The existence of quite a number of the mines of Utah is dependent upon a fair lead valuation, the ores being so low in silver that their value is almost entirely determined by the lead, the contents furthermore being not sufficiently high to withstand a marked reduction. With lead at 4c. or under, these properties cannot be worked to any advantage, and the smelters suffer accordingly. Again, the largest producers, such as the Beck Bullion, Eureka, Mammoth and the big mines of Park City, the Ontario, Daly, etc., ship the bulk of their ore out of the territory, the railroads favoring the long haul to such an extent that the difference between the rates charged to local smelters and those at Denver, etc., is not sufficiently great to enable the smelters here to compete with the superior advantages which Denver, Pueblo, etc., possess as smelting centres. The result is that the competition for the small amount of ore offered here is carried on to such a ruinous extent that only through the greatest economy, and with the exercise of the greatest possible skill in the management and conduct of the works, can smelting be carried on with any degree of success.

Railroad Snow-Plows.—To be prepared against a possible recurrence of the snow blizzard of March last, the Philadelphia & Reading Railroad Company has gone to great expense in constructing an immense snow-plow of the old type, and is said to have now ordered twenty-five more of them. The New York Central has purchased a rotary steam snow shovel. These machines have proved their value on the Canadian Pacific Railroad.

New Railway Bridge at Cincinnati.—The great bridge of the Chesapeake & Ohio Railway, at Cincinnati, was recently completed. From masonry to masonry, across from Covington to Cincinnati, the bridge is 5300 feet long, and, including approaches in Covington and Cincinnati, its length is 6900 feet. The style of truss used it that known as the "camel-back" truss. Its clear height above low water is 113 feet This bridge cost, up to the present, a trifle above $5,000,000. Its construction is of sheet iron, with steel bolts, and of this material the three channel trusses required 5000 tons.

New Method of Electric Street Lighting.—A French electrician has addressed a letter to the Paris Municipal Council containing a highly novel and original suggestion for the lighting of the streets of Paris by electricity, and, at the same time, for effecting a complete reconciliation between all the conflicting interests involved. It seems that this ingenius gentleman has designed a gas engine measuring only 25 centimeters in diameter, and which can therefore easily be placed within a hollow pillar of the size of an ordinary gas lamp. In the same pillar, above or below the engine, he would put a dynamo, and surmount the whole by an arc lamp.

Disposing of Slag Without Slag Pots.—One of our Arizona exchanges reports that the Arizona Copper Company has adopted a novel contrivance for getting rid of its slag. A sluice box of large capacity is brought from the main flume to the smelter, and from there is carried on to the river with a fall of about 15 degrees. From the tap-hole there is a conductor to convey the fluid slag, discharging it into the sluice box, where it is immediately granulated and carried off by the water into the river. The same contrivance has sometimes been adopted in making "building sand" from slag for mortar at some of the iron furnaces, and for granulating copper matte to avoid the great labor of crushing it when required for roasting.

Machine for Riveting Stove Pipe.—A recent invention is a machine for riveting stove pipe. In the old way each of the six or nine rivets in a piece of pipe was drawn and driven separately. By the use of this riveting machine all the rivets are drawn by one drop of the hammer, and all of them are set by one drop of the hammer. One man with this machine can turn out from 600 to 1000 joints of pipe per day. The pipe is formed on a cylinder connected with the riveting machine, and this makes it uniform in size and leaves the lap smooth and free from buckles. There is, we believe, no machine of this description in the market, and it is said the invention will mark a new era in the manufacture of stove pipe. It is easily operated, there is no complicated machinery about it and it does the work perfectly.

Strength of Hollow Porous Earthenware.—This comparatively new material is used in the construction of the ceiling at the Auditorium building in Chicago, being keyed in position between the steel beams which form the support for the different floors. The strength of this earthenware was thoroughly, though accidentally, tested recently. A coping stone, weighing nearly two tons, fell from the outer wall of the Auditorium building, cut its way as with a chisel through the tiling of the first intervening floor, and stopped on the next, where it was allowed to remain on exhibition for several days to show the strength of the material. When the hole was patched up, the floor was as good and strong as new, not having been disturbed in any other part.

The Julien Storage Battery for Car Motors.—The following data, recently furnished by the Julien Company, show the point reached by it so far in solving the electric street car problem. On the Fourth avenue line its cars are now running three round trips, or 36 miles, without change of battery; and it is expected that four trips, or 48 miles, can be accomplished without change, as, at the end of the third trip, the voltage of the battery is still above two volts per cell. When the battery is fully charged the voltage stands at about 320 (144 cells). Twelve miles are run on an expenditure of less than 15 E. H. P. Calculating the cost to be two cents per H. P. hour, it costs 30 cents for energy for a round trip of 12 miles, or 2½ cents per mile, exclusive of wear and tear.

The company expects better results with the cars now building, as they will be furnished with a far more efficient motor than those now in use, and the weight of the new cars will be at least two tons lighter than those running.

Chilian Finance.—We learn from the recent report of the Chilian Minister of Finance that the country is in a very flourishing condition; the estimated revenue is $50,000,000, whilst the expenditure, ordinary and extraordinary, will amount to $58,236,065, thus leaving a balance of $8,236,065 to be provided for out of the surplus in the treasury, which, it is estimated, amounted to, on the 1st of January, $20,000,000.

The revenue is as follows:

	Revenue.
Customs	$36,000,000
Railways	7,000,000
Agricultural taxes	1,180,000
National property	1,500,000
Miscellaneous	4,320,000
	$50,000,000

The receipts from customs from the 1st January to 31st August, 1888, are given at $28,673,260. This, compared with the same period in 1887, shows an increase of $4,171,765, the amount then received being $24,501,495.

This expenditure in excess of current revenue is owing to provision being made for an item of $17,000,000 for railroad construction and other public works; $2,700,000 are set aside for the redemption of paper currency, and apparently from the balance of about $12,000,000 in the treasury after the above mentioned expenditure, Chili will be able to pay for her new railroad construction without borrowing money.

The Law Regulating the Use of Water in Placer Mining in California.—In the State Supreme Court the suit of Fuller *et al. vs.* The Swan Placer Mining Company, the following decision was lately rendered:

1. No person shall be allowed to flood the property of another person with water, or to wash down the tailings of his sluice upon the claim or property of another person, but shall take care of his own tailings or become responsible for any damage that may arise therefrom. Sec. 2393, General Statutes.

2. A comparison of the relative values of two mining claims is not the test for determining the rights of the parties to the use of water thereon, and if any value is shown those rights must be protected.

3. Although plaintiffs in error commenced the building of the flume, by which the alleged wrongful diversion of water was made, in 1871, and the suit to restrain such diversion was not begun until five years later, the delay in beginning suit worked no estoppel, because the evidence did not show any diversion of the water to the detriment of defendant in error until two months preceding suit.

4. In the case of an undeveloped mining claim it would be impossible to show the extent of the injury done to it by acts which rendered its development an impossibility, hence the legal remedy is inadequate and equitable relief is proper.

5. "In the absence of injurious consequences to others" any change of the point of diversion and place of use which the prior appropriator of water from a stream may choose to make is legal and proper, and does not affect his right of priority.

BOOKS RECEIVED.

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

Chemical Report of the Coals, Soils, Clays, Petroleum, Mineral Waters, etc., etc., of Kentucky. By Robert Peter, M. D., Chemist to the Survey, assisted by Alfred M. Peter, S. M. The seventh chemical report in the new series, and the eleventh since the beginning of the survey. Vol. A, Part III. Published by the Geological Survey of Kentucky. Jno. R. Proctor, Director, 1888. Pages 171 and Index.

PATENTS GRANTED BY THE UNITED STATES PATENT-OFFICE.

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

PATENTS GRANTED JANUARY 15TH, 1889.

396,101. Split Pulley. John J. McErlain, South Bend, Ind.
396,102. Tuyere. Bernard McGroder, Cleveland, Ohio.
396,136. Conveying-Belt. Daniel Brennan, Jr., Saltersville, N. J.
396,140. Dumping-Car. Ferdinand E. Canda, New York, N. Y.
396,197. Chain Conveyer for Unloading Cars. James M. Dodge, Philadelphia, Pa.
396,225. Art of Manufacturing Artificial Marble. Lewis Nathan, New York, N. Y.
396,270. Process of Electric Welding. Charles L. Coffin, Detroit, Mich.
396,275. Process of Making a Lead Pigment. Ambrose G. Fell, New York, N. Y.
396,300. Plastic Mineral Composition, etc. John L. Stewart and James L. Hastings, Philadelphia, Pa.
396,301. Plastic Mineral Composition, etc. John L. Stewart and James L. Hastings, Philadelphia, Pa.
396,356. Magnetic Separator. Thomas A. Edison, Llewellyn Park, N. J.

THE METALLURGY OF STEEL.*

By Henry M. Howe.

(*Continued from page 527.*)

B. *The Distortion in Hot Forging*, which evidently must occur, is illustrated by Figures 55, (p. 165), 76 and 77, the first showing the rodlike or fibrous arrangement of the slag in rolled bars, the second arrangement of the slag

Schistosity of Bent Wrought-Iron. (Sorby.)

Figure 76. Somewhat bent.

Figure 77. Much bent.

and metal at the concave side of a wrought-iron bar bent somewhat at redness, the third that in such a bar bent so much as to cause great squeezing, the structure-lines being here normal to the surface of the bar. This structure shows why, when a bar thus bent is again opened, rupture readily occurs in planes perpendicular to the surface.[a]

The Grain of Hot-Forged Iron Equiaxed.—Sorby found that the ultimate crystals of ferrite, cementite and pearlyte in bars of ingot-steel and of weld-iron, the former drawn out to 6·25 times its initial length by hot forging, were but little if at all longer in the direction of the length of the bar than transversely. A bar about one inch square forged from a Bessemer ingot showed traces of the original ferrite network, disturbed and drawn out: apart from this network, some only of the crystals of ferrite and pearlyte remained distorted by the elongation; and even these probably owed their distortion to forging prolonged till the metal was too cold to recrystallize fully.

The large patches in Figure 54, p. 165, some light, some dark, may be the traces of large crystals distorted by forging, surviving the recrystallization which has given rise to the small nearly equiaxed grains which now compose them.

The slag of weld-iron remains for the most part drawn out into long fibres. A moderate quantity of slag does not prevent the neighboring metallic grains from recrystallizing equiaxially. Figure 55 contrasts the fibre of the slag with the equiaxed grains of the metal itself. But when the proportion of slag is excessive, the iron itself "might be said to have a sort of fibre,"[b] even after hot forging. I understand that this "sort of fibre" is more apparent than real, the grains themselves being equiaxed, yet separated into quasi fibres by layers of slag, like a mass of minute cubes of iron very highly magnetized, divided up into rows by thin strips of glass, the strength and ductility of the whole being due to the magnetization of the iron cubes, and being merely lessened by the glass. Such iron may be likened to a gneiss, the crystals of felspar and quartz with their axes in all azimuths, the plates of mica lying parallel and causing cleavage. In this view wrought-iron may indeed be said to have fibre: but the fibre as such should weaken, not toughen.

The grains of hot-worked ingot-iron and steel examined by Wedding[c] and by Osmond and Werth also appear to be equiaxed.

Slag, though retaining the shape acquired in forging much more tenaciously than metal, under favorable conditions seems to draw together. Sorby finds it in almost perfect spheres within crystals of wrought-iron, very long heated.[d]

D. *Lengthwise vs. Crosswise Properties.*—Table 88 shows that, as we should expect, the strength and ductility of wrought-iron are much higher along than across the direction of rolling, the difference being probably due to the presence of longitudinal threads, sheets, etc., of slag. There is a general belief that a like but less marked difference exists in case of ingot-metal. The data in Table 88 indicate that this difference, if it exists at all, is very slight; but those on which Table 88A is based have been thought to indicate that it is very great even in case of ingot-metal.

The value of the evidence in Table 88 is somewhat lessened by the fact that, in most cases, we are not perfectly sure that the rolling has been chiefly lengthwise of the plate. But, in a great group of cases given by Riley,

a Figures 76–7, originally intended to illustrate the schistosity of rocks, show the structure of hot-bent wrought-iron almost exactly, according to Sorby. (Journ. Iron and St. Inst., 1887, I., p. 269.)

b Idem, p. 263.

c Idem, 1885, I., p. Plate III.

d Idem., 1887, I., p. 262.

TABLE 88.—INFLUENCE OF THE DIRECTION OF ROLLING.

The properties of test pieces cut from plates of weld iron, ingot iron and ingot steel parallel with the length of the plate, compared with those of similar test pieces cut perpendicularly to it.

Number.	Observer.	General description.	Thickness. Inches.	Number of groups in which the maximum crosswise tensile strength exceeds or equals minimum lengthwise tensile strength.	Total number of groups or cases.		Number of groups in which the average crosswise properties are less than the lengthwise.				Deficit (—) or excess (+) of the crosswise over the lengthwise properties, measured in percentages of the lengthwise properties.			
					Groups.	Cases.	Tensile strength	Elastic limit.	Final elongation.	Reduction of area.	Tensile strength	Elastic limit.	Final elongation.	Final reduction of area.
1..	Kirkaldy	Crucible-steel plates	·187@ ·375	4	4	40	1		2	1	+0·52		+7·5	+25·4
2..	J. Riley	Ingot-iron plates	·25@1·00		56	432	29		46	50	+0·1		−6·66	−16·07
2A	"	The 1 inch thick plates of Number 2	1·00		20		11		15	18	+0·1		−7·9	−12·06
2B	"	" ½ " " " " "	·50		16		8		13	14	−0·45		−1·77	−17·11
2C	"	" ¼ " " " " "	·25		20		10		18	18	0·		−7·82	−16·63
3..	Gatewood	Ingot-iron plates	·50	2	2	8	2		2	1	−0·76		−12·48	−4·27
4..	Barba	" " "			3	28					+0·2		−3·61	
5..	A. E. Hunt	" " "	·24@ ·63			17					−7·19		+14·6	−11·27
6..	Kirkaldy	" " "	·25@1·0			48					−0·3	0		
7.	"	The 1 inch plates of Number 6	1·00								0	−0·7		
8..	"	" ½ " " " " "	·75								−1·4	−1·3		
9..	"	" ½ " " " " "	·50								−1·0	−0·6		
10..	"	" ¼ " " " " "	·25								+1·3	+0·5		
11..	"	Puddled steel plates	·12@ ·31	3	6	37	5		6	5	−14·91		−35 68	−38·14
12..	"	Wrought-iron plates	·19@ ·94	21	26	325	25		25	25	−8·92		−44·45	−42·01

1. Kirkaldy, Expts. on Wrought-iron and Steel, 1866, p. 145, table H. Of the 40 tests 22 are lengthwise, 18 crosswise.
2. J. Riley, Journ. Iron and St. Inst., 1887, I., p. 144, sheet III., abstract I. All from 12 ingots from a single charge of steel, probably open-hearth.
3. Assistant Naval Constructor R. Gatewood, U. S. N., Rept. U. S. Naval Advisory Bd. on mild steel, 1886, p. 124, table XXIV. The pieces were all cut from the same plate, apparently of open-hearth steel of 0·16% carbon, made at the Chester Rolling Mills.
4. Use of Steel, Barba, Holley, pp. 26, 29, tables V., VII. The elongation is given in only two cases, each of which appears to be the average of an unknown number of tests. Twenty-eight results for tensile strength are given, of which two at least represent more than one test. The remaining 26 results are obtained from punched plates.
5. A. E. Hunt, Trans. Am. Inst. Mining Engrs., XII., p. 815, 1884. The tests were all made on steel from a single open-hearth charge containing 0·15% of carbon. Of the 17 tests, 13 were made parallel with and 4 across the direction of rolling.
6 to 10. Kirkaldy, Gatewood, Rept. U. S. Naval Advisory Bd. on mild steel, 1886, p. 133, from Parliamentary Paper, C, 2897, London, 1881.
11. Kirkaldy, Expts. on Wrought-iron and Steel, p. 145. Of the 37 tests, 20 were made lengthwise, 17 crosswise.
12. Idem, p. 150. Of the 325 tests, 163 are lengthwise, 162 crosswise.

TABLE 88 A.—INFLUENCE OF DIRECTION OF FORGING, FROM MAITLAND'S DATA. (EXCESSES +, DEFICITS —.)

	Description.	Test pieces taken.	Tensile strength, lbs. per sq. in. Unhardened.	Tensile strength, lbs. per sq. in. Oil hardened.	Elastic limit, lbs. per sq. in. Unhardened.	Elastic limit, lbs. per sq. in. Oil hardened.	Elongation, % in 2 inches. Unhardened.	Elongation, % in 2 inches. Oil hardened.	Work of rupture, inch-tons per cubic inch. Unhardened.	Work of rupture, inch-tons per cubic inch. Oil hardened.
1...	Unforged, heated once.	Lengthwise	72,800	99,126	35,392	.....	21·5	7·25	5·75	.....
2...		Crosswise	70,504	100,240	34,384	.....	14·875	7·875	3·90	.....
3...		% deficit of No. 2	—3·25	+1·13	—2·85	.....	—30·79	+8·54	—32·17	.....
4...	Heated twice, forged once.	Lengthwise	71,008	99,904	32,256	.....	27·0	16·75	6·97	.....
5...		Crosswise	69,328	90,888	31,752	54,432	20·25	10·875	5·12	.....
6...		% deficit of No. 5	—2·36	—9·02	—1·56	.....	—25·0	—35·07	—26·54	.....
7...	Heated four times, forged thrice.	Lengthwise	74,816	92,512	53,536	59,248	30·0	24·75	9·07	9·00
8...		Crosswise	70·448	93,072	43,456	58,464	25·5	19·75	6·12	5·35
9...		% deficit of No. 8	—5·84	+0·65	—18·83	—1·33	—15·0	—20·20	—32·53	—40·56
13...	Round ingot, unforged.	Axially	62,608	77,728	.....	.....	9·25	9·25	.....	.....
14...		Radially	69,216	75,483	.....	.....	15·55	11·5	.....	.....
15...		% deficit of No. 14	+10·55	—2·88	.....	.....	+68·11	+24·33	.....	.....
16...	Round ingot, flattened.	Radially	73,024	97,216	33,376	56,000	26·0	18·75	6·94	7·38
17...		Axially	61,152	91,392	30,464	.....	8·25	6·75	1·87	.....
18...		% deficit of No. 17	—16·26	—5·99	—8·73	.....	—68·27	—64·00	—73·05	.....
19...	Round ingot, lengthened	Axially	74,368	87,696	39,200	56,448	29·0	24·25	8·10	8·50
20...		Radially	66,080	74,256	30,688	.....	17·75	11·0	5·50	6·90
21...		% deficit of No. 20	—11·15	—15·33	—21·72	.....	—38·79	—54·64	—32·10	—18·82

1 to 9, two pieces were cut from the same ingot "so as to be of equal quality." One was forged successively from the section 10″ × 10″ to 7″ × 7″, to 5″ × 5″ and to 5″ × 2·5″, each reduction occurring at one heating. The other piece was heated together with the first, but not forged. 1 to 3 gives the properties of the second piece heated once but not forged; 4 to 6 those of the first piece heated twice and forged once, from 10″ × 10″ to 7″ × 7″; 7 to 9 those of the first piece heated four times and forged thrice, the total reduction being from 10″ × 10″ to 5″ × 2·5″.
13 to 21. From the upper part of a circular ingot longitudinal and transverse test pieces were cut, numbers 13 to 15. A part of the same ingot was then flattened down into a cheese, and test pieces were taken transversely and axially, 16 to 18. A third piece was drawn out parallel with the length of the ingot, 19 to 21.
Maitland, "The Treatment of Gun-Steel," excerpt Proc. Inst. Civ. Eng., lxxxix, 1887.

and included in Number 2 of Table 88, all the rolling was lengthwise of the plate, and here the lengthwise and crosswise properties are practically identical.

From a study of the first nine lines of Table 88A, which all refer to the same material, we cannot say confidently that the forging has improved the properties of test-pieces taken lengthwise more than those of test-pieces taken transversely. In seven cases the ratio of the lengthwise to the transverse properties is greater, in five it is less, after than before forging. From such contradictory data no safe conclusion can be drawn.

The last nine lines at first seem to indicate that forging benefits the metal more along than across the direction of forging; for in every case the ratio of the lengthwise to the transverse properties is greater after than before forging. But two facts raise our suspicion, and tempt us to look beneath the surface. First, if this action is due to setting up a sort of fibre parallel with the direction of forging, how comes it to be as strong in the oil-hardened as in the unhardened test-pieces?

If the metal was reheated for oil-hardening after forging ceased, the reheating should according to Sorby at least tend to efface the grain, and so to equalize the lengthwise and crosswise properties. Again, how is it that the crosswise properties of the original ingot are so much better than the lengthwise? Does not this suggest another explanation, also competent to explain the slight excess of the lengthwise over the transverse properties in case of ingot-metal, shown in Table 88?[a] In our ingot the blowholes, even the minute ones which might escape notice in the test-piece, lie radially, presenting their *ends* to transverse, their *sides* to longitudinal stress. This should make the transverse test-pieces cut from the unforged metal stronger than the longitudinal ones; and so we find them in lines 13 to 15 of Table 88A. Flattening the ingot cheese-wise should exaggerate this excess of the radial over the axial properties, and so it does in lines 16 to 18. But drawing the ingot out lengthwise should draw the blowholes and similar cavities out lengthwise of the ingot, so that they will present their ends to longitudinal and their sides to transverse stress, and the longitudinal test-pieces should be somewhat stronger than the transverse, and so they are in lines 19 to 21 of Table 88A, and so they may be to a slight extent in Table 88 taken as a whole.

Three facts go to show that any excess of the longitudinal over the transverse properties is not due directly to the formation of fibre parallel with the length of the plate, owing to rolling at so low a temperature during the last passes that the elongated grains cannot thereafter become equiaxed. 1, The excess in question is as great in annealed as in unannealed ingot-metal, while annealing removes the effects of cold-working nearly or quite completely, including the distortion of the grains. 2, The excess is nearly and perhaps quite as great in thick as in thin and hence cooler finished plates. 3, Cold-rolling seems to increase the strength as much in one direction as in another.

To sum up, the properties of ingot-metal are probably in general nearly independent of the direction of rolling or hammering as such: any slight difference between the lengthwise and the transverse properties may be due in part, and perhaps wholly, not to the existence of a definite direction of grain or fibre such as exists in wood, but to the longitudinal drawing-out of cavities, often minute or even microscopic.

§ 259. CHANGE OF CRYSTALLIZATION IN THE COLD.—Do shock, vibration, flexure, etc., change the crystallization of iron at the ordinary temperature? Do they make tough fibrous iron brittle and crystalline? Iron is sold me as tough and fibrous: after long vibration it breaks with a crystalline fracture: have I a prima facie case against the seller? May the properties and crystallization of the metal while at rest change in the cold? Before answering, let us consider the nature of crystalline and fibrous iron.

A. *Fibre in Iron and Steel.*—Whether the metal yields a fibrous, a silky, or a crystalline fracture depends (1) on the properties of the metal itself, and (2) on the mode of rupture. Certain tough irons yield a fibrous fracture under favorable conditions, *e. g.* when nicked on one side and bent slowly away from the nick, but a crystalline one under others, *e. g.* when nicked all around and broken with a sharp blow.[b c] Again, good fibrous wrought-iron armor-plates struck by shot shatter like glass, and with a crystalline fracture.[b] The usual explanation is that during slow rupture the individual grains are drawn out into fibres, while in sudden rupture there is not time for this elongation, and accordingly rupture strikes across the piece, between the crystal faces: perhaps rather a re-statement than an explanation.

Thick pieces of soft steel which fail in the bending test usually show a crystalline fracture, though tensile rupture produces in them a silky one.[d] Again, not only do guns, whether cast-iron, wrought-iron or steel, whether of brittle

[a] Cf. J. Head, Journ. Iron and Steel Inst., 1886, I., p. 100.

[b] Percy, Iron and Steel, pp. 10, 11. I have verified this. Thurston vouches for this effect on armor-plate. Matls. of Engineering, II., p. 593.

[c] Cf. Bayles, Trans. Am. Soc. Mech. Eng., VII., p. 270.

[d] J. Riley: paper 2236, "The Treatment of Gun-Steel," Proc. Inst. Civ. Eng., LXXXIX., p. 187, 1887.

or ductile material, on bursting invariably show a short granular fracture, but Maitland has found that this same fracture invariably arises when steel *tubes* are burst by pressure from within, whether this pressure be suddenly or gradually applied, whether the metal elongates much or little On the other hand, *rods* torn in two tensilely by explosion of gun-powder or even gun-cotton invariably yield a silky fibrous fracture.[a] In explanation it is pointed out that, under tensile test of a rod or common test-piece, the rupturing stress is in a single direction, and tends to elongate the metal's crystals: that when a tube is burst these crystals are exposed to forces acting simultaneously at right angles, a longitudinal and a tangential stress[b]: the crystal cannot so readily elongate in two directions at once, the tangential stress opposes the tendency of each crystal to elongate lengthwise of the tube, and vice-versa: hence, although the tube as a whole may elongate greatly, its individual crystals elongate but little. Do they then slide past each other?

Further, a punched steel bar yields a crystalline fracture: ream but a knife-blade thickness from the sides of the punch-hole and it yields a silky fracture, rupture in one case apparently starting at the hole's edge and ripping thence—as a ton-strong canvass-roll once notched is ripped by a boy—in the other all parts of the section pull jointly. The change, in the regions apart from the hole, is probably due to changed approach of stress rather than changed condition before stress.

Though the effect of a crack in steel is like in kind to that of a notch in cloth or India-rubber, it is much less in degree, as the following experiments show. Fine saw-cuts were made sometimes on one, sometimes on both edges of steel and of wrought-iron test-pieces: they were then closed at a heat which though high was below the welding heat, thus practically making artificial cracks. These reduced the tensile strength of the remaining section as follows:

TABLE 87 A.—EFFECT OF CRACKS ON THE TENSILE STRENGTH OF THE REMAINING SECTION. BAKER'S DATA.[c]

	Wrought-iron.		Steel.	
	Tensile strength, lbs. per sq. in.	Loss %	Tensile strength, lbs. per sq. in.	Loss %.
Strength of solid piece	52,640	.....	72,880	.....
Piece cracked on one edge	.....	.....	55,328:[a] 37,856[b]	24.[a] 48[b]
" " on both edges	50,400	4·2	70,336	2·6

[c] "The Working of Steel," Proc. Inst. Civ. Eng., LXXXIV., p. 164, 1886. [a] When held in the usual way. [b] When held by a pin.

A fine knife-cut on each edge of a strip of India-rubber reduced the strength of the remaining section by from 60 to 70 per cent.

To arrest the development of cracks, Metcalf recommends drilling holes at their ends.[c] A rounded notch or a drilled hole increases the strength of a common test-piece per unit of remaining section, at the expense of the elongation.

A fibrous fracture is most readily developed

A in tough irons, hence those with little carbon, phosphorus, etc.: and probably those which, by proper heat-treatment, have acquired a fine crystalline structure (*e. g.* those which, since last exposed to an excessively high temperature, have been forged, or reheated to about W): those in which the stress due to quenching to below V has been avoided, etc.

[a] Maitland, do., p. 120-1.

[b] Barlow, idem., p. 203. I would point out that in the bending test we have these same conditions, tangential and radial stress acting simultaneously.

[c] Trans. Eng. Club, W. Penn., 1887, p. 133. Jour. Iron and Steel Inst., 1887, II., p. 352.

It is natural that the grains of tough iron should, during rupture, be drawn out into fibres more readily than those of brittle iron.

B, in slag-bearing, *i. e.* weld iron; and, so it is said, more readily in weld iron with much than in that with little slag, and in rolled than in hammered weld iron, as the rolling draws the slag more into longitudinal rods and strips. We can understand that longitudinal threads or blades of slag between the equiaxed grains of metal, (Figure 55) like blades of mica among highly magnetized cubes of iron, should tend to promote fibrousness of fracture, though the metal before rupture may have no true fibre in itself.

Though toughness may produce fibre during strain and rupture, we do not know that fibre existing before strain produces toughness. Indeed, we have seen that the grains of cold-worked and hence brittle iron are fibrous, or at least elongated, while those of tough hot-worked iron are equiaxed. Moreover, it is not clear that the fact that the former are not equiaxed has any important direct effect on the properties of the metal, for the strength of cold-worked iron seems as high across as along the grain.

Again, because toughness and slag both produce fibre, some befogged ones infer that slag produces toughness. Health, rouge and intemperance redden the cheeks: do rouge and rum give health?

These fallacies pricked, let us examine (I.) the reasons to expect that slag should toughen iron, and (II.) the evidence that it does.

I. Slag may affect iron (a) chemically and (b) mechanically. Chemically, the slag of weld iron may toughen the metal by oxidizing carbon and silicon, for the basic iron silicates of which it consists are energetic carriers of oxygen. In ingot metal this action is less important, since the carbon and silicon are better removed otherwise, and since, at least in acid ingot metal, the acid slag has little oxidizing power.

No relation between the percentage of slag and that of carbon in weld metal can, however, be traced in the results of the United States Board, Table 83, p. 169.

Mechanically, slag (a) breaks up continuity, (b) brings the metal a step towards the condition of a wire rope or the leaves of a book, and (c) hinders rupture from striking straight across the piece.

The first action weakens and makes brittle.

The second may promote flexibility, but hardly toughness as measured by final elongation under tensile stress: I do not know that a wire rope excels in elongation a solid bar of equal net sectional area. Moreover, it must lower the transverse strength and ductility as much if not more than it increases the longitudinal flexibility. The transverse strength of a wire rope is practically nil. And that it does lower the transverse properties we learn from Table 88 which, representing nearly 900 cases, shows that the tensile strength of weld iron plates is decidedly and its ductility very much (about 40%) less crosswise than lengthwise, while the properties of ingot metal are nearly independent of the direction of rolling.

The third might be important were the toughness of slag comparable to that of iron: hair toughens mortar. But we can hardly expect the brittle feeble rods of slag to obstruct the path of rupture materially.

That they do not is indicated by Baker's experiment in Table 87 A, in which an artificial crack weakens wrought-iron as much as steel.

II. For evidence of the toughening effect of slag we

have (*a*) the toughness of certain Swedish and other weld-iron. Feeble support! Till ingot-iron as free from carbon, silicon and unoxidized phosphorus is known to be less tough, we cannot know that this toughness is not due to remarkable purity.

(*b*) The toughness and fibrousness of Avesta Bessemer ingot-iron, into which slag was said to be poured intentionally. But the trifling quantity of probably irregularly distributed slag in Avesta metal, reported to be as low at times as 0·05%, seems a wholly inadequate cause. Indeed, after this practice, probably as useless as it seemed senseless, was abandoned, the fibrousness and toughness of the metal remained unimpaired. A cynic might regard the claim that the Avesta metal excelled because it contained slag, as an attempt to make a virtue of necessity, on the part of steel-makers whose crude plant permitted slag to run into the ingot-moulds nolens volens. It would, indeed, seem about as easy to mix slag and steel effectively, as corks and water.[a]

The scanty data of the United States test board, Table 83, while suggesting that slag weakens wrought-iron tensilely, give no weighty indications as to its effect on toughness.

The Terre Noire engineers believed that a minute quantity of slag made ingot metal weak and even red-short.[b]

In brief, while we see no strong reason why slag should benefit iron in any way, and while we have no strong evidence that it does, yet our knowledge of the rôle which it plays in wrought-iron is too crude to warrant our holding confidently that it does not toughen the metal in certain ill-defined ways. But, on the whole, it seems more reasonable to ascribe provisionally the widespread belief in the greater toughness of wrought- than of ingot metal not to the presence of slag in the former, but to the usual greater freedom from carbon, silicon, manganese and unoxidized phosphorus.

As fibre appears to be due to the drawing out of the previously equiaxed grains of iron by favorable mode of rupture, we may define {fibrous / crystalline} iron as that whose grains {are / are not} readily drawn out into fibres during rupture, or that which {can / can not} be readily made to yield a fibrous fracture.

§ 260. INFLUENCE OF VIBRATION, ETC.—The question left now resolves itself into two: (1) Do vibration, etc., induce coarser crystallization; and (2) do they, without altering the shape or size of the crystals, increase the tendency to yield a crystalline fracture?

1. Regarding iron as a viscous liquid, it is not intrinsically improbable that the size of its crystals should change at the ordinary temperature, eminent but dogmatic engineers to the contrary notwithstanding. The crystals of native silver and of "moss copper" are credibly reported as changing their shape somewhat rapidly in mineralogical cabinets.[c] Given such a tendency, vibration might well increase it. Agitation precipitates the crystallization of water tranquilly cooled below 0° C. Instances of important changes in iron at relatively low temperatures are that of density at 100° C. observed by Langley, of stress at 60° by Barus and Strouhal, of carbon at a brown tint by Brinnell, of flexibility by Coffin at a straw tint.

2. It is, however, easier, and for most purposes enough, to answer the second question. We can readily understand that vibration should increase the tendency to break with a crystalline fracture. First, every variation of stress alters the shape of the metal: and all vibration and shock must cause variation of stress. Now, if the metal is a composite mass of crystals of different minerals, say kernels of pearlyte imbedded in a meshwork of ferrite, Figure 56, p. 165, when it is deformed these minerals, both on account of their different moduli of elasticity and of their different shapes, may receive stress and resist deformation unequally: the thin meshes of ferrite may be strained far more than the kernels of pearlyte, or vice versa. Differently deformed, the harder may gradually wear into the softer, the more brittle be gradually disintegrated by excessive stress on its most burdened saliences. Again, repeated deformation may weaken the cement between the large crystals of the first order more than that between the smaller secondary crystals (Figure 54). These are not offered as the true condition of affairs, but as instances of the numberless ways in which indefinitely repeated deformation may gradually alter the strength of the metal, the path of least resistance and of rupture, so that rupture may develop a crystalline where it would once have yielded a fibrous fracture. A given degree of deformation may thus have little effect, a but slightly greater one profound influence. Vibration may be harmless if longitudinal, injurious if transverse and so flexure-causing; the flexure the immediate, the vibration an indirect cause. That which would eventually destroy a mass composed of a given group of minerals might be impotent were the proportions, shape, size or mode of arrangement of the minerals altered. Reheated, the disintegrated minerals may reunite. In this view, cases in which prolonged vibration or repeated shock or flexure are known to change the fracture from fibrous to crystalline, show the existence of already reasonably suspected tendencies: those in which no such change occurs argue relative power to resist these tendencies.[d]

Again, if stress be applied to iron by some vibrating body whose vibrations are synchronous with the natural vibration of the metal itself, then each vibration of that body creates a stress which tends to increase the amplitude of the metal's vibration, and we can conceive that this might go on till we reached an amplitude so great as to cause rupture, as in the fabled attempt to fiddle a bridge down. As an only slightly different rate of vibration, even if more rapid, would not act in this special way, numberless cases in which iron resists vibration successfully would merely show that the liability to failure in this way was small, not that it did not exist.

(TO BE CONTINUED.)

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

[a] Fischer, Oest. Zeitschrift, XXXIV., p. 244, 1886. Goedicke, Idem, p. 536. Drown, Proc. Soc. Arts, Mass. Inst. Technology, 1885-6, p. 150. Raymond, Howe, Eng. and Mining Jr., XLII., pp. 181, 219: 1886.

[b] Gautier, Journ. Iron and Steel Inst., 1877, I., pp. 43-4. Also Holley, Metallurg. Review, II., p. 210, "The interposed slag must necessarily decrease (its) strength and ductility."

[c] Not only do long delicate filaments of silver, evidently not due to mechanical pressure, form below the melting point of this metal when finely divided silver sulphide is heated in hydrogen (Percy, Metallurgy, I., p. 359), and growths of this metal sprout from silver sulphide below 228°C., 440°F., (Liversidge, Chem. News, XXXV., p. 68, 1877); but moss copper has formed visibly within a few minutes on fresh surfaces of copper matte cool enough to be held in the hand, (W. H. Hutchings, idem, p. 117), and very considerable growth of moss copper and silver in the cold, in one case within a few weeks, in others in periods of about a year, are quite credibly reported by T. A. Readwin and J. H. Collins, (Idem, pp. 144, 154).

[d] Cf. Percy, Jour. Iron and Steel Inst., 1885, I., p. 17; Metcalf, Trans. Am. Inst. Civ. Eng., XV., p. 290, 1887: Hill, Mechanics, 1882.

PERSONAL.

The Hon. John M. Poore, first Mayor of Carbondale, Pa., died on the 12th. inst., aged 80 years.

Mr. Thomas S. White, of Deadwood, Dakota, has gone to California to examine and report on mines for some English companies.

Mr. Samuel A. Beckett, mining engineer and president of the Beckett Foundry and Machine Company, at Arlington, N. J., committed suicide on the 10th inst.

Mr. O. C. Davidson, formerly superintendent of the Brier Hill mine, at Norway, Mich., but later of the Florence mine, Wis., has been superseded by Mr. E. J. Gilbert, formerly of Youngstown, Ohio.

Mr. E. A. Weinberg, Mining Engineer, who has just returned from a trip to New Mexico, is about to start for Queensland, Australia. Mr. R. E. Fishborn, Mining Engineers, will accompany Mr. Weinberg.

Mr. Samuel I. Potts, a descendant of one of the pioneer iron manufacturers of Pennsylvania, recently died at Reading, Pa., in his 84th year. Mr. Potts was one of the earliest coal operators in Schuylkill County.

Mr. Leopold Batres, the Mexican Government archæologist, has started for Palenque to inspect the mines and view new chambers discovered. He claims that this is the greatest archæological discovery of this century.

Mr. Gustavus Murmann, Civil and Mining Engineer, of Coal Creek, Anderson County, Tenn., writes in renewing his subscriptions: "Take it all in all, your ENGINEERING AND MINING JOURNAL is the best paper of its kind, and the most valuable."

Mr. James Livingston, foreman of the Crown Point and Belcher mines, died on the 10th inst., at Gold Hill, Nev., aged forty-five years. He was well and favorably known among mining people on the Pacific coast, and had long been connected with the Comstock mines.

Mr. E. Jay Gilbert, for the past three years assistant superintendent of the Youngstown mine, Crystal Falls, Mich., has been appointed superintendent of the Florence mine, in place of Mr. O. C. Davidson, who has been appointed assistant superintendent at the Colby mine.

Professor Melville Dewey, formerly of the Columbia College faculty, New York, now conductor of the State Library at Albany, N. Y., has declined to serve on the commission of experts to examine the condition of the Assembly's new ceiling and report results to the Legislative Committee. He pleads pressure of official duties.

At the annual meeting of the American Society of Civil Engineers held in New York this week, the following officers were elected: President, M. J. Becker, of Pittsburg; Vice-Presidents, A. Fteley, of New York; E. L. Corthell, of Chicago; Secretary and Librarian, John Bogart, of New York; Treasurer, George S. Greene, Jr., of New York. Directors: Charles B Brush, Eliot C. Clarke, Walter Katté, Robert E. McMath, William P. Shinn.

The President has appointed the following Assay Commission to test the coinage of the calendar year 1888: Senator Voorhees, of Indiana; Representatives Tracy and Boutelle; A. J. Bowie, San Francisco; Francis M. Burdick, Cornell University, Ithaca, N. Y.; George H. Cook, Rutgers College, New Brunswick, N. J.; Edward Hall, Lyon Mountain, N. Y.; E. N. Horsford, Cambridge, Mass.; Charles J. Leeds, New Orleans; Henry Leffermann, Philadelphia; Henry Morton, Stevens Institute, Hoboken, N. J.; George C. Munson, Denver; J. S. Newberry, Columbia College, New York City; William H. Pettee, University of Michigan; Robert H. Richards, Massachusetts Institute of Technology, Boston; Robert P. Waring, Charlotte, N. C. The ex-officio members are: United States District Judge William Butler, Philadelphia; Controller of the Currency William Trenholm; Herbert G. Torrey, assayer of the United States Assay Office, New York City. The commission will meet at the Mint in Philadelphia on February 13th.

INDUSTRIAL NOTES.

The patent coke works of the Meier Iron Company, at East St. Louis, Ill., will be sold at judicial sale on the 26th inst., together with other property of the company.

Messrs. John A. Kruse & Co., of Chicago, Ill., have broken ground for their 50-ton charcoal iron furnace at Jefferson, Tex. The furnace will be followed by car-wheel works.

The McCosh Iron and Steel Company, Burlington, Iowa, having decided to add wire drawing to its business, is having put in a 50 block mill, and a new 250 horse-power engine.

The Burden Iron Company, at South Troy, N. Y., has completed its new building, 322 by 62 feet, and is putting in three new machines with a capacity of 150,000 horseshoes per day, besides other machinery.

The Lehigh Valley Railroad Company has just made practical tests of a new electric and automatic brake. An emergency stop brought a train of fifteen cars to a standstill within 680 feet, the speed of the train being 34 miles an hour.

The Fishback Rolling Mill of the Pottsville Iron and Steel Company, of Pottsville, Pa., which was closed on account of lack of orders, resumed operations on the 14th inst., full handed and with prospects of continued work during the winter.

The Trumbull Iron Company, Girard, Ohio, has commenced work on another addition to the puddling department of its mill, and a number of new puddling furnaces will be erected. When completed there will be 27 puddling furnaces in operation.

The Chicago Copper Refining Company, of Blue Island, has an Edison plant running for the deposition of copper, which gives a current of 1000 ampères at 70 volts pressure. The dynamo is a number 32, and is doing excellent and very satisfactory work.

The Henderson Steel and Manufacturing Company report that their furnace at Birmingham, Ala., is running very smoothly, making two or three heats per day, without night shift. The product seems to meet every want of commercial soft as well as hard steel.

Mr. Henry Clay Frick, of the Frick Coke Company, has purchased the interest of the late David A. Stewart, to whose death we referred in our issue of December 15th, 1888, in the Carnegie firms. Mr. Frick has been elected Chairman of Carnegie Brothers & Company, Limited, Pittsburgh, Pa.

The Green Forest Furnace Manufacturing and Land Improvement Company has been organized in Lexington, Va., with a capital stock of $500,000. The object of the company is to develop the Buena Vista iron mines at Green Forest, on the Richmond & Allegheny and Shenandoah Valley railroads, lay out a town and build a 200-ton iron furnace.

The Cartersville Steel and Furnace Company and the Etowah Mining and Manufacturing Company, Cartersville, Ga., have consolidated as the Georgia Coal, Iron and Steel Company. The new company intend to build two furnaces, using the Pratt dephosphorizing process, and also contemplate building other furnaces, a rolling mill, opening mines, etc.

The Westinghouse Electric Light Company, of Pittsburg, has completed its contract of one year ago for lighting the Hoosac Tunnel. There are 1200 large size incandescent lamps, run by three No. 1 Westinghouse alternating current dynamos. The lamps are arranged in sections of 20 50-volt lamps; the lamps are 40 feet apart, alternating on the two sides of the tunnel, thus bring them really 20 feet apart. The work is pronounced a success.

The Thomson-Houston Electric Light Company, which has works at Lynn, Mass., has been negotiating with the Schuyler Electric Light Company, of Middletown, Conn., for consolidation. A resolution has been introduced in the Legislature amending the charter of the Thomson-Houston Company so that it shall have power to buy up all the plants and electrical railways it can, and make one concern, with a capital of $10,000,000 common and $5,000,000 preferred stock.

The Edison General Electric Light Company was incorporated on the 8th inst., in New Jersey. The capital stock is $12,000,000, of which $1,000,000 has been paid in. The stock is divided into 120,000 shares at $100 each. The works are to be in West Orange, with branch offices in all the leading cities The incorporators, who each hold 200 shares, are Edward H. Johnson, of Greenwich, Conn.; Samuel Insul, Schenectady; Francis R. Upton, Orange; Charles Batchelor, New York, and Alfred O. Tate, West Orange.

The Pecos Irrigation and Investment Company, of New Mexico, is pushing work on the Roswell and Eddy 30 miles irrigation canals. There are four "New Era" ditching machines, made by the Austin Manufacturing Company, of Chicago, two on each canal, and they are found, under ordinary circumstances, to handle from 1500 to 2000 cubic yards per day each. As compared with ordinary scraper work, it is found that each machine, drawn by 14 mules and operated by three men, is quite equal to 70 mules with scrapers and 40 men, and the cost of earth handled by them is not in excess of 2½ or 3 cents per cubic yard.

James J. Nealis, receiver of the Hydraulic Salt Forcing Company, in pursuance of an order of the Court in the suit of the Warsaw Salt Company against the Hydraulic Salt Forcing Company, dated December 3d, 1888, will sell at publicauction at the New York City Hall, on the 23d inst., 1889, at ten o'clock A M., Letters-Patent of the United States, numbered 327,307 and 327,308 respectively, and Letters Patent of the Dominion of Canada, numbered 25,099 and 25,100 respectively, all for process and machinery for raising brine.

The Cincinnati Corrugating Company, of Cincinnati, Ohio, has recently purchased the machinery, good will, books, etc., of the iron roofing firm of Caldwell & Co. The latter was established in Cincinnati over 30 years ago, being the oldest concern in this line in the West, and among the oldest in the whole country. They were engaged principally in the manufacture and sale of the Outcalt patent elastic joint iron roofing. The Cincinnati Corrugating Company is now prepared to turn out many improved forms of plain and corrugated roofing, siding, etc., with great promptness.

Recently one of the most severe tests to which an electric railroad can be subjected was, it was stated, experienced by the Davenport line, installed by the Sprague Electric Railway and Motor Company, of New York, at Davenport, Iowa. It is regarded as proving conclusively that an electric railway can be operated even under the most adverse conditions of weather. The snow of the heavy damp variety fell all day and covered the streets to the depth of from four or five inches to one foot on a level, and in several places caused deep drifts over the line of the electric railway. In spite of this the cars on the road kept running uninterruptedly, carrying a large number of passengers and showing that no amount of snow could prevent them operating on schedule time.

The Emmonsite Explosives, Guns, and Ammunition Company, which has a capital stock of $5,000,000, and was organized in Illinois, has concluded to build a factory in Pittsburg, Pa. It is stated that Messrs. Edwin Booth and Lawrence Barrett, the well-known actors, are among the principal stockholders, and while playing in Pittsburg last week, met a number of Pittsburg capitalists, and arrangements were made for erecting the building, which is to cost $50,000. The company was formed for acquiring and dealing with all the inventions of Dr. S. H. Emmons in connection with explosives, arms, and ammunition. The company now has a small factory at Harrison, N. Y. The directors and executive officers are: A. B. Chase, Edwin Booth, Lawrence Barrett, H. Henry, S. H. Emmons, and H. Edgell.

CONTRACTING NOTES.

Our list of machinery and supplies wanted will be found on page xii. Manufacturers of machinery, engineers and contractors should also consult our directory of "Contracts Open" on page xii. This week, proposals are invited for the following new contracts: No. 1257, Railway Constructson; No. 1258, Excavating and Building River Wall; No. 1259, Furnishing Water Pipe; No. 1260, Shaft Sinking.

The Vulcan Iron Works, Chicago, Ill., have been given the contract for 18 steel shafts and crank shafts for the United States monitor "Monadnock," now in process of construction in San Francisco, Cal.

Only one bid was received at the War Department in response to the advertisement for proposals for pneumatic dynamite guns, carriages and the necessary machinery and projectiles for coast defense. This was from the Pneumatic Dynamite Gun Company, of New York, and aggregated within $2000 of the $400,000 applicable to the purchase of these articles.

The contract for the construction of the Merchants' Bridge across the Mississippi at St. Louis, Mo., has been awarded to the Union Bridge Company, of New York City. The bid in gross for the building of the bridge only and for what iron work is specified for in the approaches is $1,200,000. According to the charter agreement work must be begun by February 2d, or a forfeiture to the United States is the result.

The mayor of Leetonia, Ohio, has made the following announcement concerning the water-works to be built at that place: "Further action on Leetonia Water-Work enterprise is hereby suspended, until an enabling act is secured from the Legislature authorizing such enterprise; which course is deemed advisable, so as to leave no room for doubt as to village having legal authority to contract. Upon passage of which, due and formal notice of time of bidding will be given to all correspondents."

GENERAL MINING NEWS.

Parties who are in want of machinery for a modern stamp-mill will find an opportunity to buy the same cheap by addressing parties, now advertising such machinery, on page xvii.

A corps of engineers is at work making surveys for the proposed new railroad between the Ontario & Western Railroad line at Hancock, New York, and the Lackawanna coal-fields near Carbondale, Pa. The distance between these points is about thirty-one miles, and the route is claimed to show easy lines of grading. The building of the road is the revival of an old project which is said to have had at one time the backing of the Erie Railroad Company, and for which a charter was obtained from the Pennsylvania Legislature. The Ontario & Western Company recently secured the original surveys and profile and is building this branch line with the purpose of securing for its road a share of the enormous coal traffic between that region and New York and New England. The company count upon a heavy coal carrying trade all along its northern line to Oswego, while it will have the advantageous New England connections via the Poughkeepsie Bridge Railroad at Campbell Hall Junction.

It is said the Ulster & Delaware Railroad, of which Mr. Thomas Cornell is president, is also interested in building the Carbondale branch. The complete scheme is reported to include the extension of Mr. Cornell's road from Stamford to a junction with the Ontario & Western at Delhi, thus opening up an advantageous coal carrying route, independent of the Delaware & Hudson Canal Company, between the Lackawanna coal-fields and the Hudson River at Rondout.

It is stated that a road will be built from Parkersburg, W. Va., to Clifton Forge, Va., as a part of the "Black Diamond" system. The line will connect at its eastern terminus with the Chesapeake & Ohio and the Richmond & Allegheny, and will open a rich mineral and lumber district.

It has been decided to abandon the Morris Canal. No boats will be run upon it after this year, and probably none will be started out this year. Its coal traffic has fallen to about 50,000 tons a year, the tolls upon which are not sufficient to pay the cost of keeping the canal open. The canal's terminals at Jersey City are needed by the Lehigh Valley Railroad Company for its piers and depots now being erected, and arrangements are nearly completed for supplying the city of

Newark with water from the canal. The railroad agrees to furnish 50,000,000 gallons of water daily, and to sell the plant for $6,000,000. Asa Packer leased the canal to afford the Lehigh Valley an outlet for its coal to New York harbor. With the construction of the Eastern & Amboy Railroad, however, the importance of the canal declined, and it has ever since been operated at a loss.

WHEELING, LAKE ERIE & PITTSBURG COAL COMPANY.—A mortgage given by this company to the Mercantile Trust Company of New York was recorded at Steubenville, Ohio, on the 14th inst. The mortgage is given to secure the payment in gold and semi-annual interest at 5 per cent of 1000 thirty-year bonds of $1000 each. The company was incorporated under the laws of New Jersey, as reported in our last issue, and owns upward of 6000 acres of coal land in the southern part of this county along what is known as the Short Creek Valley, considered the richest deposit of what is commonly known as Pittsburg coal. A railroad was surveyed through the southern part of Jefferson County, Ohio, in which the company's lands are located, thirty years ago, but no prospect of development appeared until the last summer, when two companies began the contstruction of lines to Wheeling. The Cleveland & Wheeling has succeeded to the rights and titles of the South Pennsylvania & Ohio, and will soon have a direct line in connection with the Cleveland & Canton between Wheeling and Cleveland, while within eight months the Wheeling & Lake Erie will have a through line from the Ohio River to the lake points, Huron and Toledo. The Wheeling & Lake Erie has the additional advantage of being the nominal owner of the coal lands referred to, as the syndicate back of the coal company is composed of those interested in the railroad. It is stated that the mines will be opened within about eighteen months.

ALABAMA.

CALHOUN COUNTY.

SOUTHERN SMELTING AND REDUCTION COMPANY.—It is reported that this company is preparing to erect its smelting works at Anniston.

ARIZONA.

GRAHAM COUNTY.

SILVER LEAF.—This mine has been bonded to Colonel Robinson and Major Fred. Smith, of Tuscon. The bond is for 60 days and calls for $20,000. Colonel Robinson is now in the East, where he expects to place the property. It is stated that the claim has developed by three shafts sunk 30 or 40 feet deep, all showing a uniform vein running from 8 inches in width at the top to a width of 22 inches at the bottom and increasing in value. The ore taken out of these shafts has all been shipped without assorting and has paid the owners, it is stated, an average of $60 per ton above all expenses of mining, shipping and reduction.

PIMA COUNTY.

PEERLESS MINING COMPANY.—A shipment was made on the 5th inst. of five bars of bullion valued at $8650, making a total for the month to date of $14,543.

SILVER BELLE.—This group of mines near Tucson has been sold to a syndicate of English capitalists. Mr. C. S. Morton, a mining engineer of London, Eng., has examined the property, and will go to London to present his report.

PINAL COUNTY.

MASTODON.—This claim, which adjoins the Monarch mine on the east and has been worked for over a year, being at one time bonded to the Monarch Company, has been sold. A tunnel has been run into the mine 150 feet, showing a large vein 10 or 12 feet wide of low-grade gold and silver ore.

MONARCH MINING COMPANY.—Work on this mine progresses steadily. A tunnel has been cut into it 250 feet and a contract has just been made for a 100-foot extension from its face. The air-shaft on top which is to connect with this tunnel is now down 80 feet and parties are now under a contract to sink it the remaining 70 feet to make the connection. The new stamp-mill lately received at Casa Grande is being hauled to this property.

SILVER KING MINING COMPANY.—The production for 1888 consisted of 60,226·44 ounces of fine silver, 612,708·09 ounces fine silver in concentrations, and 34,867·32 of fine silver in sulphides.

The financial statement presented at the annual meeting shows:

Receipts, January 1st—Balance on hand, $27,924.30; sales of bullion during the year, $101,319.20; sales of concentrates, $441,713.58; assessment No. 1, $50,000; total, $620,957.08.

Disbursements—Assaying, $456; expenses, $8126.06; law, $1505; insurance, $797.15; interest, $1946.95; freight, $19,605.74; merchandise and supplies, $41,028.99; superintendent's drafts on account of mine and mill, $531,206.19; balance, cash on hand, $16,283.40.

On hand, 110,000 ounces of silver.

Liabilities—Superintendent's drafts unpaid, $18,147.76; merchandise account unpaid, $478.60; labor on mine, estimated, $11,000; total, $29,626.36.

SILVER REEF MINING COMPANY.—This company, which recently purchased the North Star silver mine, is making preparations for the reduction of its ore. Arrangements are making for the purchase of the old Butte, Mont., smelters, which will be removed to the properties.

CALIFORNIA.

AMADOR COUNTY.

PLYMOUTH CONSOLIDATED GOLD MINING COMPANY.—To an ENGINEERING AND MINING JOURNAL eporter, Mr. A. W. Lazelle, the secretary of this company said: "We have received the following communications from E. L. Montgomery, our superintendent, which show what progress we have made. The first, dated Plymouth, December 31st, says: "The water is down 60 feet below No. 5 level (1400 feet). We hope it will be down to No. 6 (1500 feet) in four days. Cannot yet tell what the condition of the stopes are. No. 4 drift is closed 85 feet from the shaft. No. 5 is closed about 250 feet from the shaft. There are 18 inches of mud in the bottom of No. 5 drift." Another on the 5th inst., reports: "We expect to get the water out by Monday week if we have no bad luck. I am getting the Pacific mill in order, so that we may be ready to start it at the earliest possible moment," and lastly, on Tuesday of the present week, the 14th. inst., came the welcome telegram, "Water all out," signed "Montgomery." Secretary Lazelle states that the annual report of receipts and expenditures will be mailed to the stockholders at the usual date.

MONO COUNTY.

STANDARD CONSOLIDATED MINING COMPANY.—The present management of this company are soliciting proxies for the next annual meeting to be held in San Francisco on the third Tuesday in February, and have accordingly made the following report to the stockholders, dated January 11th, 1889: "Shortly after the commencement of this fiscal year the grade of ore being mined, while assaying well, became very refractory, and the mill was run at a loss for some time in hopes of conquering the difficulty, thus causing the suspension of dividends after June. During August, September and part of October, the mill was closed for repairs, but all this time prospect work was vigorously pushed, and some ore accumulated which has kept the mill steadily running since the latter part of October. During the past five weeks the quality of ore has changed somewhat, and the shipments have improved, making our gross receipts, including that from tribute ore, about $30,000 for December. Our President, Mr. Pettibone, expresses himself very confidently as to the improved outlook of the mine. In the law suit between the Bulwer and Standard, the judge's decision having been so recently given, we are not fully advised as to the result, but we believe it is generally favorable to the Standard." The report is signed by E. St. John Hays, D. Hinckley, C. H. Badeau, C. W. Smith, W. H. Oscanyan, Joseph Tate. In addition to the above, Mr. Tate said to an ENGINEERING AND MINING JOURNAL representative: "Of the $30.000 mentioned in the above report, $16,000 was taken out by the lessees of a formerly abandoned portion of the property, and of this amount we only received one third, which, added to the $14,000 we have taken out ourselves, amounts to about $19,000 as the actual receipts of the company. Our superintendent in a letter of the 5th inst., reports a shipment of $7226, which, however, is included in the December receipts. The ore is certainly running much better. For the week ending January 5th, the average assay was $28.10 per ton."

MONTEREY COUNTY.

The Southern Pacific Company has purchased Stone's coal mine in Slack's cañon, this county, for $75,000.

COLORADO.

The following is a statement of gold and silver bullion deposited at the U. S. Mint at Denver the calendar year 1888:

	Gold.	Silver.	Total.
Colorado	$1,296,031.00	$14,277.07	$1,310,308.07
Arizona	82,715.67	966.21	83,681.88
Dakota	154.28	1.23	155.51
Idaho	4,251.17	23.31	4,274.48
Oregon	8,837.14	52.37	8,889.51
New Mexico	65,498.29	513.82	66,012.11
Wyoming	8,956.82	178.22	9,135,04
Old jewelry	8,632.18	165.71	8,797.89
U. S. gold coin	1,745.00	....	1,745.00
Re-deposits	15,982.72	324.81	16,307.53
Total	$1,492,864.27	$16,502.75	$1,509,307.02

Gross weight deposits for year, ounces	97,340·46
Net " " "	94,204·88
" " base removed	3,135·58
Average per cent base removed	·031
" fineness, gold	·764
" " silver	·195

BRECKENBRIDGE MILLING COMPANY.—The annual meeting of the stockholders of this company was held in New York on the 8th inst. The stock of this company is held almost entirely by a prominent firm of diamond dealers in New York, who refuse to give any information concerning their property. Incidentally it is worthy of remark that jewelers seem to have a strange predilection for mining investments. Recently a well-known mining promoter said to an ENGINEERING AND MINING JOURNAL reporter, in speaking of a certain stock which once figured quite prominently on our local exchange: "Oh, there are a lot of jewelers in it, and as they don't know any more about mining than the man in the moon, we can't make much progress."

[From our Special Correspondent.]

Permit the correction of several items in the letter of an occasional correspondent in the ENGINEERING AND MINING JOURNAL of December 29th:

Trinidad has but *three* railroads, the A., T. & S. F., the D., T. & F. W. and the D. & R. G. The Rock Island is expected to build into Trinidad within the year, and the T. & R. M. to be built to Las Vegas. The estimated output of Trinidad coal mines is between 4200 and 4300 tons daily.

The iron ores from near Elizabethtown, N. M., 65 miles from Trinidad, have been found, so far, to be free from titanic and phosphoric acids in appreciable quantities. The highest result in phosphoric acid obtained was 00·014 per cent, while your correspondent from Los Cerillas says the Glorieta ore contains 00·03 per cent *phosphorus*. The Elizabethtown ore also contains 67·20 per cent metallic iron *without roasting*, and is in immense quantities.

CUSTER COUNTY.

SILVER BAR MINING COMPANY.—Suits have been entered against this company for labor, supplies, etc., amounting to about $3000. In addition to this, it is said, there is something like $1000 due other parties who have not made any decided move in that direction.

LAKE COUNTY.

DUNKIN MINING COMPANY.—The company has filed a petition in the district court at Leadville asking for an injunction to restrain Mr. Amos Henderson, the county treasurer, from enforcing the assessment upon its property by sale. A temporary injunction is prayed for until the merits of the question can be settled, and it is asked that the injunction be then made perpetual. The ground alleged for the application is that the law under which the assessment was levied is unconstitutional and therefore void.

PUEBLO COUNTY.

The Philadelphia smelter, Pueblo smelter and Colorado smelter, in Pueblo, have each donated a fifty ounce silver brick, to be sold by the Stock Exchanges of the cities of New York, Philadelphia and Pittsburg, for the benefit of the cyclone sufferers in Pennsylvania. The bricks have been shipped.

PHILADELPHIA SMELTING AND REFINING COMPANY.—This company, which began operations at its new works, at Pueblo, in December, will probably build six more furnaces at once. The company has six in operation now.

SUMMIT COUNTY.

VICTORIA MINING COMPANY.—This company, which owns extensive gold lode and placer property in Breckenridge, has been doing a large amount of development work upon it during the past year. Among other things, a saw mill and a gold mill have been erected, and a flume four miles in length has been built. Just at present but little is being done, owing, it is reported, to some changes which are being made in the organization of the company. The company in New York reports the cause of delay to have been the freezing of the water flume. It is now proposed to pump the supply until spring sets in.

WIRE PATCH MINING COMPANY.—It is reported that this company is operating the Ontario and Elephant mines, located on Farncomb Hill, with great success. The company has built a tramway from the mines to the mill, and the latter, which was originally equipped with two Huntington pulverizers, has now been enlarged and four more Huntingtons put in it.

DAKOTA.

According to the Deadwood *Pioneer* "the steam stamp has not been as great a success as was hoped it would prove. Though crushing as much ore as 100 stamps, it failed to crush it as fine as stamps would. The management of the Homestake Company have (we are unofficially informed) about concluded to remove the ponderous piece of machinery and put up stamps in its stead."

HARNEY PEAK TIN MINING AND MANUFACTURING COMPANY.—The following letter recently appeared in the *Mining Journal*, of London, and we reprint it, as Mr. Benedict's criticisms are perfectly fair:

To the Editor of the Mining Journal:

SIR. In my "long, discursive, and hardly cogent second letter," which you publish, together with comments, in the issue of the *Mining Journal* of November 10th, it was stated, in regard to Harney Peak tin prospects, that Professor Vincent's report "practically condemns the property on the basis of the present showing of ore."

Since you have quoted so freely from this report in support of your arguments to prove "the payable character of the tin deposits in the Harney Peak district of Dakota," you must at least allow me a similar privilege in support of a contrary opinion.

According to Professor Vincent's estimates, certain ones of these groups of "claims," which will be enumerated further on, contain tin in the ground to an aggregate value of about £1,450,000.

On page 67 he says: "My estimates thus far have been based on the current price of tin—£166 per ton. Though this has been the ruling figure for months past, yet I feel it should be regarded and treated as exceptionally high. For safety and commercial prudence let the value be taken at £83—one half the rate to-day—at which price profitable results would ensue."

His report is so full of ambiguous language and contradictions it is often difficult to understand precisely what he means; but if the above quotation is accepted as meaning that the claims can be worked at a profit with tin at £83 per ton, and if his estimates of costs are taken as correct, we find that the tin product from the seven groups of claims, which he has deemed worthy of such estimates, viz., the Sarah, Ingersoll, Excelsior, Campaign Nos. 1 and 4, Cowboy, Coates and Gerty, would cost, in round numbers, £80,000 *more than it would be worth;* and this without taking into consideration the cost of the necessary "dead work" and plants for mining, milling, transportation and smelting.

But, in spite of the fact that investors usually like to know something about the probabilities of profit on their investments, you have neglected to publish this portion of his report, or, at least, it has not come to my attention in your long articles on the property in question.

May I ask, "Why have you not discussed the financial side of this question?"—Respectfully yours,

New York, W. DE LE BENEDICT.

MICHIGAN.

NEGAUNEE CONCENTRATING COMPANY —At the annual meeting of the stockholders of this company, held in New York on the 9th inst., the following trustees were elected: Andrew Williams, Andros B. Stone, R. S. Middleton, Henry Siebert, Charles Siebert, E. C. Benedict, Benjamin Haskell, W. A. Allen, W. de L. Benedict. The officers chosen were Henry Siebert, President; Benj. Haskell, Vice President; E. C. Benedict, Treas., and W. de L. Benedict, Secretary. This company was incorporated in 1882, under the laws of New York State, with a capital stock of $300,000. There are 3000 shares. We understand that the concentrating works erected at Negaunee are in first class condition, but "owing to the low price of iron," no active work has ever been done. According to the sworn statement filed at the County Clerk's office, the existing debts do not exceed $50,000.

COPPER MINES.

CLIFF —It is reported that the negotiations for the sale of this mine have been carried through and that the property has recently been purchased.

IRON MINES.

NORRIE.—The fire in No. 6 shaft at this mine, to which we referred in our issue of the 5th inst., is out. The shaft has been opened and the men entering is found only a little fire remaining in one corner of the pump-house. The extent of the damage was not nearly as great as was expected.

MONTANA.

DEER LODGE COUNTY.

BI-METALLIC MINING COMPANY.—The mill was expected to start operations about the 15th of the present month.

CHAMPION MINING COMPANY.—This company is now sinking to the 350-foot level, and is getting some flattering assays. Nineteen tons shipped to Anaconda for reduction netted the company $2078, averaging 146 ounces of silver and $3 gold per ton.

MOUNTAIN LION.—The negotiations with a St. Louis company for the future development of this mine have been terminated successfully, and the company will at once place a hoist and pumping plant; and in return for this development work they get a share of the treasury stock, to be issued as development progresses. The machinery is to be forfeited in case the company fail to perform their part of the agreement.

LEWIS & CLARKE COUNTY.

EMPIRE MINING COMPANY, LIMITED.—In sinking a winze from the 500-foot level of this mine a body of rich ore was struck at the depth of 35 feet and followed down until stopped by the inflow of water. Nothing further can be done at this place until a pump is put in. A large Knowles pump has been purchased, which will be put up as soon as possible.

MONTANA COMPANY, LIMITED.—The production for December was $93,600; the working expenses for the month amounted to $50,000.

MEAGHER COUNTY.

CUMBERLAND MINING AND SMELTING COMPANY.—Mr. E. P. Suydam is in Boston to place stock of this company, which is capitalized for $5,000,000 in $10 shares. Mr. Suydam offers 250,000 shares, one half of the capital, four associates and himself owning the balance. The company has four claims, of which the Cumberland is the chief. In our issue of December 29th we referred to the financial difficulties of this company.

SILVER BOW COUNTY.

BLUE-EYED NELLIE —Negotiations which have been pending for some time are now completed, by which Mr. Frank G. Brown becomes the sole owner of this mine. Mr. Brown was one of the original locators of the mine three years ago. The Nellie is situated on what is known as Carbonate Hill, five miles west of Anaconda. It has been systematically developed to the depth of 600 feet. The ore is shipped to Denver. It is possible that reduction works will be erected near the mine, as several other properties in the vicinity are showing up well.

NEVADA.

ELKO COUNTY.

During the year 1888 the mines of the Tuscarora district shipped to San Francisco bullion of the gross value of $1,008,854.72. There were large shipments of ore to Salt Lake, the returns of which would add very largely to the above. It is quite probable that the bullion yield of the camp for 1888 reaches $1,500,000. During the year the North Belle Isle mine shipped bullion valued at $564,955; Nevada Queen, $207,908 20; Grand Prize, $103,897.84; Commonwealth, $71,062 69; and Navajo, $61,030.91. The North Belle Isle mine paid $200,000 in dividends during the year. The total assessments levied by the Tuscarora mines in 1888 were $398,000.

COMMONWEALTH MINING COMPANY.—The company has decided to erect concentrating works, owing to the success of those erected by the Nevada Queen and North Belle Isle companies.

EUREKA COUNTY.

EUREKA CONSOLIDATED MINING COMPANY.—A bullion shipment valued at $27,800, which was the clean-up for the past month, has been made. All work has been suspended at the mine, until the timber suits brought against the company by the Government have been settled. Mr. Hank Donnelley, the Superintendent, is in San Francisco, where he will remain for the winter.

LINCOLN COUNTY.

MAYFLOWER.—This mine, Bristol mining district, was sold at sher ff's sale December 31st, 1888, to satisfy a judgment obtained by William Bell and John Saviour against the property, on foreclosure of mechanics' liens.

STOREY COUNTY—COMSTOCK LODE.

We condense the following from the Virginia City *Chronicle:*

The Woodworth pan mill near Dayton has been shut down for the winter. The mill was, and has, been running on Comstock ore tailings, flumed there from Silver City stamp mills when they were crushing Consolidated Virginia & California ore in 1876. The mill was shut down on account of the tailings sulphurets not amalgamating as well in cold weather as when the temperature is moderate, and also on account of a scarcity of water, due to the freezing of the Carson River, by which power the mill is operated.

BENTON CONSOLIDATED MINING COMPANY.—Bids for the erection of a building over the Benton shaft and for the construction of a hoist plant are under consideration. There is said to be now a surplus in the treasury sufficient to proceed with the vigorous development of the property, which will begin as soon as the above contracts are let.

CHALLENGE CONSOLIDATED MINING COMPANY.—During the week ended there were shipped to the Brunswick mill for reduction 210 tons of ore, the average battery sample of which shows a value of $33.09 a ton. The Challenge assays are the same as the Confidence, as the ore now being extracted comes from joint workings.

CHOLLAR AND POTOSI continue crushing daily at the Nevada mill from 90 to 100 tons of ore from the joint Potosi stopes. No new developments in explorations in either mine.

CONFIDENCE MINING COMPANY.—The ore shipments are reduced to an average of 100 tons daily due to the shrinkage in the Carson River flow. To crush even that amount necessitates the employment of the Brunswick Mill's auxilliary steam power.

CONSOLIDATED CALIFORNIA & VIRGINIA MINING COMPANY.—The official returns of the December ore and bullion yield of this mine shows that during that month a total of 11,195 tons of ore were crushed at the Eureka and Morgan mills, producing bullion of the gross assay value of $260,320.56, of which $132,766.72 was gold and $127,648.33 was silver. From a clean-up of the local assay office $5921 37 was realized, aggregating a total of $267,631.27. The average yield of the ore in bullion per ton was $23.25, of which $11.85 was in gold and $11.39 was in silver. The average assay value of the battery samples was $29.53 per ton. It will be noted that gold predominates in the December bullion, above 50 per cent of the assay value being yellow metal.

HALE & NORCROSS MINING COMPANY.—During the week ended the 7th inst. the company shipped 829 tons of ore of the average value of $22.93 per ton, according to battery sample assays. The December bullion yield of the mine to that date was $89,015.

JUSTICE MINING COMPANY.—The mill is now in full operation, crushing above thirty tons of ore from the mine daily, showing an assay value of above $30 per ton. The mill will now crush steadily forty tons daily.

OCCIDENTAL CONSOLIDATED MINING COMPANY.—This company has recently acquired by purchase a length of nearly two miles of ground north and south on the Brunswick or Occidental lode, in Silver Star district. The company's possessions include the Brunswick and Silver Star lodes within its east and west boundaries, a distance of above 3000 feet. The distance between the Brunswick and Silver Star lodes, on the Sutro tunnel level, is about 3000 feet. The Silver Star lode is supposed to be the northern continuation of the Lady Bryan vein, in Flowery District, as indicated by tracing the surface croppings. Between the Brunswick and Silver Star lodes are numerous lines of surface croppings of metal-bearing quartz. In driving the Sutro tunnel the Silver Star, Brunswick and Solferino were the only important veins cut through, the former at a depth of 1300 feet below the surface and the latter 2000 feet below.

The Occidental, Con. Occidental and St. John companies now propose exploring the Brunswick and Silver Star lodes on the Sutro tunnel level. The former was stripped for some distance north and south by the Sutro Tunnel Company, and some high grade ore was cut in driving these lateral drifts from the tunnel level.

OVERMAN MINING COMPANY.—There were extracted 321 tons of ore and shipped to the Vivian mill 242 tons, and one bar of bullion valued at $7540.31, the production for December.

PHIL SHERIDAN MINING COMPANY.—The San Francisco *Report* states that besides being fleeced in the stock market by John W. Pearson, who is on trial for the alleged embezzlement of $60,000 of the company's funds, the stockholders of this company have now lost their more or less valuable mine. It is stated that Warren, J. Sheriden, Bart Burke and Louis Herzberg have "jumped" and relocated the whole property, and the claim is now recorded in their names. The annual work required by law was not done on the property in 1888 and it was therefore open to relocation. The shaft has been used as the waste dump of all the families at the north end of the Comstock for the last few years.

SAVAGE MINING COMPANY.—During the week ended the 7th inst., the company shipped 438 tons of ore, showing an average value of $18.60 per ton by battery sample assays. The total bullion yield of the mine in December was $24,398.

YELLOW JACKET MINING COMPANY.—Important developments are looked for in the Yellow Jacket when cross-cutting is begun on the 360, 600, 800 and 900 levels. Superintendent Sharon has had lateral drifts run on those levels in new ground, and the indications are considered flattering. The bullion production for December amounted to $79,356.81.

NEW YORK.

ALLEGANY COUNTY.

The test well which was drilled in the town of Greenwood, near Andover, was torpedoed on the 14th inst. with thirty quarts of nitro-glycerine. The well was cleaned out, and when the tools were pulled out the oil flowed and shot over the top of the derrick. The gas continues to flow with great force, and pipe is now here to be used in conveying it to Andover for fuel and light. Many acres of land are being leased in the vicinity for oil and gas purposes.

PENNSYLVANIA.

PHILADELPHIA & READING RAILROAD AND COAL AND IRON COMPANY.—A condensed abstract of these companies' report for year ending November 30th, 1888, in comparison with 1887, is:

	1888.	1887.	Inc.	Dec.
Earnings	$39,638,989	$41,188,736	.....	$1,549,746
Expenses	29,961,001	28,758,683	$1,202,318	.....
Net	9,677,988	12,430,053	.....	2,752,065
Leases	2,882,582	3,300,382	.....	417,800
Interest	5,351,305	6,672,404	.....	921,098
Surplus	1,444,100	2,857,267	.....	1,413,166

Of the net earnings, only $28,650 were from the Coal and Iron Company. The gross receipts of the railroad company were $20,815,336.

This report fixes the vexed question of fixed charges ahead of the incomes. They were in 1888, $8,233,887.

COAL.

Messrs. James A. Chambers and H. Sellers McKee, of Pittsburg, and New York and Philadelphia capitalists contemplate the building of a branch of the Southwest Pennsylvania Railroad to the coking fields and the erection of 1500 coke-ovens. It is stated that the coke portion of the enterprise alone involves the expenditure of $1,000,000. The company has a capital of $1,000,000, and bonds to nearly this amount are now in Philadelphia. The territory purchased lies in George Township, Fayette County, along Beeson's Run, and about four and one half miles south of Uniontown. There are 793 acres in the tract, and it contains several veins of the best quality of coking coal. The land is five miles from the Southwest Pensylvania Railroad. Arrangements have been made with the railroad people to run a branch up Beeson's Run to tap the fields, and this work will be commenced immediately. This new branch will also run to the Revere Coke Company's plant. The new branch will also reach the Schoonmaker property of 2,700 acres. This company, through whose influence the new branch is to be built, has let contracts for 1000 ovens, to be commenced immediately.

Mr. William Thaw, of Pittsburg, has bought the 160-acre farm of Dr. Walker, near Uniontown, both surface and coal, for $6200. This makes $122,000 Mr. Thaw has invested in Fayette County coal lands. He owns now over 2000 acres lying about Uniontown.

In the State Senate, on the 16th inst., Mr. Hines introduced a bill to prevent unlawful combinations of railroads and anthracite mining corporations.

The convention of miners which was held at Monongahela City this week, adjourned without taking any action. Less than a dozen pits were represented. It was, however, decided to hold mass meetings along the river this month and to hold another convention at Monongahela City in February, when an attempt will be made to secure a uniform scale for both the Monongahela and Kanawha river pits

At the annual meetings of the stockholders of the following companies held in Philadelphia this week the following officers were elected:

CALEDONIA COAL COMPANY.—President, Joseph M. Gazzam; Secretary and Treasurer, William S. Wallace; Directors, Joseph M. Gazzam, John G. Reading, Charles Bartles, James H. Rowland, A. G. Richey, William H. Bartles, B. C. Bowman, Charles W. Scates, John B. Otto.

DENT'S RUN COAL COMPANY.—President, William Emery; Secretary and Treasurer, William S. Wallace; Directors, William Emery, Joseph M. Gazzam, A. G. Richey, Charles Bartles, W. H. Bartles.

LEHIGH LUZERNE COAL COMPANY.—Managers, J. Eogers Maxwell, George F. Baker, James A. Garland, Edward D. Adams, B. Williamson, Henry Graves, Joseph S. Harris, Solomon Shepherd, C. Parrish.

LEHIGH VALLEY COAL COMPANY.—The annual report shows that during 1888 the tounage from collieries owned and operated by the company was 1,649,316; coal shipped by tenants and from lands controlled by the company, 2,057,369 tons; a total of 3,706,685 tons, as compared with 3,296,351 tons in 1887, and 3,348,710 tons in 1886.

LEHIGH VALLEY RAILROAD COMPANY.—The following is a summary of the statistics contained in the annual report presented at the stockholders' meeting held in Philadelphia this week: The total coal tonnage for the year ending November 30th, 1888, was: Anthracite, 7,950,447 tons; bituminous, 74,887 tons; a total of 8,025,334 tons, being an increase of 1,141,377 tons over 1887, and exceeding that of any previous year. The income from all sources was $12,353,739.29; operating expenses, $7,128,234.73, leaving $5,225,504.56, against which there has been charged interest, dividends and general expenses (including estimated depreciations), $4,940,034.43; leaving $285,470.13 to be carried to the credit of the profit and loss account. The capital account shows a total of $64,751,550, to which may be added $8,273,500—obligations guaranteed by the company. The additional issue of stock, allotted to shareholders at par to an amount equal to 20 per cent of their holdings, amounted to 130,531 shares, only 4325 shares being untaken, being mostly those assigned to estates whose representatives felt uncertain of their right to subscribe. President Elisha P. Wilbur and the old management were re-elected.

OIL.

Exports of refined, crude, and naphtha from the following ports, from January 1st to January 12th:

	1889. Gals.	1888. Gals.
From Boston	102,772	9,744
Philadelphia	2,612,053	2,826,476
Baltimore	1,513	.....
Perth Amboy	459,960	1,014,430
New York	8,291,013	12,103,289
Total exports	11,472,311	15,953,939

UTAH.

HORN-SILVER MINING COMPANY.—The following is a condensation of the report by Mr. H. C. Hill, late manager of the Horn-Silver mine, Utah, of the past year's operations:

There have been taken from the mine during the year (up to December 1st) 3778¼ tons of ore. Of this 1937 tons came from the fourth level, and 1150 from the seventh.

This ore has been sold in open market in Salt Lake for the gross sum of $102,541.36. It has cost $24,028.83 for labor to take out this ore; $18,056.50 has been expended for dead work (prospecting for ore, etc.), the work done with this money comprising 967 feet of winzes, drifts and raises.

These winzes, cross-cuts, and drifts have been utilized in getting down the ore from the north end of the mine to where it could be hoisted to surface bins through the main shaft.

In the north shaft 60 feet has been entirely retimbered, and 200 feet more partially retimbered and repaired. This shaft being the upcast from the mine it is always damp and hot, and timbers decay very rapidly. It is now, however, in good condition.

A year ago it was decided to drive down a winze from the 12th level to test the continuance down of the vein, and also the quantity of water. This winze has been driven down 200 feet, the dirt hoisted by hand windlass to the 12th level, thence to surface through main shaft, and has been secured by timbers wherever necessary.

The old shaft has been partitioned and converted into a ladder way and ore chute, and is in good repair. All ore from above the 7th level comes to the main shaft through this ore chute to the 7th level, whence it is trammed to shaft and hoisted to surface.

Supplies have cost $10,456.95, the largest items of which are "mine timbers" and "fuel." Less than $2,000 has been expended for water.

Each ton of ore taken out of the mine has cost for actual extraction $4.27. To this cost of extraction there has been added in the distribution of expenditures, dead work (prospecting), $4.58, surface labor (engineers, carpenters and car men), $3.64, for supplies (timber, fuel, powder, fuse, candles, oil, etc.), $2.68, making each ton of ore carry a cost of $15.35. The average value of each ton of ore has been, for lead ore $30.50, for copper ore $14.50.

About 2000 tons of good ore have been taken from the north end of the mine on and above the 4th level in ground that had not been deemed worth prospecting. This ore has always carried a good percentage of silver and has aided in getting into market a quantity of ore low in silver coming from other parts of the mine. At this particular point there is not very much ground left and but little more ore can be expected from there. Below the 4th level, in the north end of the mine, there has been discovered in the last few days another ore-body that promises very well. There has not been, since it was found, time to do enough work on this ore to determine much about it. It is midway between the 4th and 5th levels.

The 183 foot cross-cut driven between the sixth and seventh levels ran into a body of copper ore that was left in the sixth level in former work, it then being unsalable. It, however, has now a fair market value, and has been and is being mined and marketed, and the prices for which it sold may all be considered as profit, as its position is such that to get at the lead ore beyond, the removal of this copper ore was a necessity. With and alongside of this ore there is a large quantity of singularly pure oxide of manganese. Attempts to find sale for this have not proved successful.

Overlying this copper ore and south of it there is a body of ore high in lead, but not correspondingly rich in silver. Over a thousand tons have been taken from here, giving a fair profit on cost of extraction with the proportion of dead work added. The extent of these ore-bodies can not be definitely stated. There are small ore-bodies showing in places in the north drift on this sixth level, some or probably all of which may develop into paying quantities.

On the eighth level extending down to and below the ninth level, there is a body of black antimonial ore carrying some rich streaks, but it will not pay to work the entire body at present prices of lead and silver. A quantity of this ore was taken out last year, sorted at surface, the first class being sold and shipped. There exists on the dumps 10,000 to 12,000 tons of the second class ore left after sorting. Efforts have been made to sell this but have failed, cost of transportation and reduction being greater than it could stand.

The winzes going down from the twelfth level showed the existence of the vein as far as it was driven; also, that the water could be controlled by the appliances on hand without a pump. The intense heat prevented any extension of the work along the vein. No ore was found in going down.

On the 12th level the drift had been extended along the foot-wall nearly 200 feet south of the cross-cut from the shaft, always in vein matter but thus far without ore. Work was discontinued in this drift to admit of sinking the winze below it. No cross-cut from the shaft exists below this 12th level.

There is on hand ample tools of all kinds for the work, and a fair quantity of timber and more contracted for that will be delivered this month. There is about $80,000 in cash here. All the machinery is in good condition; some slight repairs needed will be made during the Christmas holidays. HENRY C. HILL.

FOREIGN MINING NEWS.

BRITISH COLUMBIA.

Press dispatches state that the difficulties with the miners at the Wellington coal mine at Victoria assumed a serious aspect on the 11th inst. The miners held a meeting and by a majority of forty decided not to go back to work. Miners have been notified to leave the company's houses immediately. As some seven hundred men are affected the evictions can hardly be made without trouble ensuing. It is generally considered in Victoria that the men have acted hastily, and have no real grievances, and that the trouble is the work of some professional agitators, who have nothing else to do. The miners have been making $3 to $5 per day.

CANADA.

PROVINCE OF MANITOBA.

According to reports, coal has been found twelve miles south of Deloraine in the Turtle mountains. A company has been formed and application made for a charter. A shaft will be sunk at once. The mines are forty-five miles west of Killarney.

PROVINCE OF NOVA SCOTIA.

The production and shipments of gypsum from Windsor during the past year have amounted to 124,500 long tons, and in the past six years to about 700,000 tons.

CENTRAL AMERICA.

SAN SALVADOR.

SAN SEBASTIAN GOLD MINING COMPANY.—Mr. Thoes Achelis has filed a judgment in New York against this company for $2023.84.

LEADVILLE ORE MARKET.

[From our Special Correspondent.]

Eleven million eight hundred and thirty thousand two hundred and five dollars and forty-eight cents is given by the local papers as the gross value of Leadville's mineral production during the year which has just closed. This is $242,762.33 less than the estimated value of the production of 1887, but it should be borne in mind that the average price of lead was $4.60 per hundred in 1887, and the average price of silver was 97c. per ounce, whereas in 1888 lead was $4.50 and silver only 93½c. If the lead and silver produced in 1888 could have been figured at the same price as the previous year, the aggregate value would have exceeded 1887 by probably $75,000. Moreover, if the price of lead had averaged $4.60 and silver 97c., it would have greatly stimulated mining and the tonnage would have been larger, with a corresponding increase in the total of gold, silver and lead.

Take it all in all, 1888 was an exceedingly profitable year for the mines in Leadville, and while 1889 comes in with a depressed lead and silver market, it also brings with it a strong effort on the part of the smelters to offer somewhat higher prices than prevailed a few months ago. For instance, the ruling schedule then for high grade carbonates was as follows:

For the silver, 95 per cent of New York quotation:

From 25 to 30 per cent lead, 40 cents per unit, less $4 per ton working charge.

From 30 to 35 per cent lead, 40 cents per unit, less $3.50 per ton working charge.

From 35 to 40 per cent lead, 45 cents per unit, less $3.50 per ton working charge.

From 40 per cent and over lead, 50 cents per unit, less $3 per ton working charge.

Lead basis $4.50 per hundred; add and deduct one cent for each change of five cents in New York quotation.

This still continues to be the recognized schedule, but concessions are made by the smelters in the way of not exacting the full deduction of 1c. for each 5c. so long as lead remains below $4 per hundred.

Carbonate ores under 25 per cent lead vary considerably in price, and the lower the lead percentage the more irregular is the scale, as may be seen in the following extremes:

For the silver, 95 per cent of New York quotations.

For the lead: Under 5 per cent, nil; $10 to $12.50 working charge.

From 5 to 15 per cent, 20c. to 40c.: $8 to $9.50 working charge.

From 15 to 25 per cent, 30c. to 40c.; $5 to $7.50 working charge.

Lead basis $4.50 per hundred; add and deduct 1c. for each change of 5c. in New York quotation.

There has been no marked change in sulphides, and I repeat the scale of last month:

For silver, 90 to 95 per cent. of New York quotation.

Under 10 per cent lead, nil; $15 to $18 working charge.

From 10 to 20 per cent lead, 25 to 35c. per unit less, $14 to $16 working charge.

From 20 to 30 per cent lead, 30 to 40c. per unit, less $14 to $15 working charge.

From 30 to 40 per cent lead, 35 to 40c. per unit, less $13.50 to $14.50 working charge.

From 40 to 50 per cent lead, 45c. per unit less, $12.50 to $13.50 working charge.

Lead basis, New York quotation of $4.50 per hundred; add and deduct 1 cent per unit for each change of 5 cents per hundred in New York quotation.

Zinc basis, 10 to 16 per cent; deduct 50 cents for each per cent in excess of basis.

Crude sulphides or sulphide concentrates, which average high in lead and low in zinc and silica, bring somewhat more for their lead, and there is less deducted for working charge.

The continued scarcity of dry ores has caused an advance of from 50c. to $1 per ton, and they may now be quoted at:

For the silver, 90 to 95 per cent of New York quotation; $11 to $14 working charge.

There is less inquiry for straight iron pyrites, with low gold and silver contents; but if rich in the precious metals they maintain their former price of:

For the silver, 90 to 95 per cent of New York quotation.

For the gold, $18 to $19 per ounce; $12.50 to $13.50 working charge.

Owing to interruptions, from making improvements, at several of the mines which are heavy producers of iron fluxing ores, the output has scarcely kept up to the requirements of the smelters and prices have advanced to 47½ to 52½c. per ounce for ores carrying 8 to 13½ ounces per ton.

Basis 40 per cent excess of iron and manganese over silica.

These high figures have been an incentive to commence work on bodies which at lower prices were neglected and the output will probably be quite up to all demands within the next few weeks.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Jan. 18.

Statistics.

Production of Anthracite Coal for week ended January 12th, and year from January 1st:

Tons of 2240 lbs.	1889. Week.	1889. Year.	1888. Year.
P. & Read. R.R. Co.	132,351	218,312	45,000
Cent. R.R. of N. J.	113,972	177,190	152,474
L. V. R.R. Co.	100,000	200,672	325,981
D., L. & W. RR. Co.	71,721	94,222	301,710
D. & H. Canal Co.	82,382	124,556	172,345
Penna. R.R.	61,876	107,723	121,427
Penna Coal Co.	10,769	21,042	69,387
N. Y., L. E. & W.	12,000	24,000	15,000
Total	585,071	967,717	1,203,324
Decrease	.....	235,607	.....

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

Production for corresponding period:

1884	1,012,351	1886	943,335
1885	955,001	1887	919,664

Production of Bituminous Coal for week ended January 12th, and year from January 1st:

EASTERN AND NORTHERN SHIPMENTS.

Tons of 2240 lbs.	1889. Week.	1889. Year.	1888. Year.
Phila. & Erie R.R.	1,553	3,000	1,080
Cumberland, Md.	67,061	105,501	134,726
Barclay, Pa.	3,500	7,000	6,000
Broad Top, Pa.	11,895	20,728	14,017
Clearfield, Pa.	77,667	136,145	137,285
Alleghany, Pa.	21,193	38,078	35,133
Pocahontas Flat Top.	23,864	53,292	56,562
Kanawha, W. Va.	*24,770	24,770	33,495
Total	221,503	388,514	418,298

* Week ending January 7th.

WESTERN SHIPMENTS.

Pittsburg, Pa.	10,983	23,255	27,200
Westmoreland, Pa.	36,526	64,233	54,457
Monongahela, Pa.	3,438	6,949	18,797
Total	50,947	94,437	100,454
Grand total	272,450	482,951	519,752

Production of Coke on line of Pennsylvania R.R. for week ending January 12th and year from January 1st, in tons of 2000 lbs.: Week, 103,036 tons; year, 182,501 tons; to corresponding date in 1888, 188,077 tons.

Anthracite.

The continued mild weather has greatly interfered with the demand for anthracite, and though the companies are reducing their output very heavily, the stocks have still increased somewhat during the last month. The official statistics show that at the close of December the stocks at tide-water amounted to 652,126 tons, or 83,000 tons more than at the end of November. The total shipments of coal from all the regions aggregated in 1888 58,145,718 tons, being an increase of 3,500,000 tons over the shipments of the previous year. If we add to the shipments 6 per cent for the consumption of coal at the mines it would give us a total production of 40,400,000 tons, by far the largest the trade has ever seen.

The companies have found it necessary to still further curtail the output, and some of them have almost stopped sending out coal. They seeem, in fact, to have decided to maintain the tone of the market by reducing the production, the only possible way to do this efficiently, and will keep the stocks at a reasonable figure until the opening of the spring trade. Under these circumstances it is rather surprising that the individual operators should shade prices as heavily as they now do. Fair selling prices alongside in New York are to-day about as follows: Broken from $3.90 to $4; egg about the same; stove from $4 to $4.35 and nut from $4 to $4.25. The f. o. b. prices at shipping ports would, of course, be about 20 cents less than these figures. Free burning coals are selling at about the same price as Lehigh. The companies are holding firmly to standard quotations, but are not doing much business.

No one expects the production of coal this year will equal that of 1888. If the present weather continues we may expect a difference of several million tons on that account only. At the same time there is no probability of there being any demoralization in the trade; the companies are managing it better than eve

before, and it seems assured that prices will be maintained at whatever standard may be established during the year. Of course, the opening prices will be somewhat lower than later on, but whatever the price decided on may be it will, we believe, be firmly maintained.

The most important matter in the coal trade during the past week, has been the great advance in rents asked by the owners of the Washington building, in this city. This advance amounted to from 30 per cent to 100 per cent, or to $3.50 and $4 a square foot of floor: and as a consequence of it and of the manner in which the tenants have been treated, a good many of them are likely to leave the building and move to other quarters. We understand that among those who will move are Coxe Bros. & Co., who go to the Equitable building, and in all probability a good many others will also leave. It is more convenient for the trade to be close together, but the prices that have been asked are exorbitant, and even those who have consented to pay them have, as a rule, taken only a short lease until next year.

Mr. John H. Jones, Chief of Bureau of Anthracite Coal Statistics, has issued the following statement of anthracite coal tonnage for the month of November, 1888, compared with same period last year. This statement includes the entire production of anthracite coal, excepting that consumed by employés and for steam and heating purposes about the mines, but does not represent the entire anthracite coal tonnage actually transported by the respective railroad companies, adjustment being necessary in the compilation to avoid duplications, etc.

COMPANIES.	Dec., 1888.	Dec., 1887.	Difference.	
Phila. & Reading RR..	467,969	618,305	Dec.	150,306
Lehigh Valley RR.....	482,099	356,647	Inc.	125,453
Central RR. of N. J....	446,587	382,447	Inc.	64,141
Del., Lack. & West. RR.	532,437	725,685	Dec.	193,249
Del. & Hud. Canal Co..	346,495	417,701	Dec.	71,206
Pennsylvania RR.....	267,081	351,213	Dec.	84,132
Pennsylvania Coal Co.	72,835	151,734	Dec.	78,899
N. Y., L. E. & W. RR..	88,390	64,347	Inc.	24,043
Total.....	2,703,923	3,068,079	Dec.	364,156

COMPANIES.	For year 1888.	For year 1887.	Difference.	
Phila. & Reading RR..	7,175,095	7,555,252	Dec.	380,157
Lehigh Valley RR.....	6,592,716	5,784,451	Inc.	808,265
Central RR. of N. J....	5,742,279	4,852,859	Inc.	889,420
Del., Lack. & West. RR.	6,996,192	6,220,793	Inc.	775,400
Del. & Hud. Canal Co..	4,486,188	4,048,230	Inc.	437,958
Pennsylvania RR.?....	4,554,441	3,816,143	Inc.	738,297
Pennsylvania Coal. Co.	1,624,433	1,603,456	Inc.	20,977
N. Y., L. E. & W. RR..	974,374	759,835	Inc.	214,539
Total.....	38,145,718	34,641,018	Inc.	3,504,700

	Dec., 1888.	Dec., 1887.	Difference.	
From Wyoming Region	1,524,579	2,145,228	Dec.	620,649
From Lehigh Region...	519,175	36,511	Inc.	482,663
From Schuylkill Region	660,169	886,340	Dec.	226,170

	For year 1888.	For year 1887.	Difference.	
From Wyoming Region	21,852,366	19,684,929	Inc.	2,167,437
From Lehigh Region...	5,639,236	4,347,062	Inc.	1,292,175
From Schuylkill Region	10,654,116	10,609,027	Inc.	45,089

The stock of coal on hand at tide-water shipping points December 31st, 1888, was 652,156 tons; on November 30th, 1888, 569,233 tons increase; 82,923 tons. The amount on hand December 31st, 1887, was 130,977 tons.

Of the total production in 1888, 57·29 per cent was from the Wyoming Region; 14·78 per cent from Lehigh Region, and 27·93 per cent from Schuylkill Region.

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

1888..... 13,657,604 tons
1887..... 12,081,826 "

Bituminous.

The bituminous trade is in a very good condition; it is now abundantly supplied and prices are firm all around. The new Seabord Association programme has been agreed upon with a few reservations, and it is hoped that the Beech Creek district will also come into the pool. There is still a good deal of discussion as to the Pocahontas field and the arrangement by which the coal is brought from it at such extremely low prices that the railroad loses money. This question appears to be growing in interest. It is rumored that the London stockholders of the Norfolk & Western have a strong suspicion that their property has been used for the benefit of the coal trade of the Pocahontas Flat Top Trust. If this suspicion should assume the form of an investigation, it is said that important results would probably follow.

The report that there is a strike at the Pocahontas mines is unfounded. The trouble, which was at the Elkhor mines, and not at Pocahontas, was settled without a strike.

We continue our quotations as heretofore: $2.50 f.o.b. at Baltimore and Georgetown, $3.25 for New York Harbor Shipping ports, $3.50 alongside New York.

The contracts for 195,440 tons for the Philadelphia gas-works were awarded as follows: The Penn Gas Coal Company and the Westmoreland Coal Company were awarded the contract for 57,520 tons each, at $3.82, the highest price paid. The Manor Gas Coal Company got 5000 tons at $3.81. The balance went to Virginia mines.

Boston. Jan. 17.

[From our Special Correspondent.]

The anthracite coal market remains in a state of suspended animation at this port. The oldest dealers never saw anything that went ahead of this for winter weather, and they have plenty of time to overhaul their memories on this point. Broadly speaking, there is no demand for anything. There seems to be considerable confidence, however, in the ability of the companies to maintain prices without serious break, at least it is said that fully 50 per cent production is in force, and that shipments to tide-water are greatly lessened. The agents and jobbers here are doing nothing with company coal, because they are not allowed to force it; if they were, the market would become at once demoralized. As it is, the outsiders are offering their coal down, but they do not force it.

The most abundant sizes are egg and stove, which are very plenty at $3.90@$4.30 f.o.b. at New York for egg, and $4.35@$4.65 for stove. Inferior coal can be had at lower figures. Broken coal ranges from $3.50 to $3.75. It is noticeable that the decreased production lessens the amount of nut, pea and buckwheat, and that all of these small sizes are more firmly held. In the same way, locally, the demand for wharf screenings is unusually good, simply because the dealers are selling, delivering and thereby screening so little coal. Every one is certain that "of course, there will be some cold weather," and so things jog along.

In bituminous coal circles the uppermost thought comes in connection with the new pool; the old one goes out of existence February 28th. The general expectation is of a new and stronger arrangement. No one is doing any contract business, unless it is on the sly. Cargo business is fairly active at $2.45@$2.60 f.o.b.

Freights are easy at Baltimore, but are fairly strong everywhere else, and as high as ever at Philadelphia. Barges are more plenty. We quote, exclusive of discharging: New York, $1.10@$1.20; Philadelphia, $1.55@$1.60; Baltimore, $1.60; Newport News and Norfolk, $1.50@$1.60.

Retail trade is frightful. They do say that some of the retailers cart coal around town and back to the yards just to see if the wheels will go round. We quote delivered prices, 2000 lbs., as follows: Stove, $6·50; Nut, $6.50; Egg, $6.25; Furnace, $6.00; Franklin, $7.75, all sizes; Lehigh Egg, $6.50; Furnace, $6.25. Wharf prices are 50 cents per ton less than the above. Bituminous coal is $4.75 on the wharf.

Buffalo. Jan. 17.

[From our Special Correspondent.]

In the absence of any changes to note in demand, supply, or prices of anthracite and bituminous coal, perhaps the following may be of interest to the readers of the ENGINEERING AND MINING JOURNAL:

From the Western, New York & Pennsylvania Railroad's annual report for 1888, it appears that 2000 thirty-ton coal cars were purchased. The Buffalo coal docks and trestles need renewals and repairs, and additional storage capacity required. The business of shipping much curtailed for want of adequate facilities. A large increase of traffic is expected when the Johnsonburg branch is opened in February next, connecting the Clermont branch with the Philadelphia & Erie at that point, and making a short line from the bituminous coal-fields to Buffalo, Rochester, and other important points.

Mr. F. Guilford Smith, the Chairman of the Coal Committee of the Buffalo Merchants' Exchange, presented the following report at the annual meeting held a few days since: "The committee are pleased to report very largely increased shipments of coal to Buffalo for re-shipment there by lake and rail. Lake shipments were as follows: 2,546,905 net tons, including 2071 cargoes distributed to 55 ports, a very marked increase over last year—about 600,000 tons. The rail figures, when all in, will no doubt show a considerable increase, but they are not yet available.

"To move this large amount of increased traffic by lake, increased facilities have been necessary. The Lehigh Valley interests have largely increased their shipping wharves at Tifft Farm during the past season. The New York, Lake Erie & Western Railroad has also increased its dock facilities and pocket-carrying capacity. At the present time the Delaware, Lackawanna & Western is also increasing same at the foot of Erie street, and will be able to ship more coal during the season of 1889 than ever, should it be desired. During 1888 the Central Dock Terminal Company has been organized, and has acquired property for the shipment of Reading coal, and during the year 1889 their docks and pockets will, no doubt, be constructed and add largely to the shipping facilities of this port.

"In addition to the facilities mentioned for the increase of tonnage by lake very considerable contracts have been entered into by the New York, Lake Erie & Western for the storage of coal during the winter, and its trans-shipment into line cars. This coal trestle will be ready for use on the opening of the spring trade. The New York Central & Hudson River Railroad has also appropriated very considerable land, and put in tracks for the storage of large contracts of anthracite coal during the winter, which can be utilized in the same way.

"The consumption of coal in Buffalo does not seem to have been as largely affected by natural gas as was expected, probably owing to the lack of supply on the part of the Natural Gas Company, and partly owing to the stringent measures which they have seen fit to adopt in reference to supplying their customers, since the disastrous fire of last spring, which nearly consumed St. Paul's Church.

"There are no statistics, as far as known, of the arrivals of coke in Buffalo, as separated from anthracite and bituminous coal, but the amount used here and in the vicinity, and which passes through Buffalo is constantly on the increase. The leasing of the Niagara River Iron Company's blast-furnace will no doubt increase this consumption greatly, and it would seem desirable to have, if possible, separate statistics on this fuel."

The Grand Trunk Railway of Canada has advertised for 380,000 tons of coal to be delivered at the bridges. The time for sending in the bids expires at noon February 4th. The conditions and terms are the same as those of 1888.

Pittsburg. Jan. 17.

[From our Special Correspondent.]

Coal.—We have to report a continued dull market. The mild weather and the markets overstocked, makes dealers wish they had their money invested in some other article. There are hundreds of empty boats and barges in the pools, where they will remain until coal commands better prices. Mining in the pools is pretty much suspended. Nominal rates:

PRICE OF COAL PER 100 BUSHELS = 7600 LBS.

First pool	$4.75	Fourth pool	$3.25
Second pool	4.50	Railroad coal	5.00
Third pool	3.90		

Connellsville Coke.—Matters seem to be at a standstill in the coke regions; neither side seems to be satisfied with the present situation. The present supply of coke exceeds the demand, while shipments fall off considerably. Production is as large as ever, showing that the operators have enough confidence in the market to stock up some coke. Estimated production, 127,327 tons. Shipments aggregate 5985 cars. Total output for December, 527,646 tons, against 532,389 tons for November.

Nominal rates at the ovens:

Furnace Coke	$1.25@$1.35	Foundries	$1.50
Crushed	2.20		

Freight rates from ovens to Pittsburg, 70c per ton; to the Mahoning and Shenango valleys, $1.35; East St. Louis, $3.20; Cleveland, $2.80; Chicago, $2.75. The week's production aggregated 127,383 tons, as against 126,818 tons for previous week, shipments reaching a grand total of 7120 cars.

FREIGHTS.

The latest coal charters per ton of 2240 lbs.

From Baltimore to:—Bangor, Me., 1.60; Bath, 1.60; Boston, 1.65; Bridgeport, Conn., 1.45; Bristol, 1.25@1.30; Brooklyn, 1.25; Charleston, 1.00; Fall River, 1.30; Galveston, 3.10@3.15; Gardner, Me., 1.75; New Bedford, 1.25; Newburyport, 2.25; New Haven, 1.25; New London, 1.25; New York, 1.10; Portland, 1.65; Portsmouth, N. H., 1.65@1.75; Providence, 1.25@1.40; Quincy Point, 1.50; Richmond, Va., .70 Roxbury, 1.50 3c.; Salem, Mass., 1.65; Savannah, 1.35; Somerset, 1.25@1.30; Williamsburgh, N. Y., 1.10; Wilmington, 1.35.

From New York to:—Bangor, Me., 1.25@1.30*; Bath, 1.30@1.40*; Beverly, 1.15*; Boston, 1.10*; Bridgeport, Conn., .60; Cambridge, Mass., 1.15*3c.; Cambridgeport, 1.10*; Charlestown, 1.10*; Chelsea, 1.10*; Com. Pt., Mass., 1.15*; E. Boston, 1.15*; E. Cambridge, 1.15*. Fall River, .75@.90; New Bedford, .80@.90; Newburyport, 1.25*; New Haven, .60; Newport, .75@.90; New London, .85; Norwalk, Conn., .60; Portland, 1.10*; Portsmouth, N. H., 1.20*; Providence, .75@.90; Salem, 1.15*.

From Philadelphia to:—Bangor, 2.00*; Boston-1.60@1.70*; Charleston, 1.00; Chelsea, 1.55@1.60*; Com. Point, Mass., 1.60*; E. Boston, 1.70*; East Cambridge, 1.50*; Fall River, 1.15@1.25*; Galveston, 3.00*; Gardner, Me., 1.60*‡; Georgetown, D. C., 1.00; Lynn, 1.75@1.85*; New Bedford, 1.15@1.25*; Newburyport, 1.75*; New York, .90†; Norfolk, 1.60@1.70*; Portland, 1.60@1.70*; Portsmouth, N. H., 1.60@1.70*; Portsmouth, Va., .65; Providence, 1.35@1.40*; Richmond, Va., 1.00; Rockport, 1.22½*; Saco, Me., 1.75*; Salem, Mass., .90*; Savannah, 1.25; Washington, 1.00; Weymouth, 1.15*; Wilmington, N. C., .60.

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

METAL MARKETS.

NEW YORK, Friday Evening, Jan. 18, 1889.

Prices of silver per ounce troy.

Jan.	Sterling Exch'ge.	Lond'n Pence.	N. Y. Cts.	Jan.	Sterling Exch'ge.	Lond'n Pence.	N. Y. Cts.
12	4.88	42 7-16	92⅝	16	4.88	42⅝	*
14	4.88	42⅛	92¾	17	4.88	42⅝	93
15	4.88	42⅝	93⅛	18	4.88	42 11-16	93⅛

* 93⅛@92⅞.

Foreign Bank Statements.—The governors of the Bank of England at their weekly meeting made no change in its rate for discount, and it remains at 4 per cent. During the week the bank gained £348,000 bullion, and the proportion of its reserve to its liabilities was raised from 38·90 to 41·70 per cent, against an advance from 40·16 to 42·35 per cent in the same week of last year, when its rate for discount was 3 per cent. Thursday, the bank gained £35,000 on balance. The weekly statement of the Bank of France shows a loss of 2,450,000 francs gold and a gain of 800,000 francs silver.

Copper.—The copper market still continues in a condition in which it is difficult to discover anything interesting to report. The recent publication of the World's Stocks of copper and copper material, at the close of last year, has undoubtedly had the effect of shaking to some extent the almost unbounded confidence hitherto felt by the public in the ability of the syndicate to carry on their project to a successful issue, as many people were

hardly prepared to find that these stocks had already accumulated to such an extent, and they cannot see any prospect but a further large and continuous addition to the present heavy stocks.

There is no business to report on our Metal Exchange during the past week, and whilst the tendency is somewhat easier quotations are nominally unchanged at 17¼@17⅜c. for Lake and about 15¾@16c. for casting kinds.

The European markets are in an unsatisfactory condition, and the demand for furnace material is limited to present immediate requirements and at prices under the quotations officially reported. For Chili bars and G. M. B. copper the market in London has also given way a little, and the last quotations are £77 7s. 6d. to £77 10s. spot, and £78 to £78 2s. 6d. 3 months.

The secretary of the Portuguese Consolidated Copper Mines advises a London exchange that a contract with the Société Industrielle des Métaux has been concluded and signed for the output of the company's mines for a period of two and a half years, with the option, on the part of the buyers, of a further period of twelve years.

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

To Liverpool—	Copper Matte.	Lbs.	
By S. S. The Queen.....Sacks.	6,065	692,499	$34,100
By S. S. Ptolemy.....Bbls.	223	224,143	10,000
By S. S. Ptolemy.....Bags.	272	40,650	3,500
To Liverpool—	**Copper.**		
By S. S. The Queen.....Casks.	113	113,000	18,088
By S. S. Ptolemy.....Bbls.	27	33,750	5,500

Tin.—The tone of this market has also been rather easier, and quotations have given way somewhat both in London and also in this city. Demand, however, continues fairly satisfactory, which may be to some extent accounted for by the comparatively steady market for this metal during the last few weeks. Our present quotations are: Spot, January, 21¾@21⅞c; February, 21⅞@22c; March, 21⅞@22c.

Lead.—The price of lead is unaltered since we last reported, but during the week there has been some amount of fluctuation caused by the strong market and higher prices out West, where the demand has been very good during the week at 3·60, St. Louis, which is equivalent to 3·90 New York. Latest advices, however, report the Western markets easier again with demand falling off owing to the consumers being now pretty fully supplied. The closing quotations in St. Louis are 3·55, or equal to 3 85 New York, and here we close at 3¾@3·90 for Spot and January delivery. For delivery during the succeeding 2 or 3 months the price may be given as 2½ to 5 points higher.

The general feeling seems to be that the lead market will continue steady at about present values for some time to come, as with existing large stocks no material increase in prices seems probable. London is weak; £13 for special.

The Senate bill has been changed to read as follows:

"Lead ore and lead dross, 1½ cents per pound: *Provided*, That lead ore containing silver, or silver ore containing lead, shall pay a duty of 1½ cents per pound *on the lead contained therein according to sample and assay at the port of entry.*"

This makes the meaning clear, though it makes little difference in the working of the law, if it should become law, for in either case, whether the duty of 1½ cents a pound be on the ore or the lead in the ore, no lead can come in. Our lead producers will be relieved of possibly 20,000 tons of lead a year from this source. Will Idaho make it up?

St. Louis, Mo.—Messrs. John Wahl & Co. telegraph to-day as follows: Business gradually revives, with a moderate demand at unaltered quotations. Probably 500 tons sold at from 3·57½c. to 3·60c.

Chicago, Ill.—Messrs. Everett & Post telegraph to-day as follows: The market stands with the following bid and asked. 3·60@3·65c. Sales for the week about 200 tons at 3·65c. Market very quiet.

Spelter continues very firm and in good demand at 5 for prime Western. The European markets have eased a little and the latest quotation in London is £18 10s. Antimony remains firm at 11c. for Hallett's and 13c. for Cookson's.

CHEMICALS AND MINERALS.

NEW YORK, Friday Evening, Jan. 17.

Heavy Chemicals.—The present week has witnessed no increase in the volume of business and prices on the whole are practically unchanged. Since January 1st the inquiry for heavy chemicals has been very light and prices have been depressed, despite the small stocks on the spot. The outlook for the immediate future is uncertain. It is stated that the present dullness is a reaction from the activity of last November, and that consumers purchased so heavily at that time that they are fully supplied now. However this may be, dealers are striving to sustain prices as high as possible, and, notwithstanding the limited demand at present, there are many who predict better times soon. It is undeniable that in the latter part of December the outlook for 1889 was very bright, and the depression now existing after all may be but temporary.

Carbonated soda ash, 48 per cent, is the firmest article on the list. Spot stocks are light. Liverpool advices are encouraging, and there is a general feeling that this article is worth, and will command, full value. Arrivals are quoted at 1·25@1·27½c. Small lots from store will probably bring 1·32½@1·35c. Caustic soda ash, 48 per cent, is very quiet at about the same figures.

Caustic Soda.—Neither the continuance of the combination nor the restriction of a week's make in the January output have prevented a depression in the price of caustic soda, simply because a much more powerful influence, the absence of buyers, has been at work. And thus it is again shown that an artificial inflation of values cannot be permanent until the demand is normally large enough to sustain it. For the higher tests, 70, 74 and 76 per cent, 2·27½@2·30c. are perhaps fair quotations. For large orders, 2·25c. might be accepted. For 60 per cent 2·40c. is asked. Sal soda is still dull. Both spot and to arrive may be had at ·95c. Small sales only are reported. For small lots from store, fair prices would be 1@1·05c.

Bleaching powder continues dull. Early in the week there was an unusual pressure to sell some small lots which had to be removed from dock, and this also had the effect of lowering the market. We hear of quotations as low as 1·82½c. for both spot and arrivals in a large way.

Acids.—As yet, there is no improvement either in prices or in the size or number of transactions. "Combination" rumors have been in circulation again, but, so far, unconfirmed.

Acetic acid is dull. Quotations for prompt delivery are nominally 2@2¼c.

Muriatic and Nitric Acids.—There is no important inquiry for either of these acids at present. Quotations, however, are steadily maintained at the old figures. This is also applicable to tartaric acid. We continue to quote 41@43c. for crystals, according to quantity, and 42@44c. for powdered.

Oxalic Acid.—The combination has agreed upon another advance in prices. This is the second in the past two weeks. It is becoming evident that our original statement, to the effect that the combination had agreed upon a series of gradual advances, was correct. Asking prices now are 9½c. per lb. for 10-ton lots, and 10½c. per lb. by the single cask for prime German and English makes, ex dock or store, New York, Philadelphia and Boston.

Sulphuric acid is also rather quiet, the principal business doing being in fulfillment of contracts. So far as can be learned, however, manufacturers have not decreased their output to any important extent, and many are of the opinion that as soon as the new year is well underway business will begin "to pick up again." Ruling quotations for 66 degrees are ·90@·95c., for large quantities. Small lots for prompt delivery might command 1·15@1·25c.

Fertilizers, etc.—There is a continued demand for nearly all articles of this class, which in some instances has not been equaled by the supply, and prices in consequence have shown an upward tendency. The revised price-list is about as follows: Azotine, $2.70@$2.75; dried blood (city), low grade, $2.60@$2.65 per unit; Western high grade, $2.75 per unit for ground material; tankage, high grade, $25@$26 per ton; low grade, $24 per ton, as to quality. Fish scrap, $25 per ton f.o.b. factory. Sulphate of ammonia, $3 35@$3.40 per cwt.

Refuse bone-black, guaranteed 70 per cent phosphate, is quoted at $19 per ton. Dissolved bone-black is 95c.@$1 per unit for available phosphoric acid, and acid phosphate 85@90c. per unit for available phosphoric acid.

Steamed bones, unground, $19; ground, $25@$26.

Charleston rock, undried, $5 per ton; kiln dried, $6 per ton, both f.o.b. vessels at the mines. Charleston rock, ground, is held at $10@$10.50 ex steamer at New York. Our correspondent at Charleston, S. C., sends us the following statement of shipments of phosphate rock from that port during December: To domestic ports—December, 1888, 20,852 tons crude, 647 tons ground; December, 1887, 20,771 tons crude, 300 tons ground. To Liverpool—December, 1888, 200 tons crude; December, 1887, 340 tons ground. The port of New York alone received 982 tons crude during December, 1888. During the same period Baltimore received 7145 tons and Philadelphia 3555 tons.

Muriate of Potash.—About the only spot supply to be had is in small lots in second hands, for which 1·85@1·95c., according to quantity, is asked. Arrivals can be secured at 1 80c. sail shipment, 1 82½c. steamer.

Double manure salts are firm on account of the limited spot supply. For spot 1·20c. is asked. Arrivals may be had nearby at 1·17½c. Shipment is quoted at 1·15c., basis of 48 per cent. High grade sulphate of potash, basis 90 per cent, is worth 2·40@2·50c. on the spot, and about the latter figure to arrive.

Kainit remains firm at about former quotations. The small quantity on the spot is held in second hands as high as $11@12 per ton. Forward deliveries command $9.75@$10.50.

Brimstone is meeting with little favor from buyers at present, and prices are consequently rather week. We quote for best unmixed seconds on the spot $20.25, to arrive, $19.75; January-February shipment, $19.50; thirds, to arrive, $19@$19.25.

Nitrate of soda is also quiet. Spot may be had at 2·27½@2·32½c. Futures, 2·25c. The present weakness is attributed to large arrivals against an indifferent demand. F. B. Nichols reports on the 15th inst., the total deliveries to that date as 25.933 bags. Stocks in New York are estimated at 88.677 bags, with 94.000 bags to arrive. Mr. Nichols also says: The market weakened under offerings ex vessel, and concessions were made to induce business rather than put into store. The Valparaiso market shows more strength, and Europe is firm, notwithstanding the report early in the month that 120,000 tons were loading for her ports. The decline on the coast has checked business in late forward shipments.

Acetate of lime continues to move slowly at ·95@1c. for brown, and 1·90@1·95c. for grey.

Cream of Tartar.—There is nothing new to report concerning this article. The market is unsettled. Quotations nominally remain as quoted last week.

Minerals.—Borax is in moderate request and quotations continue fairly steady at former figures. Sulphate of barytes is also quiet and unchanged. Transactions are light. China clay is in a little better demand, with quotations unchanged and spot stocks light. Full quotations are given in our current prices.

Liverpool. Jan. 5.

[From our Special Correspondent.]

Chemicals.—Messrs. J. P. Brunner & Co. write us as follows: There is an improvement in the demand for heavy chemicals this week, and a fair business has been done. Prices show little change, but there is a tendency in most cases in an upward direction. Soda ash is in moderate compass. For 48 per cent caustic ash ¾d. has been accepted in one case, but several makers hold both caustic and carbonate ash for 1 1/16d., which figure has been paid to a limited extent for special brands. Spot quotations are: Caustic ash, 48 per cent, 1@1 1/16d.; high test, 1@1 1/16d.; carbonate ash, 48 per cent, 1@1 1/16d.; high test, 1 1/16d. Soda crystals are in light request at £2 10s.@£2 12s. 6d. Caustic soda is stiffening, and buyers show more disposition to operate. Sixty per cent is held for £6@£6 5s., with sales for prompt delivery at the lower figure, and £6 2s. 6d. paid for a couple of months ahead.

Seventy per cent. is in request. A few days ago £6 18s. 9d. was accepted by one seller for a line of 100 tons, but this price has since been refused, and nothing to be had at under £7, while most makers hold for 5s. per ton advance on this figure. For February and December £7 2s. 6d. has been paid, but no sellers now to be found at under £7 5s., while as high as £7 10s. is asked by the majority of makers for forward delivery. Seventy-four per cent. is held for £7 12s. 6d.@£7 15s., and orders at a shade under the lower figure have been refused. Bleaching powder firm at $7 12s. 6d.@£7 15s., and difficult to buy at under the higher quotation. Chlorate of potash weak, buyers showing a want of confidence in the market. The spot quotations are nominally 5½@5⅝d., but 5¼ has been accepted by one maker, who, however, declines to go on at this figure. Oxalic acid has been advanced to 4½d. per pound net cash.

Minerals.—We take pleasure in presenting the following review of the Liverpool market for 1888, written by our regular correspondent, Mr. Geo. G. Blackwell: "The past year has been one of fluctuations. We began with unsually low prices, but as the year advanced prices improved. A relapse was experienced, but we close with considerably advanced figures, accompanied with large importations and a larger consumption. Importations of manganese ore this year have been again in advance of any previous year. We have experienced unusual fluctuations, but we close the year with a considerable advance, and with a prospect of a further increase in prices. Our stocks, which consist of only about 1200 tons, are abnormally low, and this, taken into consideration with the increased freights, as well as high cost of production, shows a certainty of higher figures for the coming year, especially when it is well known that the wants of consumers during 1889 will exceed any previous requirements. The quality of ore imported during the past year has been very good and quite above the average. Iron Ore: Whilst the production has increased, the consumption has held it in check, and with the ruling freights we close the year with considerable advance in prices and a prospect of a further advance in future. Barytes: Prices have been fully maintained during the past year, and best qualities have experienced a further advance. French Chalk: Never since this article has been imported have we had such a large consumption as during the current year. Its value is becoming to be more and more known, and whilst we have already had during the last six months a considerable advance in prices, they are below the average of previous years, and therefore if this article only maintains the position of the past we shall certainly see considerably higher prices. Our stocks are lower than they have ever been for a considerable number of years, notwithstanding that the imports are very much higher. Magnesite: The consumption of this article has been very steady, without material improvement. A combination of producers has been formed to raise the price, but there are other sources from which consumers can get their supply to compete. Chrome Ore: Importations of this article have very much increased. Prices have advanced somewhat, but on the whole, considering the quality, consumers have had their ore at low figures. Emery-stone: Importations have increased this year, and prices have advanced, especially for best and well-known qualities, for which there has been a great demand. Strontia: Whilst the production has improved in quantity, prices have been steady, yielding rather to a decline chiefly on account of unnecessary competition with producers. Bauxite: Still further improved patents for the consumption of this article have been brought out, the merits of which have become more widely known; therefore, for outside purposes alone, there has been a large increase in the consumption, in addition to which, for ordinary purposes, the consumption has been larger than any previous year, and prices, therefore, have been fully maintained, in many cases considerably advanced. We look forward during the coming year to a very largely increased trade. Ferro-manganese: With the improved price of manganese ore this article has also advanced.

BUILDING MATERIAL MARKET.

NEW YORK, Friday Evening, Jan. 18.

The returns now coming in show that the year 1888 was an extremely active one in the principal cities of the country, with the single exception of New York. Denver has had an unprecedented boom in this direction, and, indeed, at times, according to the Colorado papers, the interest in real estate and building speculations has been so intense that mining investments have been neglected. Milwaukee, says an exchange, has issued permits for 627 buildings, to cost $2,045,180, since the middle of last March, while the outlay is believed to have been over $3,500,000. Kansas City, Duluth and many other cities report the past year as phenomenal in the extent of buildings prosecuted. Another of the cities touched by the boom is New Orleans. Splendid structures of metropolitan character, seven and eight stories high, built of granite, brown stone, pressed brick and terra cotta, are being constructed in large numbers in that city. Chicago has also had a big year.

Bricks.—River navigation is open to Albany, and building operations have not yet ceased. To be able to make this announcement at this season is, to say the least, unusual. It has even been feared that the weather is too open, that the continued arrivals will soon be more than the market can stand, and that, consequently, a depreciation in price must ensue.

That there is some ground for these fears is evidenced by the fact that quotations in some quarters have already perceptibly weakened, but manufacturers do not seem to take so cautious a view of the matter. Fair quotations for both Hackensacks and up rivers are $6.50@$7 per M.; Haverstraw seconds are quoted at $6.75@$7, and firsts about 25c. higher. Shipments having continued while making has ceased, stocks at the main sources of supply are now considerably less than they were at this time in 1888 or 1887.

Lime.—Spot supplies are light. Association rates are maintained on Rockland. St. John is reported rather scarce, with no quotable change in prices.

Slates.—Dealers are very much interested in the outlook for the coming year. If the combination is continued, 1889 will probably bo as good as 1888. In this line of material the past year was a very active one.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Jan. 18.

The week under review has not shown the improvement that has been fondly looked for. The iron trade is dull, and its improvement is as yet only in "hope." It is too early to expect any large increase in demand, but the statistical position of the market is very satisfactory. Stocks are light, and any considerable increase in consumption would soon bring about a stiffening in prices.

The weak point, of course, is that our productive capacity in nearly every department of the iron trade, exceeds our consumptive requirements, and unless the output be restricted by trusts and combinations, prices cannot be maintained at any high level; while the organization of trusts and combinations, and the imposition of unnecessary or extravagant tariffs, which might enable manufacturers to maintain prices possess the very serious danger of exciting an irresistible public opposition, that once set in motion would probably not stop at the limit of moderate and necessary protection, but might sweep away the entire support of many industries and bring about a depression from which it would require many years to recover.

The best friends of the metal industries to-day are those who advocate moderation in tariff, the limitation of the "Trust" craze, and generally the avoidance of those excesses which inevitably bring an injurious reaction. "Save us from our friends" is a prayer that many in the metal trades should breathe, and breathe cut loud too, before the mischief is done.

American Pig.—The pig-iron trade is quiet and without feature worthy of note. Southern irons are still offered in this market at prices which tempt consumers to leave their old brands for the new, and we see no good reason to suppose that this state of affairs will soon cease. The works located advantageously with regard to cost of production will necessarily push to the wall those that cannot compete, since there is not work enough to keep all running.

There is no announcement yet of the opening prices for Thomas Iron Company's iron, but the impressson becomes more and more confirmed that the prices will be lower than they were last year. The tone of the market both here and in Philadelphia, in fact in every market in the country, is week, and while quotations are nominally unchanged, the actual prices obtained are lower than they were a short time ago; nevertheless, there are more furnaces blowing in the East than there have been for a good while. This, of course, will aggravate the dullness.

Scotch Pig.—This market is about steady, at the following prices: Coltness, about $20.50; Glengarnock and Langloan, $20; Dalmellington, $19.50. No iron can be brought here at these figures, but some has been sold below cost of importation. This business is gradually dying out and it will, before very long, be scarcely worth reporting. Freights continue very low, 3 to 4 shillings per ton.

Bessemer Pig.—There is nothing new to report in this market; prices are purely nominal, and no foreign metal is coming in. Spiegeleisen still continues rather firmer, and we continue our quotations of $28 to $28.50. Ferromanganese is quoted at $54.50 to $55.

Steel Rails—This market is very dull and we hear of but few contracts. The Hartford road has purchased 5000 tons, and a Georgia road 5000, but the prices have not been stated. It is generally believed that less than 28 at Eastern mills has been received. The amount of rails shipped by the different companies during the past year aggregated 1,206,279 tons. These figures do not include the light section rails which are not controlled by the Association.

The American Iron and Steel Association publishes the following statistics of steel rail production:

"The total production of steel rails in 1888 was 1,528,057 net tons, or 1,364,337 gross tons, against 2,290,197 net tons, or 2,044,819 gross tons, in 1887—a decrease in 1888 of 680,482 gross tons, a shrinkage which is greater than our total production of steel rails in 1879, when we made 610,682 gross tons. The decreased production of 1888, as compared with the production of 1887, was almost exactly 33⅓ per cent. The production in the last half of 1888 was less than in the first half.

"Our consumption of steel rails in 1888 was fully 750,000 gross tons less than in 1887, the imports in 1888 having declined about 77,000 tons as compared with 1887. In 1887 they amounted to 137,588 gross tons, and in 1888 to about 60,000 gross tons."

Structural Iron and Steel.—The Beam Trust, as we announced last week, has had to succumb, and prices now stand at 2·8c., a reduction from 3·3c. The competition of Carnegie Bros., in Pittsburg, has brought about this reduction, for the percentage of the whole business which they demanded was greater than the other compaties in the Association were willing to concede. It is scarcely to be expected that the price will remain even at 2·8 cents, for the market can readily be over-stocked by the mills, which are prepared to manufacture or which are getting ready to make structural steel. Steel beams are sold at the same price as iron, and this department of the trade is likely, as we recently stated, to reach nearly the same level as the steel rail business; that is, it will get down to very nearly the cost of manufacture.

There are no changes in other kinds of iron or steel except in old rails, which are still held very strongly: $23.50 we are told has been refused for T's and a higher figure is expected. Stocks are very low, as we reported last week.

We refer to our table of current quotations on another page for the prices of the different articles.

Louisville. Jan. 15.

[Special report by HALL BROTHERS & Co.]

There have been large sales made during the past week, and at figures that are regarded as unnecessarily low. One concern alone has purchased in the neighborhood of 20,000 tons of iron, and various other orders, ranging from car-loads to 1000 tons, have been placed. It is said that one holder of iron has sustained a heavy loss, having sold at bottom figures. It cannot be said as yet that buying is a general thing. It has been confined to a few of the leading class of consumers. Many of the buyers are still waiting developments and have displayed an unwillingness to anticipate into the future until next month.

Our quotations, which are cash f.o.b. cars Louisville, will be found in our weekly register of prices.

Philadelphia. Jan. 18.

[From our Special Correspondent.]

In spite of several very favorable influences at work in and around the iron market, business has not improved much this week. Every one in a position to know talks encouragingly. A large trade is promised at a very early day. Some big iron makers are predicting stronger prices before the 1st of March. Their reason for this is not very clear, but simply is that stocks of good iron are light and that between now and then a sharp and general demand will set in, for which makers of good brands can obtain better prices than are quoted to-day. The strongest point in the entire iron market is that there is a heavy consumption and no excessive production. One favorable probability is that a large amount of new work may set in, some of which will be in railroad construction. Best brands of crude iron are held very firm. Some little Southern iron is being offered but not selling. A few inquiries have just been received for foreign material but no sales have been reported.

All kinds of blooms are in irregular demand. Up to to-day full prices have been paid. There are no fears about a fall. The entire bar iron market is a little weaker. If any large business was promised it was held back to have this effect. Mill owners everywhere think that all will come out right. A great deal of the nail-making capacity is idle, and some additional capacity will be thrown off unless demand improves within the next two or three weeks. Skelp iron is weak, but a little business is being done. Only small orders have been booked during the past six days for wrought-iron pipes and tubes.

An improvement in the demand for heavy and light sheet is setting in. An improvement is also setting in for several kinds of merchant steel, particularly tool steel and sheet. The movement in plate iron is very light, but notwithstanding the scarcity of orders, manufacturers say that everything will turn out right within sixty days. The plate iron capacity of the State is very large and a dullness of a week or three weeks soon shows itself in weak prices.

Structural iron is quiet as to orders, but a great deal of business is getting into shape. There will be large buyers for material in the market during February and March if some financial obstacles are disposed of to the satisfaction of promotors of several large schemes. Very little business has been done in steel rails, and prices are being shaded from $28; how much less it is impossible to ascertain. There is a great deal of material being worked up in the smaller shops and factories of the country. See table of prices current for quotations.

Pittsburg. Jan. 17.

[From our Special Correspondent.]

Raw Iron.—The past week was far from a satisfactory one. Dealers seem to be further apart than at date of last report, and transactions show a falling off. The principal difficulty at present seems to be the uncertainty of prices. Margins have been narrowed down to such an extent that fractional changes in prices for the raw material often change the account from profit to loss or *vice versa*. Another reason for the indisposition to enter into new engagements is the continued large production, particularly of pig-iron, while consumption is said to be gradually decreasing, without any certainty as to what its proportion will be when business is again under full headway. At the same time, there are dealers who differ from the opinion noted above. Producers have this to say: the present output is not at all in excess of the probable requirements for the coming four or five months. They are, therefore, not willing to make concessions, because they feel warranted in present prices, and there is no room for any decline considering the present cost of labor and materials. A report was in circulation that a good deal of work is being held back, and mill men and founders are, therefore, slow about covering forward requirements. It is too soon to form any definite opinion with regard to the probable course of events during the next three or four months, but so far developments have not been as favorable as many in the trade seem to have expected.

While pig-iron shows no quotable change, there seems to be a little softening at both extremes of the market. At the same time certain dealers are not disposed to make concessions on standard or favorite brands. We have sales of gray forge reported at last week's prices. Bessemer holds its own. Old rails are off. Charcoal and native ores unchanged.

Coal and Coke Smelted Lake Ore.	
1500 Tons Bessemer, Spot	16.75 cash.
1500 Tons Gray Forge	15.50 cash.
1000 Tons Bessemer, January and February	16.90 cash.
1000 Tons Bessemer, January and February	16.90 cash.
500 Tons Bessemer, January and February	16.90 cash.
1000 Tons Bessemer, January	16.85 cash.
500 Tons Gray Forge	16.50 cash.
200 Tons No. 1 Mill	15.50 cash.
200 Tons Mottled	15.00 cash.
100 Tons No. 2 Foundry	17.00 cash.
Coke, Native Ore.	
500 Tons Gray Forge	15.25 cash.
100 Tons Gray Forge	15.50 cash.
75 Tons No. 2 Foundry	16.25 cash.
60 Tons Mottled and White	15.00 cash.
50 Tons No. 2 Foundry, all ore	17.50 cash.
50 Tons No. 1 Foundry	17.75 4 mo.
Charcoal.	
65 Tons No. 1 Foundry, H. R.	24.50 cash.
25 Tons Cold Blast	27.75 cash.
50 Tons No. 2 Foundry	22.00 cash.
Steel Slabs and Billets.	
500 Tons Billets	28.00 cash.
500 Tons Nail Slabs	27.50 cash.
200 Tons Billets	28.00 cash.
Muck Bar.	
1000 Tons Neutral, January and February	28.50 cash.
500 Tons Neutral, Spot	28.25 cash.
500 Tons Neutral,	28.50 cash.
Ferromanganese.	
200 Tons Imported February and March, 80 per cent	56.00 cash.
100 Tons Imported February 80 per cent	55.50 cash.
Steel Wire Rods.	
500 Tons February and March	40.00 cash.
Steel Bloom Ends.	
500 Tons Bloom Ends	19.25 cash.
Old Iron Rails.	
800 Tons American Ts	23.50 cash.
400 Tons American T's	24.00 cash.
200 Tons City Passenger Rails	22.50 cash.
Scrap Material.	
200 Tons No. 1 Wrought Scrap, net	21.00 cash.
150 Tons No. 1 Cast Scrap, gross	16.00 cash.
150 Tons Wrought Turnings, net	14.00 cash.
150 Tons Cast Borings, gross	12.50 cash.
175 Tons Leaf Steel, net	23.00 cash.
100 Tons Old Iron Axles, net	28.00 cash.
300 Tons Old Iron Rails, T's, gross	25.00 cash.

FINANCIAL.

NEW YORK, Friday Evening, Jan. 18.

The new year has brought no activity in the mining market, which continues to be dull. The prices remain unchanged and in a few cases only show an advance.

The committee representing the interests of some stockholders in the Phœnix Mining Company, of Arizona, have issued another circular, from which we take the following: "Details have been obtained respecting the suit under which an attempt has been made to sell the mine and extinguish the rights of the stockholders. It would seem that a claim amounting to $13,000 was made against the company by the lessees of the mine for advances. As the lessees worked the mine on royalty, and since it is further known that up to a recent time they have kept it and the stamp mill running on more than full time, it is very difficult to see how such a claim should have originated. It also appears that the suit was not defended properly by the existing management of the corporation. A mere formal defense was interposed, and there is ground for saying the court indicated some unwillingness to grant the judgment. The sale of the property has now been postponed until the 1st of February. The committee will pursue their investigations, and have, from the facts which came into their possession, little doubt of their ability to not only open the judgment, but that a rigid examination of the operations of the mine under the lease will result in disclosures of the highest value and importance. To pursue these objects to a successful conclusion,

and to protect rights of the stockholders, the committee needs sufficient funds for the necessary expenses. So far, a number of owners of stock have responded to the call for a voluntary contribution of five cents per share for that purpose. The co-operation of all interested is necessary to success, and the committee feel assured that in any readjustment that is made, the disposition of all concerned would be to provide in some form for the reimbursement of contributions made to this end.

"Those who have not sent in their assessment of five cents per share must do so on or before January 21st, 1889, to secure protection for their stock."

Signed, S. W. Curtis, Charles I. Hardy, Henry E. Wallace, Committee.

Messrs. Marbury and Fox, of this city, are also conducting an investigation. They are retained by a stockholder, Mr. John Bloodgood, to look after his individual interests. Although working independently Messrs. Marbury & Fox state that they are in consultation with the stockholders' committee. A rumor, started by one of the daily financial papers, was to the effect that the present agitation was simply for the scaring of stockholders into parting with their shares. When questioned in regard to this, Mr. S. W. Curtis said that it was extremely absurd, and that on the contrary the stock had risen in value since the investigation was begun.

Negotiations are going on, from which it is probable that this Phœnix property will be provided with a working capital sufficient to put up a large mill, and a change in the management of the compny is also probable. Should our anticipations be confirmed, the stock would probably increase considerably in value. The mine appears to have improved on development and the mill returns show a fair grade.

The Homestake Mining Company has declared its usual monthly dividend of $25,000, making a total paid to date of $4,318,750. One sale of the stock was made during the week at $12. Caledonia was firm at $3. Iron Hill appeared to-day, selling at 11c. Sullivan Consolidated show sales amounting to 20,884. The price was firm all week at from 64 to 68c. To-day it advanced to 75c.

Alice shows one sale at 80c.

Shoshone shows a sale at 8c.

Buffalo Iron Mining shows an upward tendency, going from $5 to $5.38, selling to day at $5.38.

The Daly Mining Company has just announced its monthly dividend of $37,500, making the total dividends paid to date $900,000. Ontario continues firm at from $33.88 to $34.50. Horn-Silver was quiet and declined from 80 to 76c. Parties interested in this stock will find a report of the condition of the mine in our Mining News column.

Silver King was actively dealt in and advanced from $1 to $1.25 but later declined to $1.10 to $1.15. We publish elsewhere the financial statement presented at the annual meeting.

Consolidated California & Virginia was not dealt in until Tuesday, and then was actively dealt in at from $8.88@$9.50. Hale & Norcross shows a sale at $5.38. Sierra Nevada at from $3.45@$3.65. Bullion at $1.90@$1.95. Julia at 50c. Union Consolidated at $3.25.

Operations in the Tuscarora district are being carried on vigorously, and the prospects at many of the mines are very favorable, but little is doing in the stock of the companies in this market. There was only one sale of Belle Isle at 37c., and one of Grand Prize at 90c. Barcelona, which last week declined to 62c., was this week dealt in at from 65 to 67c.

The Amador stocks show again the usual business, with but little change in the prices. Amador, which on Friday sold at $1.50, advanced to $1.75 and $2 on Saturday, and since then has sold at the latter figure. Astoria was dealt in all week at 24c. until Thursday, when sales were made at 25c. Hollywood sold at 2@3c. Middle Bar remained firm at 35c.

Quicksilver Preferred did not appear on the list until yesterday, when sales were made at from $36.13 to $36.38. To-day sales were made at $36, and of Common at from $6 to $6.50.

Brunswick shows one transaction at 7c.

Plymouth Consolidated was neglected at $8.50 all week; to day a few sales were made at from $8.50 to $8.63.

The Bodie stocks are practically dead in this market. Bodie shows no sales, Bulwer one at 50c., and Standard one at $1.

There was little doing in the Colorado stocks. Lee Basin shows a few sales at from 60 to 70c.; Denver City at 12c. Cashier declined from 10 to 6c. Robinson Consolidated shows one sale at 80c. Plutus advanced from 90c. to $1. Little Pittsburg is down to 6c. Little Chief remains unchanged at from 19 to 21c. Iron Silver shows one sale at $3.20; Dunkin a few at from $1 to $1.05, and Adams at 25c.

Phœnix of Arkansas was quiet at 9@10c.

Rappahannock shows daily transactions at 6c. and 7c.

Kingston & Pembroke is neglected. The price which in the beginning of the week ruled at from $1@$1.13, declined to-day to 88c.

There is nothing doing in El Cristo. A few shares were sold at from 60 to 65c.

Colchis shows an advance from $2.75 to $2.95, at which price sales were made to-day.

United Copper holds its own at from $1 to $1.15.

Mutual was again actively dealt in and was firm at from $1.35 to $1.45, selling to-day at from $1.40 to $1.45.

The great Sutro Tunnel is at last to pass into the hands of owners who will be less encumbered financially than any of their predecessors have been for years past. The sale of the property in Virginia City on the 14th inst. has already been announced by press dispatches, but thus far no accurate description of the mode of reorganization has been published, and we are, therefore, pleased to present the following statement obtained from Mr. Theodore Sutro:

The sale of the property of the Sutro Tunnel Company under the decree of foreclosure granted by the United States Circuit Court was held in Virginia City, Nev., on the 14th inst. The property was bid in by Mr. Henry C. Dibble for the Union Trust Company of New York, which, in turn, is acting for the new Sutro Tunnel Company to be organized by the stockholders who have subscribed for the new bonds. The price paid was $1,325,000. About three fourths of the stockholders of the old company, together with a syndicate of bankers, had subscribed enough to buy the mortgage of McCalmont Bros., which in all amounted to over $2,000,000, although, owing to the intervention of Mr. Theodore Sutro and his unceasing efforts to save the property, the amount for which the decree was obtained was only about $1,450,000. However, as only $1,325,000 was paid, a judgment for the deficiency will be entered against the old company. As to the new company, it will start practically free from debt of any kind, except the new bonds, which will be issued to the extent of about $2,200,000. The proceeds of these bonds will satisfy the claims of those who have advanced the money with which to buy the McCalmont mortgage, as well as to pay the expenses attendant upon the reorganization. The receipts from the royalties alone for the month of December were $24,804, and there are rents and various other sources of income, which will enable the new company to make a very good showing. The reorganization will be completed and the new bonds issued in about six months' time, it is thought. By this reorganization the value of the old Sutro Tunnel stock is entirely "wiped out." The ENGINEERING AND MINING JOURNAL has frequently warned investors that the old stock would be absolutely worthless, but owing to the blind and usually fatal ignorance with which so many people enter into mining speculations, orders to buy it are coming in to mining brokers on the Consolidated Stock and Petroleum Exchange nearly every day. On Wednesday, for instance, a broker, acting on behalf of a customer, bid 7c. per share *at seller's option for 60 days* for 500 shares. Sutro Tunnel stock, though absolutely worthless, is still being dealt in at from 7@8c. The trust certificates sold at from 60@62c.

Last week we reported that at the Silver King meeting in San Francisco only 9000 shares were voted by Mr. Chisolm's representative. To an ENGINEERING AND MINING JOURNAL representative, Mr. W. F. Carey, of A. R. Chisolm & Co., said that the representative of the Eastern stockholders held 34,495 shares, and had it not been for the bad faith of the present management two Eastern directors would have been elected. Mr. Carey also stated that the last had not been heard of the affair yet. The records of the meeting show that the Eastern stockholders were represented by only 6575 shares.

Two memberships in the Consolidated Stock and Petroleum Exchange were purchased this week at $700 each.

Electric Stock Market.

The Thomson-Houston Electric Company is about issuing series C pool certificates. They will amount to $40,000, par $25, and will be offered to present stockholders, share for share, at $10. These certificates will be secured by $1,000,000 of sub-company securities, etc., placed in trust and managed for the benefit of this pool. This will yield the company $400,000. Beyond this it is proposed to issue $1,000,000 7 per cent preferred stock, one half to go to the present common shareholders (there are 40,000 shares) and the balance to be sold at the discretion of the company. The common stock is quoted around 120 (par 25), and receives no dividends except that which comes through the pool certificates.

The following are the latest quotations, prepared exclusively for the ENGINEERING AND MINING JOURNAL by Messrs. Crosman & Quick, brokers, New York city: Edison, $180@$190; Edison Illuminating, $95@$98; Brush, $70@$80; Brush Illuminating, $85; United States, $20@$30; United States Illuminating, $40@$50; Daft, $40@$60; Consolidated, $48@$50; Westinghouse, $36@$38.

Auction Sale of Stocks.

The following securities were sold at public auction in New York City this week:

Company.	Amount sold. Shares.	Par value.	Price.
Bassick Mg. Co., Colo	100	$1	9c. per sh.
Big Pittsburg Mg. Co. (old)	200	....	$2 for lot.
Brush Elect. Ill. Co.	25	100	$85 per sh.
Central Ariz. Mg. Co., Ariz.	200	10	4c. per sh.
Cumberland Iron & Coal Co.	50	100	$13 per sh.
Coaldale Coal Co.	220	100	10c. per sh.
Horn Silver Mg. Co., Utah	400	25	80c. per sh.
Julien Elect. Co.	20	50	$24 per sh.
Standard Oil Trust	50	....	$161¼ per sh.
Stormont Mg. Co., Utah	1100	1	4c. per sh.
Sutro Tunnel Co.	100	10	7c. per sh.

Pipe Line Certificates.

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

The oil market this week has had a declining tendency, and there has been considerable liquidation of long oil. The principal reason for selling is fear of Ohio oil, concerning which we can give the following, which we think is reliable information:

The Buckeye Pipe Line, a Standard company, handles perhaps 90 per cent of the Lima oil, and the Lima Oil Company and the Natural Gas Oil Company the remainder. A gentleman who is notoriously an employé of the Standard, is purchasing largely of developed oil territory and leasing undeveloped territory. The oil sells at 15 cents at the wells and at 40 cents loaded on the cars. The Standard Oil people all assert that a good burning oil cannot be made out of the Ohio crude, but the stacks from twenty stills are belching out smoke without cessation, no oil is barreled or inspected there, no visitors are invited to the refinery, and retail dealers are supplied from Cleveland. Our information from Lima is that cars loaded with what is supposed to be Pennsylvania crude are frequent visitors to the Standard refinery, from which it is deduced that the Pennsylvania product is used to enrich the Ohio crude.

The pumps on the pipe line from Lima to Chicago are seldom idle, and are presumed to be pumping oil to Chicago. The Eagle refinery, an independent one, has been in operation there over two years, and they are running night and day and shipping all the various products of petroleum to all parts of the country. They are selling oil in large quantities, both in barrels and bulk. Any reputable person can visit their works, and they assert that they make a good illuminant, even if the Standard cannot. Lima people say that they can scarcely reconcile the expensive storage arrangements constantly being added to, and amounting to ten or twelve million barrels, if the article has no other value than for fuel, and that as yet purely experimental. The best judgment of Ohio observers is that the territory at Lima is capable of ten times its present output.

NEW YORK STOCK EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Jan. 12	86	86⅜	85⅝	86¼	164,000
14	86⅛	87¼	86¼	86¼	236,000
15	86⅜	86⅜	84¾	85¼	783,000
16	85¼	85½	85	85½	230,000
17	85½	85½	84½	84⅝	251,000
18	84⅝	84¾	83⅞	83⅞	364,000
Total sales in barrels.					2,028,000

CONSOLIDATED STOCK AND PETROLEUM EXCHANGE.

	Opening.	Highest.	Lowest.	Closing.	Sales.
Jan. 12	86	86⅜	85⅝	86⅜	411,000
14	86¾	87	86	86⅛	606,000
15	86⅛	86¼	84¾	85¼	1,626,000
16	85⅛	85½	85⅛	85⅛	290,000
17	85½	85⅜	84¼	84¾	1,082,000
18	84¾	84⅞	83¾	83⅞	1,736,000
Total sales in barrels					5,751,000

IMPORTS AND EXPORTS OF METALS AT NEW YORK JANUARY 8th TO JANUARY 12th, 1889.

IMPORTS.

Spelter.	Tons.
American Metal Co	56
Nickel.	**Pounds.**
McCoy & Sanders	11,240
Antimony.	**Casks.**
Total	190
Tin.	**Tons.**
American Metal	17
Bidwell & French	28
Daval & Son, John	11
Hendricks Bros	7
Lehmarer, S. & Co	11
Naylor & Co	28
Phelps, Dodge & Co	112
Thomsen & Co., D	11
Tin Plates.	**Boxes.**
Bruce & Cook	2,666
Central Stamp. Co	4,572
Coddington & Co	9,714
Cort & Co., N. L	1,751
Corbier, F. & S	832
Crooks & Co	669
De Milt & Co	400
Dickerson, V. D	15,610
Iron Clad M. Co	40
Lalance & Grosjean	1,360
Lombard, Ayres	1,389
Merchant & Co	308
Mersick & Co	356
Morewood & Co	733
Phelps, Dodge & Co	15,853
Pratt Mfg. Co	5,809
Shepherd & Co	861
Somers Bros	394
Thomsen & Co., A. A	11,156
Wheeler & Co	345
Whittemore & Co	809
Pig Iron.	**Tons.**
Crocker Bros	300
Page, Newall & Co	50
Pope, J. E., Jr	100
Stetson & Co	200
Williamson & Co	200
Steel Sheets, Billets, Forging, etc.	**Tons.**
Abbott & Co	24
Bowker, C. F	9
Carey & Moen	46
Carter, G. F	200
Crenshaw, Hugh	25
Crooks & Co	51
Curran, J	5
Downing & Co	18
Erie Despatch	40
Hugill, Chas	8
Lalance, G. Mfg. Co	34
Leng's Sons, J. S	2
Lundberg, G	50
Milne & Co	199
Naylor & Co	20
Newton & Shipman	4
Oelrich & Co	91
Pierson & Co	2
Pilditch, F. S	7
Prosser, Thos	60
Wagner, W. F	27
Wallace & Co	5
Wolff, R. H	14
Bar Iron.	**Tons.**
Abbott & Co., J	175
Downing & Co	200
Steel and Iron Rods.	**Tons.**
Carey & Moen	52
Dana & Co	156
Downing & Co., R. F	125
Heyn, A	52
Lilienberg, N	1
Lundberg, G	56
Muller, Schall & Co	202
Naylor & Co	375
Wolf & Co	150
Wright, P. & Co	3
Old Rails.	**Tons.**
Perkins, C. L	310
Scrap Iron.	**Tons**
Burgass & Co	162
Spaulding, A. B. & Co	172
Ward & Co., J. E	20
Sheet Iron.	**Tons.**
Coddington & Co	24
Spiegeleisen.	**Tons.**
Dana & Co	50
Jansen, J. A	758
Perkins, C. L	101
Iron Ore.	**Tons.**
Earnshaw, A	226

EXPORTS.

Copper.	Pounds.
American Metal Co	78,000
Hurst, F. W. J	113,000
Naylor & Co	112,000
Copper Matte.	**Pounds.**
Abbott & Co	271,507
American Metal Co	484,629
Henriott, F	875,84

CURRENT PRICES.

CHEMICALS.

Acid—Acetic, ℔ 100 lbs..... 2.00@2.25
Muriatic, 18°, ℔ 100 lbs ..... 1.15@1.20
Muriatic, 20°, ℔ 100 lbs..... 1.35@1.50
Nitric, 36°, ℔ 100 lbs ..... 4.00@5.50
Nitric, 42°, ℔ 100 lbs..... 5.50@7.00
Oxalic, ℔ 100 lbs..... 8.50@9.00
Sulphuric, 60°, ℔ 100 lbs. ..... 90@95
Sulphuric, 66°, ℔ 100 lbs ..... 95@1.25
Alkali—36 p. c..... 1.12½@1.15
48 p. c ..... 1.25@1.27½
Refined, 58°..... 1.15@1.25
Alum—Lump, ℔ lb..... 1¾
Ground, ℔ lb..... 1¼@2
Lump ℔ ton, Liverpool £4 17 6
Sulphate of Alumina, ℔ ton..... £4 10
Aqua Ammonia—18°, ℔ lb..... 4¾
20°, ℔ lb..... 6
22°, ℔ lb..... 6@7
26°, ℔ lb..... 10@11
Ammonia—Sul., ℔ 100 lbs.. 3.35@3.45
Carb., per lb..... 7¼@8
Muriate per lb..... 6¼@8
Arsenic—White, powdered, ℔ lb...3@3¼
Red, ℔ lb..... 5¼@5¾
White, at Piymouth, ℔ ton. £11 10
Asbestos—Am., p. ton..... $50@$300
Italian, p. ton, c. i. f. L'pool..... £18
Asphaltum—P. ton 13.00
Prime Cuban, ℔ lb ..... 4½@5½c.
Hard, ℔ ton..... $28.00
Trinidad, refined, ℔ ton..... $30.00
Barytes—Sulph., Am. prime white17.00
Sulph., foreign, floated, p. ton....20.00
Sulph., off color, p. ton 13.00
Carb., lump, f.o.b. L'pool, ton ... £6 5 0
No. 1, casks, Runcorn " " £4 10 0
No 2, bags, Runcorn " " 3 15 0
Bleach—Over 35 p.c., ℔ lb. 1.87½@2.12½
Borax—℔ lb 9¼
Refined at Liverpool, ℔ ton..... £29
Brimstone—*See Sulphur.*
Bromine—℔ lb..... ....37@38
Chalk—℔ ton..... 3.15
Precipitated, ℔ lb..... 5
China Clay—English, ℔ ton13.50@18.50
Southern, ℔ ton..... 13.50
Chrome Yellow—℔ lb ..... 10@25
Cobalt—Oxide, ℔ lb..... ..2·60@2·90
Copper—Sulph. English Wks.,ton£24 10s.
Precip., Eng. Wks, unit. ..fluctuating
Copperas—Common, ℔ 100 lbs... 62½
Best, ℔ 100 lbs..... ....75@1.00
Liverpool, ℔ ton, in casks .....£1 15s.
Cream of Tartar—Am. 99%....31@31¾
Powdered, 99 p. c..... 31¾@32½
Emery—Grain, ℔ lb 4
Flour, ℔ lb 2½
Feldspar—Ground, ℔ ton..... 15.00
Fuller's Earth—Lump, ℔ bbl. .90@95
Powdered, ℔ lb..... ....1¾@2
Gypsum—Calcined, ℔ bbl. 1.25
Iodine—Resublimed..... 3.50
Kainit—℔ ton..... .... 9.75@10.50
Kaolin—*See China Clay.*
Lead—Red, ℔ lb. ..... 8½@9
White, American, in oil, ℔ lb....6¾@7
White, English, ℔ lb 7½
Acetate, or sugar of..... 13@13½
Lime Acetate—Amer. Brown.1.00@1.05
" Gray..2.00@2.10
Litharge—Powdered, ℔ lb. ..6½@6¾
English flake, ℔ lb..... .9@9½
Magnesite—Greek, ℔ ton..... ....10.00
Manganese—lump,c.i.f.L'pool 62s. 6d.
Per unit, upon down..... ..... 1s. 6d.
Ground £5 17
Mercuric-Chloride—(*Corrosive Sublimate*) ℔ lb..... ... 65@67
Mineral Wool—℔ lb..... 2
Mica—In sheets according to size,
1st quality, ℔ ℔.....25@$6.00
Phosphate Rock—S. Carolina,
per ton f. o. b. Charleston. 5.00@6.00
Ground, ex vessel New York.10.00@10.50
Canadian Apatite, lump, f. o. b. at
shipping port, ℔ unit..... .. 24
Phosphorus—℔ lb..... .. ....70@75
Plumbago—Ceylon, ℔ lb. ..... 4@5
American, ℔ lb..... 5@7
Potassium—Cyanide, ℔ lb.... .39@40
Bromide, ℔ lb..... 33
Chlorate, ℔ lb. ....15@15½
Carb. ℔ lb ....4.70@5.50
Caustic, ℔ lb..... 7½@8
Iodide..... .2.70@2.75
Muriate, ℔ 100 lbs..... .....1.80@1.85
Nitrate, refined, ℔ lb..... .. 6
Bichromate, ℔ lb .... 11¼@12
Sulphate, ℔ 100 lbs..... .. 2 30
Yellow Prussiate, ℔ lb..... 19
Red Prussiate, ℔ lb..... ..... 45@45
Pumice Stone—Select lumps, lb. 3¼
Original cks., ℔ lb..... ..... 1¾
Powdered, pure, ℔ lb..... .... 2¼@2½
Pyrites—Non-cupreous, p. unit, s. 5d.
Quartz—Ground, ℔ ton..... 18.00
Rotten Stone—Powdered, ℔ lb..3¼@3½
Lump, ℔ lb..... ..... 6@10
Eng., powdered, ℔ ton. £4
Lump, ℔ ton..... £5
Salt—Liverpool, ground ℔ bbl. . 75@80
Turk's Island, ℔ bbl..... .30@33
Salt Cake—℔ 100 lbs..... .50@57
Saltpeter—Crude, ℔ lb..... .. 5@5½
Refined, ℔ lb..... .... 6@8
Soda Ash—Carb.,48 %100 ℔...1.25@1.35
High test..... ... 1.12½@1.15
Caustic, 48 %..... .....1.26¼@1.35
Soda Caustic, 60%..... 2 40@2 65
" " 70%..... 2.25 @2.35
" " 74-5%..... 2.25 @2.35
Sal, English, ℔ 100 lbs.... .95 @1.00
Sal, American, ℔ 100 lbs .... .95 @1 20
Nitrate, ℔ 100 lbs..... .... 2.32½@2.40
Strontium—Nitrate ℔ lb. ..... 9@9½
Sulphur—Roll, ℔ lb..... .... 1¾
Flour, ℔ lb 2
Crude Brimstone, 2s., ℔ ton.20.00@21.00
Crude Brimstone, 3ds, ℔ ton.19.00@19.75
Talc—Ground French, ℔ lb .. ...1¼@1½
Domestic, ℔ lb ..... ¼
Domestic, ℔ ton..... ..... 15 00
c. i. f. Liverpool, ℔ ton..... £4 5 0
Tannin—Pure, ℔ lb. ....
Vermillion—American, ℔ lb.. .. 61
English, ℔ lb.. ..... 82@85
Vitriol—(Blue), Ordinary, ℔ lb. .5¾@6½
Extra, ℔ lb. ..... 6½@6¾
Zinc Oxide—Am., Dry, ℔ lb. 4½
Antwerp, Red Seal, ℔ lb..... .....6@6½
Paris, Red Seal, ℔ lb. ....6½@7
* Spot

BUILDING MATERIAL.

Bricks—Pale, ℔ 1,000 ..... 2.75@3.00
Jerseys, ℔ 1,000..... 6.00@6 50
Hackensacks, ℔ 1000..... 6.50@7.00
Up Rivers, ℔ 1000..... 6.50@7.00
Haverstraw seconds, ℔ 1000.. 6.75@7.00
Haverstraw firsts, ℔ 1,000.... 7.25@7.75
Fronts, nominal, ℔ 1000.
Croton..... 14.00@16.00
Wilmington..... 20.00@21.00
Philadelphia..... ..... 28.00@29.00
Trenton ..... @28.00
Baltimore..... 37.00@41.00
Building Stone—Amherst
freestone, ℔ cu. ft... ..... 95@1.00
Brownstone, ℔ cu. ft. ..... 1.00@1.35
Belleville, N. J., red and gray
rock, ℔ cu. ft. 1.00
Corncockle red freestone, ℔ cu.
ft..... 1 00
Granite, rough, ℔ cu.ft..... 45@1.25
Granite, Scotch ℔ cu ft.. 1.00@1.05
Cement—Rosendale, ℔ bbl 1.15@1.20
Portland, American, ℔ bbl... 2 15@2.45
Portland, foreign, ℔ bbl . . 2.10@2.40
Portland, " special brands.2.45@3.75
Roman, ℔ bbl. ..... 2.65@2.85
Keene's coarse, ℔ bbl..... 4.50@6.50
Keene's fine, ℔ bbl..... .. 7.00@9.25
Slate—Purple and green roofing, ℔ 100 ft..... 5.00@6.00
Red roofing, ℔ 100 sq. ft... .15.00
Black, roofing, ℔ 100 sq. ft.. 4.25@5.00
Lime—Rockland, common ℔ bbl... .1.00
Rockland, finishing, ℔ bbl..... 1.20
St. John, com. and finish, ℔ bb'. .... .90
Glens Falls, com. and fin., ℔ bbl .80@1.10
Labor—Ordinary, ℔ day..... 1.50@2.00
Masons, ℔ day..... 4.00
Plasterers, ℔ day..... ..... 4.00
Carpenters, ℔ day..... .... 3.50
Plumbers, ℔ day..... ..... 3.50
Painters, ℔ day..... 2.50@3.50
Stonesetters, ℔ day..... ...3.50@4 00
Tilelayers, ℔ day..... 3.50@4.50
Bricklayers, ℔ day..... 4 00

THE RARER METALS.

Aluminum—(Metallic), per lb...$6.00
Arsenic—Metallic, per lb..... 32
Barium—(Metallic), per lb.....975.00
Bismuth—(Metallic), per lb..... 2.40
Cadmium—(Metallic), per lb....150.00
Calcium—(Metallic), per oz..... 1.50
Cœsium—(Metallic).....
Cerium—(Metallic), per oz..... .160.00
Chromium—(Metallic), per lb...200 00
Cobalt—(Metallic), per lb..... 6.00
Didymium—(Metallic), per oz...160.00
Erbium—(Metallic), per oz.... ...140.00
Gallium—(Metallic), per oz 3250.00
Glucinum—(Metallic) per oz ...250.00
Indium—(Metallic), per oz..... 158.00
Iridium—(Metallic), per lb.. .. 650.00
Lanthanum—(Metallic), per oz.175.00
Lithium—(Metallic), per oz..... .160.00
Magnesium—Per lb..... ..... 4.00
Manganese—Metallic, per lb... 1.10
Molybdenum—(Metallic), per oz 6.00
Niobium—(Metallic), per oz.....128.00
Osmium—(Metallic), per lb 640.00
Palladium—(Metallic), per lb...400.00
Platinum—(Metallic), per lb. ..128.00
Potassium—Metallic, per oz... 2.00
Rhodium—(Metallic), per lb....512.00
Ruthenium—(Metallic), per oz..112.00
Rubidium—(Metallic), per oz...200.00
Selenium—(Metallic), per oz.. .. 3.00
Sodium—(Metallic) per lb. .. 4.50
Strontium—(Metallic), per oz..128.00
Tantallum—(Metallic) per oz...144.00
Telurium—(Metallic) per oz.... 9.00
Thallium—(Metallic) per oz..... 3.00
Titanium—(Metallic) per oz.....32.00
Thorium—(Metallic) per oz.....272.00
Tungsten—(Metallic) per lb..... 1.25
Vanadium—(Metallic), per oz..320.00
Yttrium—(Metallic), per oz 144.00
Zirconium—(Metallic), per oz..240.00

METALS.

Aluminum—
Bronze (10 %), ℔ ℔..... 46c.
Copper—
Lake Ingot, Spot, ℔ ℔.... .... 17¼c.
Electrolytic, ℔ ℔ .... 16·25c.
Casting Brands, ℔ ℔. .... 15¾c.
Chili Bars, London, ℔ ton .... £77 10s.
Sheet Copper (according to
size), ℔ ℔..... .....25 @38c.
G. M. B..... £77 10s.
Nickel.—
Metallic, per lb..... 46c.
Lead—
Domestic, Common, Spot.... 3·90c.
Foreign..... 4·50c.
Sheet, ℔ ℔, net ..... 7·25c.
Pipe, ℔ ℔ ..... 6¼c.
Tin lined Pipe, ℔ ℔..... 15c.
Shot, ℔ 25-lb. bag 1.16
Spanish Lead, London.. .. .. £13
Tin—
Tin Plates .... 13s. 6d.
Tin Spot in London ..... £97 10s.
Pig tin, spot in N. Y., ℔ ℔.. 21¾c.
Zinc—
Domestic spelter, ℔ ℔.... .. 5c.
Foreign spelter, ℔ ℔... .... 6c.
Silesian, ton..... £18 10s.
Sheet, American, ℔ ℔ .. .... 6¾c.
Antimony—Hallet's, per lb.... 11c.
Cookson's, per lb..... ..... 13c.
Star Antimony..... .... £45
Quicksilver—Per lb..... 60c.
London, ℔ flask..... £9 10s.

IRON AND STEEL.
New York Prices.

American Pig-Iron.—At tidewater.
No. 1 X..... ....$18.00@$19.00
No. 2 X..... .... 17.00@ 18.00
Forge .... 16.00@ 16.50
Scotch Pig—Coltness .. $20.50@$21.00
Clyde ..... 19 75@ 20.00
Dalmellington..... 19.75@ 20.00
Summerlee..... .....
Shotts... ..... 20.50@ 20.75
Langloan ....
By Cable to-day to the Metal Exchange :
Scotch Warrants..... 41s. 4d.
Coltness, at Glasgow .... 51s.
Langloan, at Glasgow ..... 50s.
Summerlee, at Glasgow..... 50s. 3d.
Gartsherrie, at Glasgow..... 48s. 6d.
Glengarnock, at Ardrossan..... 48s.
Dalmellington, at Ardrossan..... 44s.
Eglinton, at Ardrossan ... .42s. 6d.
Bessemer Pig—
Foreign, nominally.....
Domestic " ..... 17 60@ 18.00
Spiegeleisen—
German, 20 per cent..... .....
English, 20 " " ..... 28.00@ 28.75
" 30 " " ..... 33 00@ 34.00
Ferro Manganese, 80%.... 55.00
Steel Blooms, nominally ....
Steel Billets, " 31.00@ 35.00
Steel Nail Slabs, " 28.50@ 29.00
Steel Wire Rods, " 41.00@ 41.25
Steel Rails—
Heavy sections, at mill.... 28.00@ 28.00
Light " " ..... 30.00@ 32.00
Structural Iron and Steel—
Bridge Plate, at mill.. .....2·0 @2·1c.
Angles, at mill ..... 2·00@2·10c.
Tees, at mill..... 2·40@2·60c.
Steel Angles, at mill..... 2¼ @2½c.
Beams and Channels, on wharf, 2·8c. base.
Steel Plates—
Tank and Ship, on wharf..... 2¾@2½
Shell, on wharf..... .... 2¾@3
Flange, " ..... 3 @3¼
Fire-Box, on wharf..... 3¼@4
Iron Plates—
Common tank, on wharf....2·1@2·2c.
Refined, on wharf..... 2·3@2·4c.
Shell, " ..... 2·4@2½c.
Flange, " ..... 3·4@3·5c.
Extra flange, on flange..... 3¾@4
Bar Iron—
Refined..... 1·8@2·0c.
Common ..... 1·7@1·8c.
Merchant Steel—
American tool ..... 8¼@10c.
Special grades..... 13 @20c.
Crucible machinery ..... 5 @6c
" spring..... .... 4½c.
Bessemer machinery..... 2·0@2·5c
" spring. ..... 2·7@2·9c.
Cast-Iron Pipe—At works:
According to size..... $25.00@$31.00
Wrought-Iron Pipe—nominal—
Butt-Welded, Plain and Tarred, 52½% disc; Galv., 42½% disc.
Lap-Welded, Plain and Tarred, 62½% disc Galv., 52½% disc.
Boiler Tubes—Per cent disc..60@62½%
Rail Fastenings—
Spikes..... ..... 2·1@2·15c. delv'd
Angle Fish-bars..... .1 85@2c.
Bolts and Sq Nuts.....2·9 @3c
" Hex. " .....3·1 @
Wrought Scrap—
Foreign, *ex store*..... @
No. 1 Yard *to vessel*..... 20.50@ 21.50
Cast Scrap .... 15.50@ 16.50
Old Car Wheels..... .. 17.00@ 18.00
Old Rails—Tees ... . 23.00@ 23.50
—Doubles ....@ 25 00
Nails—In car-load lots. .. 1·8 @ 1 9c.
—From store ... 1·85@ 1·95

Louisville Prices.

Hot Blast Irons—
So. Coke, No. 1.....$15.75@$16.00
" " No. 2..... 15 00@ 15.50
" " No. 2½ ..... 14.50@ 15.00
Mahoning Valley (Lake Ore
Mixture) ..... 20.00@ 20.50
So. Charcoal, No. 1..... 17.50@ 18.00
" " No. 2..... 16.00@ 16.50
Missouri Charcoal No. 1.... 18.50@ 19.00
" " No. 2.... 18.00@ 18.50
Forge Irons—
Neutral Coke..... $14.25@$14.50
Cold Short ..... 14.00@ 14.50
Mottled..... 12.75@ 13.75
Car Wheel and Malleable Irons—
Southern (standard brands).$22.50@$23.00
" (other brands)..... 18 00@ 18 50
Lake Superior..... 22.50@ 22.50

Pittsburg Prices.

Coke or Bituminous Pig—
Foundry No. 1..... ...$17.50@18.00
Foundry No. 2..... .... 16.25@17.00
Gray Forge No. 2..... 15.25@15.50
" " No. 4... .... 15.25@... ...
White .... 15.00@... ..
Mottled..... 15.00@.....
Silvery .... 16.50@18.50
Bessemer..... 16.75@17.00
Low Phos..... 21.00@.....
Charcoal Pig—
Foundry No. 1. ..... 23.50@24.50
Foundry No. 2..... .. 22.00@23.50
Cold-Blast..... .... 25.00@28.00
Warm-Blast..... .... 24.00@25.00
20 p. c. Spiegel..... 27.50@28 00
Muck-Bar..... .... 28.25@28.50
Steel Blooms..... .... 28 00@28,50
Steel Slabs .... 27.75@28 00
Steel Crop Ends..... .... 19.00@19.50
Steel Bloom Ends..... .....@19.50
Ferro Manganese, 80%.. . ... 55.00@56.00
Steel Billets..... 27.50@28.00
Old Iron Rails..... .. 24.00@24.50
Old Steel Rails..... .... 18.50@19.50
No. 1 W. Scrap..... .... 21.00@.....
No. 2 W. Scrap.. .... 18.50@19.00
Steel Rails..... .... 28.00@.....
" light sections..... 28.00@31.00
Bar Iron., nominal..... 1.75@ 1.80
Nails .... $1.90 usual discount
Steel Nails..... ..... $1 90
Wire Nails..... 2.55
Two per cent off for cash. * At works

Philadelphia Prices.

Foundry No. 1..... $18.00@19.00
Foundry No. 2. ..... 17.00@17.50
Gray Forge..... 15.50@16.50
Bessemer Pig..... ..... 20.00@.....
Steel Rail Blooms..... 29.50 nom
Foreign Bessemer..... 20.00@ .....
Spiegeleisen. ....@27.00
Scrap, Selected..... 22.00@22 50
No. 1..... .... 21.00@22 00
Cargo Scrap..... ... . 20.00@21.00
Muck-Bars.. ... .@29.00
Merchant Iron..... .... 1.70@ 1.90
Plate Iron..... .... 2.00@.....
Tank Iron ..... 2.00@ 2.15
Skelp Iron..... .... 1.80@ 1.85
Angles..... .... 2.00@.....
Beams and Channels..... .. 2.80@.
Nails .... 1.70@ 1.9
Steel Rails..... .... 28.00@.....
Old Rails..... 23.50@.....

STOCK MARKET QUOTATIONS.

Baltimore, Md.

COMPANY.	Bid.	Asked.
Atlantic Coal....	1.25	1.40@1.90
Balt. & N. C.....	.20@.23	.23@.25
Big Vein Coal...	...	200
Conrad Hill	...	15
Diamond Tunnel	35	.40@.42
George's Crk. C.	105.00	115.00
Lake Chrome	.05	.07@.09
North State(Balto.).	15@.20	...
Silver Valley	.45@ 50	.55@.70

Highest and lowest prices bid and asked during the week ending January 17th.

Birmingham, Ala.

COMPANY.	Bid.	Asked.
Ala. Conn. C..	....	$27
Ala. R. Mill Co.	....	100
*Alice Furnace.	$99½	....
Bess. Land Co.	$22@$22½	$23¼@$23¾
Bir. Fur. & Mg.	$10	$16@$20
Broken Arrow.	....	$12¾
Decat. L. Imp.	$13¼@$14	$13¾@$14½
DecaturMin. L	....	$23@$25
Enterprise Mfg.	$20	$50
*Eureka	$98½	....
Hen. S. & M. Co.	$119@$140	$122@$144
Jagger-Townley	$5	....
Mag-Ellen.....	$87½@$89	....
*Mary Pratt...	....	$102
††Sloss I. & S...	....	$89½
†Sloss I. & S....	$57	$60
Tenn. C. & I. Co.	$34@$35	....
*Williamson ...	$99¾	....
Woodstock I. Co.	$51½@$55	....

Sales during the week ended Jan. 15th.
Bessemer Land Co.. 170 shs. $22¼@$23.
Decatur Land Imp. . 50 shs. $13¾@$13¾.
Henderson S. & M. Co. 288 shs. $118@$150.
* Bonds. †† First mortgage. † Second mortgage.

Highest and lowest prices bid and asked during the week ending Jan. 15th.

Pittsburg, Pa.

COMPANY.	H.	L.	Closing.
Allegheny Gas Co.	36.00	35.00	36.00
Bridgewater Gas.	48.00	40.00	40 00
Chartiers Val. Gas.	57.50	50.00	56.00
Columbia Oil	4.00	4.00	4.00
La Noria Mining ..	1.50	1.25	1.38
Lutre Mining.....	12.50	7.50	12.50
Manuf'urers' G. Co.	27.00	23.00	26.00
Nat. Gas of W. Va.	60.00	57.00	57.00
Penn Gas Co.	15.00	15.00	15.00
Ohio Valley Gas...	35.00	35.00	35.00
Philadelphia Co...	40.25	39.25	39 50
Tuma Oil Co..... ..	63.00	63.00	63.00
Washington Oil...	70.00	65 50	65.50
West'house A.B.Co.	118.00	118.00	118.00
" B.Co.Lm.	63.00	60.00	60.00
Wheeling Gas ...	30.00	28.38	29.63

Highest and lowest prices bid and asked during the week ending January 15th.

Foreign Quotations.

COMPANY.	London. Highest.	January 5. Lowest
Alturas Gold, Idaho...	4s. 9d.	4s. 3d.
Arizona Copper, Ariz..	18s. 6d.	18s.
Birdseye Creek.....	3s. 6d.	2s. 6d.
Callao Bis , Venz.....	12s. 6d.	11s. 6d.
Carlisle, N. Mex	9s. 6d.	8s. 6d.
Colorado United, Colo..	4s.	3s.
Columbian, S. A.....	34s.	32s.
Comstock, Utah..... ..	£1¼	£1⅛
Cons. Esmeralda, Nev..	6s.	5s. 6d.
Denver Gold, Colo.....	2s. 3d.	1s. 9d.
Dickens Custer, Idaho.	5s. 3d.	4s. 9d.
Eberhardt, Nev	2s.	1s.
El Callao, Venezuela....	£3¼	£2¾
Empire, Mont	£¾	£⅝
Flagstaff, Utah.....	4s. 3d.	3s. 9d.
Garfield, Nev.....	13s. 6d.	12s. 6d.
Gold Hill, N. C.....	1s 3d.	9d.
Ilex, Cal.....	£⅜	£⅛
Josephine, Cal	6s.	4s.
Kohinoor, Colo.....	2s. 6d.	2s
Mason & Barry, Port...	£07/8	£05/8
Montana Lt., Mont	£2⅛	£1⅞
New California, Colo...	10s. 6d.	9s. 6d.
New Consolidated... ..	1s. 6d.	1s.
New Emma, S., Utah..	5s.	4s. 6d.
New La Plata, Colo...	2s.	1s 6d.
Pittsburg Cons.. Nev...	17s. 6d.	15s.
Quebrada, Venezuela..	£5½	£5
Richmond Con., Nev...	£3	£2¼
Ruby&Dunderberg,Nev	1s. 6d.	1s.
Russell Gold, N. C.....	3s.	2s
Sierra Buttes, Cal.. ..	£11-16	£9-16
United Mexican, Mex...	£3⅜	£3⅛
U. S. Placer, Colo.....	6s.	5s.
Viola Lt., Idaho	9s.	8s.
	*Paris.**	January 3
El Callao, Venezuela..	67.50	67.50
Golden River, Cal	400.00	400.00
" " parts.. .	62.50	62 50
Lexington, Mont.	105.00	105.00
" parts	4.25	4 25
Rio Tinto, Spain.....	637.50	637.50
Tharsis, Spain.. ...	151.25	151.25

* Francs.

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 and amount of last.		
1	Adams, S. L.	Colo.	$1,500,000	150,000	$10	*				$555,000	Jan.	1887	.15
2	Alice, S. C.	Mont	10,000,000	400,000	25	*				775,000	Dec.	1888	.06¼
3	Alma Cons., G.	Idah.	300,000	30,000	10	*				45,000	Dec.	1888	.50
4	Alturas, G.	Idah.	1,500,000	300,000	5	....				262,500	Jan.	1888	37½
5	Amy & Silversmith, S.	Mon.	....	341,419	....	....				247,530	Aug.	1887	12½
6	Atlantic, C.	Mich	1,000,000	40,000	25	$280,000	Apl.	1875	$1.00	520,000	Feb.	1889	2.00
7	Argenta, S.	Nev..	10,000,000	100,000	100	325,000	July	1885	.10	40,000	Feb.	1880	.20
8	Aspen Mg. & S., S. L.	Colo.	2,000,000	200,000	10	*				120,000	Jan.	1888	.20
9	Aurora, I.	Mich	2,000,000	100,000	20	....				155,000	Oct.	1887	1.87½
10	Bassick, G. S.	Colo.	10,000,000	100,000	100	*				400,000	Mar.	1884	1.00
11	Belle Isle, S.	Nev..	10,000,000	100,000	100	145,000	Feb	1887	.20	300,00.	[illegible]	[illegible]	25
12	Belcher, G. S.	Nev..	10,400,000	104,000	100	2,770,000	Sept	1888	.50	15,397,200	Apl	1876	1.00
13	Bellevue Idaho, S. L.	Idah.	1,250,000	125,000	10	76,250	Nov.	1888	.15	187,500	Jan	1887	.10
14	Bodie Con., G. S.	Cal..	10,000,000	100,000	100	500,000	Sept	1888	.50	1,295,000	Apl.	1885	.50
15	Bonanza Developm't	C.&M	3,000,000	300,000	10	....				135,000	Oct.	1882	.15
16	Boston & Mont, G.	Mon.	2,500,000	250,000	10	*				520,000	Jun.	1888	.15
17	Boston & Mont., C.S.	Mon	2,500,000	100,000	25	*				400,000	Nov.	1888	2.00
18	Breece, S.	Colo	,000,000	200,000	25	*				2,000	Feb.	1880	.01
19	Brooklyn Lead, L. S.	Utah	500,000	50,000	10	....				127,000	July	1887	.05
20	Bulwer, G.	Cal.	10,000,000	100,000	10	80,000	May	1888	.20	175,000	Jan.	1884	.10
21	Bunker Hill & Sull.	Idah.	3,000,000	300,000	10	*				150,000	Oct	1883	.06⅔
22	Caledonia, G.	Dak.	10,000,000	100,000	100	505,000	May	1885	.15	64,000	Jan.	1889	.08
23	Calumet & Hecla, C.	Mich	2,500,000	100,000	25	1,200,000	..			31,850,000	Feb.	1889	5.00
24	Carbonate Hill S. L.	Colo.	1,500,000	200,000	10	*				80,000	Apl.	1884	.05
25	Carlisle, G.	N. M.	1,000,000	200,000	5	....				175,000	Dec.	1888	.12½
26	Castle Creek, G.	Idah.	100,000	100,000	1	....				51,000	Oct.	1883	.03
27	Catalpa, S. L.	Colo.	3,000,000	300,000	10	*				270,000	May.	1884	.10
28	Central, C.	Mich	500,000	20,000	25	100,000	Sept	1861	.06	1,930,000	Feb.	1889	2.00
29	Chrysolite, S. L.	Colo.	10,000,000	200,000	50	*				1,650,000	Dec.	1884	.25
30	Colorado Central, S. L.	Colo.	2,750,000	275,000	10	*				361,750	Feb.	1889	.05
31	Confidence, S. L.	Nev..	....	24,960	...	287,440	Apl.	1887	.50	174,720	Aug.	1888	1.00
32	Cons. Cal. & Va., G. S.	Nev.	21,600,000	216,000	100	108,000	Jan.	1885	.20	2,548,800	Jan.	1889	.50
33	Contention, S.	Ariz.	12,500,000	250,000	50	...				†2,587,000	Dec.	1884	.25
34	**Cop. Queen Cons, C.	Aris	1,400,000	140,000	10	....				140,000	Oct	1888	.50
35	Crescent, S. L. G.	Utah	15,000,000	600,000	25	*				228,000	Oct.	1888	.03
36	Crown Point, G. S.	Nev..	10,000,000	100,000	100	2,825,000	Oct.	1888	.50	11,588,000	Jan.	1875	2.00
37	Daly, S. L.	Utah	3,000,000	150,000	20	....				900,000	Jan.	1889	.25
38	Deer Creek, S. G.	Idah.	1,000,000	200,000	5	*				10,000	Oct.	1888	.05
39	Deadwood-Terra, G.	Dak..	5,000,000	200,000	25	*				§1,000,000	Nov.	1887	.10
40	Derbec B. Grav., G. S.	Cal..	10,000,000	100,000	100	90,000	Dec.	1881	.10	180,000	May	1887	.10
41	Dunkin, S. L.	Colo.	5,000,000	200,000	2	*				360,000	Jan.	1889	.05
42	Dunstone, G. S. L.	Mont	1,000,000	200,000	5	*				6,000	Nov.	1888	.03
43	Eclipse	Colo.	100,000	100,000	1	....				20,000	Nov.	1887	.10
44	Elkhorn, G. S.	Mont	1,000,000	100,000	10	50,000	July	1888	.50	170,000	July	1887	.05
45	Empire Lt., G.	Mont	500,000	100,000	5	....				70,500	Oct.	1887	.37½
46	Eureka Con., G. S. L.	Nev..	5,000,000	50,000	100	500,000	July	1886	1.00	4,955,000	July	1888	.25
47	Evening Star, S. L.	Colo.	500,000	50,000	10	*				1,412,500	Nov.	1888	.25
48	Excelsior, G.	Cal..	10,000,000	100,000	100	560,000	Sept	1885	1.00	875,000	Oct.	1880	.25
49	Father de Smet, G.	Dak..	10,000,000	100,000	100	200,000	Nov	1878	1.00	1,125,000	Dec.	1885	.20
50	Franklin, C.	Mich	1,000,000	40,000	25	220,000	Jun.	1871	....	800,000	Dec.	1888	2.00
51	Freeland, G. S. C.	Colo.	5,000,000	200,000	25	*				190,000	July	1886	.10
52	Fresno Enterprise, G.	Cal..	5,000,000	100,000	50	....	Mch	1883	.10	110,000	July	1882	.10
53	Garfield Lt., G. S.	Nev.	500,000	100,000	5	....				85,000	Apl.	1888	.12½
54	Golconda, G. S.	Idah.	1,000,000	100,000	10	....				120,000	May	1888	.60
55	Gould & Curry, G. S.	Nev..	10,800,000	108,000	100	4,337,400	Oct.	1888	.50	3,826,800	Oct.	1870	10.00
56	Grand Central, S.	Ariz.	1,000,000	100,000	10	....				625,000	Dec.	1882	.25
57	Grand Prize, S.	Nev..	10,000,000	100,000	100	595,000	Oct.	1888	25	495,000	Mar.	1884	.25
58	Granite, S. L.	Idah.	500,000	500,000	1	*				10,000	Jun.	1888	.02
59	Granite Mountain, S.	Mont	10,000,000	400,000	25	....				5,200,000	Oct.	1888	.50
60	Green Mountain, G.	Cal..	1,250,000	125,000	10	*				212,000	Nov.	1881	.07½
61	Hale & Norcross, G. S.	Nev.	11,200,000	112,000	100	5,086,000	July	1887	.50	1,822,000	Aug.	1888	.50
62	Hecla Con., S. G. L. C.	Mont	1,500,000	30,000	$50	....				1,257,500	Dec.	1888	.50
63	Hel'a Mg & Red, G.S.L.	Mont	3,315,000	663,000	5	*				197,970	July	1886	.06
64	Holmes, S.	Nev..	10,000,000	100,000	100	300,000	Sept	1885	.10	75,000	Apl	1886	.25
65	Holyoke, G.	Idah.	200,000	200,000	1	....				27,000	Feb.	1883	.10
66	Homestake, G.	Dak.	12,500,000	125,000	100	200,000	July	1878	1.00	4,318,750	Jan.	1889	.20
67	Honorine, S. L.	Utah	500,000	250,000	2	25,000	Jun.	1883	....	125,000	Sept	1887	.05
68	Hope, S.	Mont	1,000,000	100,000	10	*				233,252	Apl.	1888	.25
69	Horn-Silver, S. L.	Utah	10,000,000	400,000	25	*				4,000,000	Nov.	1884	.50
70	Hubert, G.	Colo.	500,000	50,000	10	*				239,500	Oct.	1888	.11
71	Idaho, G.	Cal..	310,000	3,100	100	....				5,030,900	Jan.	1889	7.50
72	Ideal, S. L.	Colo.	1,500,000	50,000	10	....				15,000	Oct.	1886	.05
73	Illinois, S.	N. M.	100,000	100,000	1	*				25,000	Jan.	1887	.25
74	Independence, S.	Nev..	10,000,000	100,000	100	340,000	Oct.	1886	.20	225,000	Sept	1879	.25
75	Indian Queen, S.	Nev..	250,000	125,000	2	....				368,750	July	1883	.03
76	Iron Hill, S.	Dak.	2,500,000	250,000	10	118,750	Sept	1888	.03	156,250	Nov	1887	.07½
77	Iron-Silver, S. L.	Colo.	10,000,000	500,000	20	*				2,400,000	Dec.	1888	.20
78	Jackson, G. S.	Nev.	5,000,000	50,000	100	237,500	Nov	1880	.20	50,000	Oct.	1886	.10
79	Jay Gould	Mont	2,000,000	400,000	5	*				321,000	Dec.	1888	.02½
80	Jocuistita, S.	Mex.	2,500,000	250,000	10	....				1,200,000	Feb.	1885	.50
81	Jumbo, G.	Colo.	2,000,000	200,000	10	....				35,000	Oct.	1887	.02½
82	Kentuck	Nev..	3,000,000	30,000	100	342,000	Nov	1881	.30	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 Cons., S.L.L.	Colo.	4,000,000	400,000	10	*				423,000	Apl.	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.	10,000,00	200,000	50	*				800,000	July	1888	.10
87	Little Pittsburg, S. L.	Colo.	20,000,000	200,000	100	*				1,050,000	Mch.	1880	.50
88	Manhattan, S.	Nev	5,000,000	50,000	100	250,000	Dec.	1887	1.00	437,500	Feb	1886	.25
89	Marion Bullion, G.	N.C.	500,000	....	....	....				15,000	Jan.	1886	....
90	Martin White, S.	Nev..	10,000,00	100,000	100	1,150,000	Mar.	1886	.25	140,000	Dec.	1886	.25
91	Mary Murphy, G. S.	Colo.	350,000	3,500	100	*				175,000	May	1888	5.00
92	Minnesota, C.	Mich	1,000,000	40,000	25	420,000	Apl.	1886	1.00	1,820,000	Mar.	1876	....
93	Mono, G.	Cal.	5,000,000	50,000	100	641,000	Sept	1888	.50	12,500	Mar.	1886	.25
94	Montana, Lt., G. S.	Mont	3,300,000	660,000	5	*				2,190,285	Jan.	1889	.06¼
95	Morning Star, S. L.	Colo.	1,000,000	100,000	10	....				775,000	Mar.	1888	.25
96	Moulton, S. G.	Mont	2,000,000	400,000	5	*				380,000	Dec.	1887	.07½
97	Mount Pleasant, G.	Cal.	150,000	150,000	1	*				150,000	Feb.	1887	.30
98	Mt. Diablo, S.	Nev.	5,000,000	50,000	100	137,500	Jun.	1880	2.00	120,000	Aug.	1888	.20
99	Napa, Q.	Cal..	700,000	100,000	7	....				290,000	Jan.	1883	.10
100	Navajo, G. S.	Nev..	10,000,000	100,000	100	485,000	Apl.	1888	.30	325,000	Feb.	1885	.25
101	New Guston, S.	Colo.	500,000	100,000	5	....				100,000	Dec.	1888	.50
102	N. Hoover Hill, G. S.	N. C.	300,000	120,000	2½	*				30,000	Dec.	1885	.06¼
103	Northern Belle, S.	Nev..	5,000,000	50,000	100	425,000	Jan.	1884	8.00	2,400,000	Apl.	1883	50
104	North Belle Isle, S.	Nev..	10,000,000	100,000	100	350,000	Jan	1889	.50	230,000	May	1888	.50
105	North Star, G.	Cal..	1,000,000	100,000	10	....				150,000	Dec.	1888	.50
106	Ontario, S. L.	Utah	15,000,000	150,000	100	....				9,725,000	Dec.	1888	.50
107	Ophir, G. S.	Nev..	10,000,000	100,000	100	4,109,440	Sept	1888	.50	1,595,800	July	1882	1.00
108	Original, S. C.	Mont	1,500,000	60,000	25	*				123,000	July	1888	.05
109	Osceola, C.	Mich	1,250,000	50,000	25	480,000	Apl.	1876	1.60	1,172,500	Sept	1888	1.00
110	Oxford, G.	N. S.	125,000	125,000	1	*				33,500	Oct.	1885	.02
111	Paradise Valley, G. S.	Nev.	10,000,000	100,000	100	57,000	Apl.	1888	.15	150,000	Apl.	1887	.10
112	Parrott, C.	Mont	1,800,000	180,000	10	....				282,000	Nov.	1888	.20
113	Peacock, S. G. C.	N. M.	2,000,000	200,000	10	*				60,000	Nov.	1886	....
114	Plutus, G. S. C. L.	Colo.	2,000,000	200,000	10	*				20,000	Feb.	1886	.10
115	Plymouth Con., G.	Cal..	5,000,000	100,000	50	*				2,280,000	Feb.	1888	.40
116	Quicksilver, pref., Q.	Cal..	4,300,000	43,000	100	....				1,337,575	Oct.	1888	1.25
117	" com., Q.	Cal..	5,700,000	57,000	100	....				151,000	July	1882	.40
118	Quincy, C.	Mich	1,000,000	40,000	25	200,000	Dec.	1862	....	5,170,000	Feb.	1889	5.00
119	Richmond, S. L.	Nev..	1,350,000	54,000	25	*				4,312,587	Jun.	1887	1.25
120	Ridge, C.	Mich.	500,000	20,000	25	219,939	Mar	1886	.50	99,785	Feb.	1880	.50
121	Robinson Con., S. L.	Colo.	10,000,000	200,000	50	*				585,000	Mar.	1886	.05
122	Robert E. Lee, S. L.	Colo	10,000,000	500,000	20	....				100,000	Dec.	1882	.50
123	Rooks, G.	Vt.	500,000	50,000	10	*				61,000	Apr	1885	.30
124	Savage, S.	Nev..	11,200,000	112,000	100	6,486,000	Jan.	1889	.50	4,460,000	July	1869	3.00
125	Security L. Mg., Mfg.	Colo.	1,000,000	100,000	10	*				50,000	July	1884	....
126	Shoshone, G.	Idah.	150,000	150,000	1	....				7,500	Apl.	1883	.01
127	Sierra Buttes, G.	Cal..	2,225,000	122,500	10	....				1,568,145	Apl.	1888	.12½
128	Sierra Nevada, G. S.	Nev..	10,000,000	100,000	100	6,150,000	Nov	1888	.25	102,000	Jan.	1871	1.00
129	Sierra Nevada, S. L.	Idaho	1,000,000	¶	1	*				20,000	June	1888	.01
130	Silver Cord, G. S. L.	Colo.	5,000,000	500,000	10	....				225,000	Nov.	1883	.25
131	Silver King, S.	Ariz.	10,000,000	100,000	100	50,000	Jun.	1888	.50	1,950,000	July	1887	.25
132	Silver Mg. of L. V.	N. M.	500,000	500,000	1	....				25,000	June	1888	.05
133	Silverton, G. S. L.	Colo.	2,000,000	200,000	10	*				80,000	Nov.	1886	.02
134	Small Hopes Cons., S.	Colo.	5,000,000	250,000	20	*				3,112,500	Dec.	1887	.20
135	Smuggler, S. L.	Colo.	600,000	60,000	10	....				66,700	Aug.	1883	.25
136	Spring Valley, G.	Cal..	200,000	200,000	1	50,000	Oct.	1886	.25	50,000	Jan	1881	25
137	Standard, G. S.	Cal..	10,000,000	100,000	100	25,000	Oct.	1884	.25	3,595,000	Jun.	1888	.05
138	Stormont, S.	Utah	500,000	500,000	1	*				155,000	Nov	1881	.05
139	St. Joseph, L.	Mo..	1,500,000	150,000	10	*				844.00	Dec.	1887	.20
140	Surinam, G.	D. G.	3,000,000	600,000	5	....				105,000	Nov.	1887	.05
141	Swansea, G.	Colo.	600,000	60,000	10	*				9,000	Apl.	1888	.02½
142	Syndicate, G.	Cal..	10,000,000	100,000	100	38,729	July	1882	.15	48,308	Sept	1885	.10
143	Tamarack, C.	Mich.	1,000,000	40,000	25	520,000	Apl.	1885	2.00	640,000	Dec.	1888	5.00
144	Tip Top, S.	Ariz.	10,000,000	100,000	100	250,000	Sept	1883	.25	100,000	Nov	1881	.20
145	Tombstone, G. S. L.	Ariz.	12,500,000	500,000	25	*				1,250,000	Apl.	1882	.10
146	United Verde, C.	Ariz.	3,000,000	300,000	10	*				97,500	Feb.	1884	.20
147	Valencia, M.	N. H.	150,000	1,500	100	*				37,500	Apl	1886	2.50
148	Viola Lt., S. L.	Idah.	750,000	150,000	5	*				272,500	Oct.	1888	.37½
149	Yankee Girl	Colo.	2,500,000	250,000	10	....				1,275,000	July	1887	.10
150	Yellow Jacket, G. S.	Nev..	12,0[illegible]	[illegible]	100	5,44[illegible],000	Dec	1885	.75	2,184,000	Aug.	1871	1.50

NON-DIVIDEND-PAYING MINES

	Name and Location of Company.		Capital Stock.	Shares. No.	Par Value.	Assessments. Total levied.	Date & am't of last.		
1	Agassiz Cons., S. L.	Colo.	$2,500,000	50,000	$50	*			
2	Allouez, C.	Mich	2,000,000	80,000	25	$657,000	Jun	1888	1.00
3	Alpha Con., G. S.	Nev..	3,000,000	30,000	100	562,500	Nov.	1888	.87½
4	Alta, S.	Nev..	10,080,000	100,800	100	2,248,800	Sept	1888	.50
5	Amador, G.	Cal..	400,000	200,000	2	*			
6	American Flag, S.	Colo.	1,250,000	125,000	10	300,000	Jun	1877	.50
7	Anglo-Montana, Lt.	Mon.	600,000	120,000	5	....			
8	Appalachian, Lt., G.	N. C.	1,500,000	300,000	5	....			
9	Astoria, G.	Cal..	200,000	100,000	2	....			
10	Barcelona, G.	Nev..	5,000,000	200,000	25	....			
11	Bechtel Con., G.	Cal..	10,000,000	100,000	100	173,500	Jan.	1889	.10
12	Belmont, S.	Nev..	5,000,000	50,000	100	735,000	Apl.	1886	.10
13	Best & Belcher, G. S.	Nev..	10,080,000	100,800	100	2,054,590	Oct.	1888	.25
14	Big Pittsburg, S. L.	Colo.	20,000,000	200,000	100	*			
15	Bi-Metallic, S.	Mon.	5,000,000	200,000	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	Brunswick, G.	Cal..	2,000,000	400,000	5	*			
20	Bullion, G. S.	Nev..	10,000,000	100,000	100	4,007,000	Aug.	1888	.50
21	Bye and Bye	Ariz.	1,000,000	100,000	10	*			
22	Calaveras, G.	Cal..	500,000	500,000	1	*			
23	Carisa, G.	Wy.	500,000	100,000	5	*			
24	Carupano, G. S. L. C.	Ven.	200,000	100,000	2	*			
25	Cashier, G. S.	Colo.	500,000	250,000	2	*			
26	Cen. Contin'l, G.S.L.	C.&A	2,000,000	200,000	10	*			
27	Charles Dickens, G.S.	Idah.	1,250,000	250,000	5	*			
28	Cherokee, G.	Cal..	1,500,000	150,000	10	....			
29	Chollar, S.	Nev..	11,200,000	112,000	100	1,428,000	Oct.	1888	.50
30	Cinnamon Mt., G.S.	Colo	750,000	150,000	5	....			
31	Cleveland, T.	Dak.	1,000,000	500,000	2	*			
32	Colchis	N. M.	500,000	50,000	1	....			
33	Comstock, G. S.	Nev..	10,000,000	100,000	100	30,000	Mar.	1887	.15
34	Con. Imperial, G. S.	Nev..	5,000,000	50,000	100	1,800,000	Nov.	1888	.05
35	Con. Pacific, G.	Cal..	6,000,000	60,000	100	177,000	Sept	1887	.15
36	Cons. Silver, S.	Mo...	2,500,000	250,000	10	....			
37	Courtlandt	Colo.	500,000	50,000	10	....			
38	Crescent, S. L.	Colo.	3,000,000	300,000	10	*			
39	Crocker, S.	Ariz.	10,000,000	100,000	100	105,000	Feb.	1888	.25
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	Dardanelles, G.	Cal..	1,000,000	100,000	10	....			
44	Decatur, S.	Colo.	1,500,000	300,000	5	*			
45	Denver City, S. L.	Colo.	5,000,000	500,000	10	*			
46	Denver Gold, G.	Colo.	300,000	60,000	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	Empire, S.	Utah	10,000,000	100,000	100	....			
53	Eureka Tunnel, S. L.	Nev..	10,000,000	100,000	100	*			
54	Exchequer	Nev.	10,000,000	100,000	100	790,000	Sept	1888	1.20
55	Found Treasure, G.S.	Nev.	10,000,000	100,000	100	18,030	July	1882	1.06
56	Gogebic I. Syn., I.	Wis.	5,600,000	200,000	25	....			
57	Gold Cup, S.	Colo.	500,000	500,000	1	*			
58	Golden Era, S.	Mon.	2,000,000	200,000	10	*			
59	Gold Placer, G.	Colo.	5,000,000	200,000	25	229,314	Dec.	1885	.25
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-Bobtail, G.	Colo.	550,000	550,000	1	*			
66	Gregory Con., G.	Mon.	3,000,000	300,000	10	....			
67	Harlem M. & M. Co., G.	Cal..	1,000,000	200,000	5	....			
68	Head Cent. & Tr. S.G.	Ariz.	10,000,000	100,000	100	....			
69	Hector, G.	Cal..	1,500,000	300,000	5	....			
70	Highland, C.	Mich	500,000	25,000	20	....			
71	Hollywood	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	280,000	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	Ariz.	10,000,000	100,000	100	*			
78	Julia Cons., G. S.	Nev..	11,000,000	110,000	100	1,650,000	Apl.	1887	.10
79	Kearsarge, C.	Mich	1,250,000	50,000	25	190,000	Oct.	1887	1.00
80	Lacrosse, G.	Colo.	1,000,000	100,000	10	*			
81	Lee Basin, S. L.	Colo.	5,000,000	500,000	10	*			
82	Lucerne, S.	Colo.	5,000,000	500,000	10	*			
83	Mammoth Bar., G.	Cal..	10,000,000	100,000	100	50,000	Dec.	1881	....
84	May Belle, G.	Cal..	10,000,000	100,000	100	84,000	Mar.	1884	.15
85	Mayflower Gravel	Cal..	1,000,000	100,000	10	435,000	Oct	1888	.50
86	Medora, G.	Dak.	250,000	250,000	1	....			
87	Mexican, G. S.	Nev..	10,000,000	100,000	100	2,725,760	Aug	1888	.25
88	Middle Bar G.	Cal..	400,000	200,000	2	*			
89	Mike & Starr, S. L.	Colo.	1,000,000	200,000	5	*			
90	Monitor, G.	Colo.	100,000	100,000	1	*			
91	Moose Silver, S.	Colo.	3,000,000	300,000	10	....			
92	Mutual Mg. & Sm.	W'sh	100,000	100,000	1	*			
93	Native, C.	Mich	1,000,000	40,000	25	....			
94	Neath, G.	Colo.	1,000,000	100,000	10	....			
95	Nevada Queen, S.	Nev	10,000,000	100,000	100	180,000	Dec.	1888	.50
96	New Germany, G.	N. S.	100,000	100,000	1	*			
97	New Pittsburg, S. L.	Colo.	2,000,000	200,000	10	*			
98	North Standard, G.	Cal..	10,000,000	100,000	10	20,000	Nov	....	....
99	Noonday	Cal..	600,000	60,000	100	208,000	Dec.	1881	.10
100	Oneida Chief, G.	Cal.	500,000	125,000	4	*			
101	Oriental & Miller, S.	Nev..	10,000,000	400,000	25	....			
102	Osceola, G.	Nev..	5,000,000	50,000	100	*			
103	Overman, G. S.	Nev.	11,520,000	115,200	100	3,737,180	Aug.	1887	.25
104	Park, S.	Utah	2,000,000	200,000	10	....			
105	Peer, S.	Ariz.	10,000,000	100,000	100	125,000	Nov.	1886	.10
106	Peerless, S.	Ariz.	10,000,000	100,000	100	345,000	Apl.	1888	.25
107	Phoenix	Ariz.	500,000	500,000	1	....			
108	Phoenix, G. S.	Ark.	5,000,000	200,000	25	*			
109	Phoenix Lead, S. L.	Colo.	100,000	100,000	1	*			
110	Pilgrim, G.	Cal..	600,000	300,000	2	*			
111	Potosi, S.	Nev..	11,200,000	112,000	100	1,349,600	July	1885	.50
112	Proustite, S.	Idah	250,000	250,000	1	*			
113	Puritan S. G.	Colo.	1,500,000	150,000	10	*			
114	Quincy	Colo.	3,000,000	300,000	10	....			
115	Rappahannock, G.S.	Va.	250,000	250,000	1	*			
116	Red Elephant, S.	Colo.	500,000	500,000	1	*			
117	Ropes, G. S.	Mich	2,000,000	80,000	25	103,200	July	1887	.50
118	Russell, G.	N. C.	1,500,000	300,000	5	....			
119	Sampson, G. S. L.	Utah	10,000,000	100,000	100	288,157	July	1888	1.00
120	San Sebastian, G.	San.S	1,600,000	320,000	5	*			
121	Santiago, G.	U.S.C	400,000	200,000	2	*			
122	Security, S.	Colo.	10,000,000	1,000,000	10	....			
123	Sheridan	N. M.	2,000,000	200,000	10	....			
124	Silver Queen, C.	Ariz.	5,000,000	200,000	25	*			
125	South Bulwer, G.	Cal..	10,000,000	100,000	100	100,000	May	1881	.25
126	South Hite	Cal..	10,000,000	100,000	100	195,000	Jan.	1883	.05
127	South Pacific	Cal..	500,000	100,000	5	....			
128	Stanislaus, G.	Cal..	2,000,000	200,000	10	....			
129	State Line, S.	Nev..	250,000	250,000	1	....			
130	St. Kevin, G. S.	Colo.	100,000	100,000	1	*			
131	St. Louis & Mex., S.	Mex.	5,000,000	500,000	10	*			
132	St. Louis & St. Elmo	Colo.	2,000,000	200,000	10	....			
133	St. L. & St. Felipe, G. S.	Mex.	1,500,000	150,000	10	....			
134	St. L. & Sonora, G.S.	Mex.	1,500,000	150,000	10	....			
135	St. Louis-Yavapai	Ariz.	3,000,000	300,000	10	*			
136	Sunday Lake, I.	Mich	1,250,000	50,000	25	....			
137	Sullivan, G. S. L.	Dak.	500,000	100,000	5	125,000	Dec.	1882	.25
138	Sutter Creek, G.	Cal..	500,000	100,000	5	....			
139	Sutro Tunnel	Nev..	20,000,000	2,000,000	10	....			
140	Sylvanite, S.	Colo.	5,000,000	500,000	10	*			
141	Taylor-Plumas, G.	Cal..	1,000,000	200,000	5	10,000	Feb.	1888	.03
142	Tioga Cons., G.	Cal..	10,000,000	100,000	10	295,000	May	1888	.10
143	Tornado Cons. G. S.	Nev..	100,000	100,000	1	*			
144	Tortilita, G. S.	Ariz.	1,000,000	100,000	100	*			
145	Tuscarora, S.	Nev..	10,000,000	500,000	2	110,000	Oct.	1881	.15
146	Union Con., G. S.	Nev..	10,000,000	100,000	100	3,210,000	Jan	1889	.25
147	Utah, S.	Nev..	10,000,000	100,000	100	120,000	Oct.	1888	.25
148	Washington, C.	Mich	1,000,000	40,000	25	....			
149	West Granite Mt., S.	Mon.	5,000,000	500,000	10	*			
150	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 Dec. 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 Aug., 1884, the California had paid $31,320,000 in dividends, and the Con. Virginia, $24, [illegible] the consolidation of the Copper Queen with the Atlanta, Aug., 1885, the Copper Queen had paid $1,350,000 in dividends. ¶ 1,000,000.

NEW YORK MINING STOCKS QUOTATIONS.

DIVIDEND-PAYING MINES

NAME AND LOCATION OF COMPANY.	Jan. 13. H.	Jan. 13. L.	Jan. 14. H.	Jan. 14. L.	Jan. 15. H.	Jan. 15. L.	Jan. 16. H.	Jan. 16. L.	Jan. 17. H.	Jan. 17. L.	Jan. 18. H.	Jan. 18. L.	SALES.
Adams, Colo.	....	....	....	....	.25	....	.25	....	.80	....	....	....	1,100
Alice, Mont	....	....	....	....	....	....	....	....	....	....	....	....	200
Argenta, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Bassick, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Belcher, Nev	....	....	....	....	....	....	....	....	....	....	....	....	.....
Belle Isle, Nev.	....	....	....	....	....	....	.37	....	....	....	....	....	200
Bodie Cons., Cal.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Breece, Colo	....	....	....	....	....	....	....	....	....	....	....	....	.....
Bulwer, Cal	....	....	....	....	....	....	....	.50	....	....	....	....	80
Caledonia, Dak.	....	....	3.00	....	....	....	....	3.00	....	....	....	....	400
Calumet & Hecla	....	....	....	....	....	....	....	....	....	....	....	....	.....
Chollar, Nev	....	....	....	....	....	....	....	....	....	....	....	....	.....
Chrysolite, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Colorado Cent'l, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Cons. Cal. & Va., Nev.	....	....	....	....	9 00	8.88	9.50	9.25	9.50	9.00	9.25	....	1,785
Crown Point, Nev	....	....	....	....	....	....	....	....	....	....	....	....	.....
Deadwood, Dak.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Dunkin, Colo.	....	....	....	....	....	....	....	....	....	....	1.05	1.00	125
Eureka Cons., Nev	....	....	....	....	....	....	....	....	....	....	....	....	.....
Father de Smet, Dak	....	....	....	....	....	....	....	....	....	....	....	....	.....
Freeland, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Gould & Curry, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Grand Prize, Nev.	....	....	....	....	.90	....	....	....	....	....	....	....	100
Hale & Norcross, Nev	....	....	....	....	5.38	....	....	....	....	....	....	....	100
Holyoke, Idaho	....	....	....	....	....	....	....	....	....	....	....	....	.....
Homestake, Dak.	12 00	....	....	....	....	....	....	....	....	....	....	....	75
Horn-Silver, Ut.	.80	....	.80	....	....	....	....	.78	....	.76	....	....	800
Iron Hill, Dak.	....	....	....	....	....	....	....	....	....	.11	....	....	1.0
Iron Silver, Colo.	....	....	3.20	....	....	....	....	....	....	....	....	....	800
Leadville C., Colo.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Little Chief, Colo.	....	....	.10	....	.20	....	.20	....	....	.21	....	....	2,800
Little Pittsburg, Colo	....	....	....	....	....	....	....	....	....	.06	....	....	300
Martin White, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Mono, Cal	....	....	....	....	....	....	....	....	....	....	....	....	.....
Mount Diablo, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Navajo, Nev	....	....	....	....	....	....	....	....	....	....	....	....	.....
North Belle Isle, Nev	....	....	....	....	....	....	....	....	....	....	....	....	.....
North Star, Cal.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Ontario, Ut.	34.00	....	....	....	34.00	....	....	....	34.50	34 00	33 88	....	290
Ophir, Nev.	....	....	....	....	....	....	....	....	6.13	....	....	....	2 0
Plutus, Colo.	.90	....	....	....	.95	....	.95	....	95	....	1.00	....	1,000
Plymouth, Cal.	8.50	....	....	....	8.50	....	....	....	....	....	8.63	8.50	280
Quicksilver Pref., Cal	....	....	....	....	....	....	....	....	36 38	36 13	36.00	....	400
" Com., Cal	....	....	....	....	....	....	....	....	6.50	6 00	6.25	6.13	8 0
Robinson Cons. Colo.	.80	....	....	....	....	....	....	....	....	....	....	....	100
Savage, Nev.	....	....	....	....	....	....	....	....	....	....	3.35	....	100
Sierra Nevada, Nev.	....	....	....	....	....	3.65	3.50	....	....	....	3.45	....	500
Silver King, Ariz.	1.05	1 00	1.10	1.05	1 25	1.05	....	....	1.15	1.10	1.25	1 15	2,800
Silver Mg. of L. V.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Small Hopes, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Stanard, Cal	1.00	....	....	....	....	....	....	....	....	....	....	....	1 0
Stormont, Utah	....	....	....	....	....	....	....	....	....	....	....	....	100
Yellow Jacket	....	....	....	....	....	....	....	....	....	....	5.00	....	10

NON-DIVIDEND-PAYING MINES

NAME AND LOCATION OF COMPANY.	Jan. 12. H.	Jan. 12. L.	Jan. 14. H.	Jan. 14. L.	Jan. 15. H.	Jan. 15. L.	Jan. 16. H.	Jan. 16. L.	Jan. 17. H.	Jan. 17. L.	Jan 18 H.	Jan 18 L.	SALES.
Alta	....	....	....	....	....	....	....	....	....	....	....	....	.....
Amador, Cal.	2 00	1.75	2.00	....	2.00	....	2.00	....	2.00	....	2 00	....	3.100
American Flag, Colo	....	....	.03	....	.03	....	....	....	....	....	....	....	1,100
Astoria, Cal.	.24	....	.24	....	.24	....	.24	....	.25	....	.24	....	4,900
Barcelona, Nev.	....	....	....	....	.65	....	.66	....	.67	....	.68	.65	1,500
Bechtel, Cal.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Best & Belcher, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Brunswick, Cal.	....	....	....	....	.07	....	....	....	....	....	.07	....	1,900
Buffalo Iron Min'g.	....	....	5.38	5.00	5 75	....	5.38	5.25	5.25	....	5.38	....	3.500
Bullion, Nev.	....	....	1.90	....	1.95	....	....	....	....	....	1.95	....	300
Cashier, Colo	....	....	.10	....	....	....	....	....	.07	.06	....	....	2,800
Castle Creek, Id.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Central Arizona	....	....	....	....	....	....	....	....	....	....	....	....	.....
Colchis, N. M.	2.80	....	2.80	....	2.75	....	2.85	....	2.90	....	2.95	....	875
Commonw'lth, Nev	....	....	....	....	....	....	....	....	....	....	....	....	.....
Con. Imperial, Nev	....	....	....	....	.90	....	.88	....	....	....	....	....	700
Con Pacific	....	....	....	....	....	....	....	....	....	....	....	....	.....
Del Monte	....	....	....	....	....	....	....	....	....	....	....	....	.....
Denver City, Colo.	....	....	....	....	.12	....	....	....	....	....	.12	....	400
Eastern Oregon	....	....	....	....	....	....	....	....	....	....	....	....	.....
El Cristo, U. S. Col.	.65	....	....	....	.60	....	....	....	.60	....	.60	....	900
Excelsior, Cal	....	....	....	....	....	....	....	....	....	....	....	....	.....
Exchequer, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Hollywood, Cal.	.02	....	.02	....	.02	....	.02	....	.03	....	.03	....	24,900
Huron, Mich	....	....	....	....	....	....	....	....	....	....	....	....	.....
Julia, Nev.	....	....	.50	....	....	....	.50	....	....	....	....	....	300
Kingst'n & Pemb'ke	....	....	1.13	1 00	....	....	....	....	....	....	.88	....	1,045
Kossuth, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Lacrosse, Colo	....	....	....	....	....	....	....	....	....	....	....	....	.....
Lee Basin, Colo	....	....	....	....	.70	.66	.70	....	....	....	....	....	1,000
Mexican, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Middle Bar, Cal.	.35	....	.35	....	.35	....	.35	....	.35	....	.35	....	2,300
Moniter, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Mutual Sm. & M. Co	1 40	1 35	1 40	1.35	1.40	1.35	1.40	....	1.40	....	1 45	1.40	6,800
N Commonwealth	....	....	....	....	....	....	....	....	....	....	....	....	.....
Nevada Queen, Nev	....	....	....	....	....	....	....	....	....	....	....	....	.....
Phoenix of Ark.	.09	....	.09	....	.10	....	....	....	....	....	.10	.09	1,100
Potosi, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Rappahann'k, Va	.06	....	.06	....	.07	.06	.07	.06	.06	....	.06	....	4,900
San Sebastian, S'nS	....	....	....	....	....	....	....	....	....	....	....	....	.....
Shoshone, Idaho	....	....	....	....	....	....	....	....	.08	....	....	....	1,100
Silver Cliff, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Silver Cord, Colo.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Siver Hill, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Silver Queen	....	....	....	....	....	....	....	....	....	....	....	....	.....
Sullivan Con	.66	.64	.66	.65	.67	.64	.68	.66	.67	....	.75	.68	20,884
Santo Tunnel, Nev	.08	....	.08	....	.08	....	.07	....	....	....	.07	....	2,700
" Trust Cert	....	....	.62	.61	....	....	.61	....	.60	....	61	....	3,400
Sylvanite M. & M. Col	....	....	....	....	....	....	....	....	....	....	....	....	.....
Tornado, Nev.	....	....	....	....	....	....	....	....	....	....	....	....	.....
Union Cons. Nev.	....	....	3 25	....	....	....	....	....	....	....	2.95	2 90	400
United Copper	1.10	....	1.05	....	1 05	1 00	1.05	....	1.10	....	1.15	....	1,000
Utah	....	....	....	....	....	....	....	....	....	....	....	....	.....

Ex. dividend. †Dealt in at the New York Stock Ex. Unlisted Securities ‡Assessment paid. Dividend shares sold, 15,535. Non-dividend shares sold, 100,864. Total New York, 116,439.

BOSTON MINING STOCK QUOTATIONS.

NAME OF COMPANY	Jan. 11.		Jan. 12.		Jan. 14.		Jan. 15.		Jan. 16		Jan. 17.		SALES.
Atlantic, Mich.	.....	....	17 63	....	17.50	17.00	17.50	17.00	17.50	17.00	.....	.....	1,655
Bodie, Cal.	.....	....	.....	....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bonanza Developm't	1.63	....	.....	....	.....	.....	.....	.....	.....	.....	1. 6	.....	700
Bost. & Mont., Copper	61 50	47 50	61.75	47.50	62 00	47.25	59.25	47.50	60.00	59.75	59.75	.....	5,022
Breece, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Calumet & Hecla	295	291	295	.....	293	291	292	283	.....	.....	29	.....	382
Catalpa, Colo.	.....	.....	.....	.....	.19	.....	.....	.....	.....	.....	.....	.....	300
Central, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chrysolite, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Con. Cal & Va., Nev.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dunkin, Colo.	.97½	.95	.97½	.....	.97½	.....	.95	....	97½	....	.....	.....	1,300
Enterprise	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Franklin, Mich.	.....	.....	16.25	.....	.....	.....	15 00	14.50	15.50	.....	.....	.....	420
Hale & Norcross, Nev	....	....	....	....	....	....	....	....	....	....	....	....	.....
Honorine, Utah	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Little Chief, Colo	....	....	....	....	....	....	....	....	....	....	....	....	.....
Little Pittsburg, Colo.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Martin White, Nev.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mono, Cal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Napa, Cal.	.....	.....	.....	.....	2.88	2.75	3.31	2.88	3 25	.....	3.00	.....	2,500
Ontario	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Osceola, Mich	21.00	20.50	.....	.....	20.00	19 75	19.50	.....	20.00	19.00	.....	.....	298
Pewabic, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Quincy, Mich.	85.00	.....	84.50	.....	.....	.....	.....	.....	83 25	.....	84.00	.....	43
Ridge, Mich	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sierra Nev., Nev.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Silver King, Ariz.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard, Cal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tamarack, Mich.	156	145.50	156	145.50	156	145 25	150	144.88	153	144.00	153	143 25	1,474

NAME OF COMPANY.	Jan 11.		Jan. 12.		Jan. 14.		Jan 15		Jan. 16.		Jan 17.		SALES
Alloues, Mich.	4.75	4.50	4.88	4.75	4.63	4 25	4.25	3.88	.....	.....	4.38	.....	1,965
Arnold, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Aztec, Mich	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Brunswick, Cal.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Butte & Boston	.....	.....	.....	.....	26.00	.....	26 00	25 50	.....	.....	26.00	.....	500
Canada	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crescent, Colo.	.....	.....	.....	.....	.....	.....	.....	.....	.10	.....	.....	.....	200
Cusi, N. Mex.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denver City, Colo.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Everett	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hanover, Mich	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Humboldt, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Hungarian	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Huron, Mich	.....	.....	.....	.....	5.63	.....	4.50	4 25	.....	.....	.....	.....	250
Kearsarge, Mich.	.....	.....	.....	.....	11 00	.....	.....	.....	11.00	.....	11.00	10 75	295
Mesnard, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
National, Mich.	.....	.....	.....	.....	7.00	.....	6 50	6.13	5.75	5.25	6 00	.....	1,300
Native, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pontiac	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rappahannock, Va	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Rockland	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Santa Fe, N. Mex.	2 50	2.13	2 63	2 44	2 63	2.38	2 50	2 38	2 50	2.44	2 44	2 38	28,272
Security, Colo	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Shoshone Idaho	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Side, Mich	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St Louis Cop.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Mary's	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sutro Tunnel	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Winthrop, Mich.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

† Rights. Boston: Dividend shares sold, 14,094. Non-dividend shares sold, 32,782. Total Boston, 46,876.

COAL STOCKS.

NAME OF COMPANY.	Par val. of sh'rs.	Jan. 12. H.	Jan. 12. L.	Jan. 14. H.	Jan. 14. L.	Jan. 15. H.	Jan. 15. L.	Jan. 16. H.	Jan. 16. L.	Jan. 17. H.	Jan. 17. L.	Jan. 18 H.	Jan. 18 L.	Sales.
American Coal.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Barclay Coal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cameron Coal & Iron Co	.....	26¾	25⅞	27	26¼	28	26¾	27⅞	26⅞	27⅞	27⅛	27¾	.....	3,070
Ches. & O. RR.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chic. & Ind. Coal RR.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do. pref.	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Col. & Hocking Coal	100	21⅛	.....	21¼	.....	.....	.....	.....	.....	.....	.....	.....	.....	70
Col., C. & I	100	..	..	31	30⅝	30¾	30¼	31	30½	30¼	.....	31⅝	30¾	4,570
Consol. Coal	100	.....	.....	28½	27½	28	.....	28¼	28	.....	.....	29	.....	670
Del. & H. C.	100	133½	132	133⅞	133	133¼	132⅝	133¼	132½	135	132	134¾	133¾	13,111
D., L. & W. RR.	50	141⅞	141¼	142½	141⅝	142⅜	141	141⅜	139½	140⅝	139½	140⅞	139⅞	162,597
Hocking Valley	100	.....	.....	26¼	26	26⅝	.....	26	25¾	25¼	25	.....	.....	1,300
Hunt. & Broad Top	.....	.....	.....	.....	.....	21⅛	.....	.....	.....	21⅜	21¼	.....	.....	310
Do. pref.	.....	47¾	47½	47¾	47½	47⅝	.....	47¾	47⅝	47⅜	47½	.....	.....	2,755
Lehigh C. & N.	50	51¾	.....	51½	51¼	51¼	51⅛	51⅜	51¼	51⅛	51¼	.....	.....	1,639
Lehigh & W. B. Coal	.....	.....	.....	.....	.....	30	.....	.....	.....	31	.....	29	.....	429
Lehigh Valley RR.	50	55	54⅞	55	54⅝	55	..	55	54¾	54⅞	54¾	.....	.....	1,104
Marshall Con. Coal	100	.....	.....	9½	9	9½	9	.....	.....	.....	.....	.....	.....	700
Maryland Coal	100	14	.....	.....	.....	.....	.....	14	.....	.....	.....	.....	.....	200
Montauk Coal	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Morris & Essex	100	.....	.....	144¼	.....	145	144½	.....	.....	.....	.....	.....	.....	172
New Central Coal	100	.....	.....	.....	.....	11½	.....	.....	.....	.....	.....	.....	.....	100
N. J. C. RR.	50	98⅜	.....	99	98	99¼	98¾	98¾	97½	98⅞	97⅝	.....	.....	12,565
N. Y. & S. Coal	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
N. Y., Susq. & Western	100	.....	.....	.....	.....	9¾	9	9	.....	9	8¾	.....	.....	1,305
Do. pref.	100	34	33¾	34½	34	34⅝	34	34¼	.....	33⅝	33½	.....	.....	3,380
N. Y. & Perry C. & I.	100	31	.....	30	29¾	30¾	30¼	30⅜	30¼	30¼	30	.....	.....	1,675
Norfolk & Western R.R.	100	.....	.....	.....	.....	.....	.....	16½	.....	.....	.....	.....	.....	20
Do. pref.	50	51½	50½	51¾	51⅝	52	51⅞	52⅜	52	52	51¾	52	.....	3,415
Penn. Coal	50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	295	.....	5
Penn. RR.	50	54¼	54⅛	54⅛	54¼	54⅛	54⅜	54⅛	54⅜	54⅜	54¼	.....	.....	7,939
Ph. & R. RR.*	50	49	48⅝	49¾	49¼	50	49⅝	49¼	48⅛	48¾	48¼	48⅞	47⅞	246,748
Sunday Creek Coal	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	14½	14	400
Do. pref.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5 ⅛	.....	100
Tennessee C. & I. Co.	100	34⅜	34⅛	34¾	34¼	34⅝	34	33⅝	33	33¾	33¼	33¼	33	4.600
Do. Pref.	.....	.....	.....	95½	95	94	.....	95	.....	.....	.....	.....	.....	189
Westmoreland Coal	100	.....	.....	69	.....	*69	.....	*69	.....	*69	.....	.....	.....	.....
Wyoming Valley Coal	..	.....	.....	51	50	*50	.....	*50	.....	.....	.....	.....	.....	500

*Bid.

*Of the sales of this stock, 43,388 were in Philadelphia, and 180,360 in New York. Total sales, 475,538.

San Francisco Mining Stock Quotations.

COMPANY	CLOSING QUOTATIONS. Jan. 11.	Jan. 12.	Jan. 14.	Jan. 15.	Jan. 16.	Jan. 17.
Alpha	.....	.....	.....	.....	.....	.....
Alta	2.70	2.80	2.70	.....	2.80	2.75
Belcher	.....	.....	.....	.....	.....	.....
Belle Isle	.....	.....	.....	.....	.....	.40
Best & Bel.	5.75	6.00	5.88	.....	5.88	6.75
Bodie	1.75	.....	.....	.....	.....	1.55
Bulwer	.55	.....	.....	.....	.....	.55
Challar	3.45	3.50	4.15	.....	3 70	3.75
C'm'weal'h	.....	4.40	5.00	.....	5.50	5.38
Con. C. & V	8.88	9.00	8.88	.....	9.00	9.00
Con. Pac.	.....	.....	.....	.....	.....	.....
Crown Pt.	6.00	6.25	6.00	.....	6.00	5.63
Eureka C.	.....	.....	.....	.....	.....	.....
Gould & C.	2.95	3.05	3.15	.....	2.95	3.15
Grd. Prize.	.....	.....	.....	.....	.....	.....
Hale & N.	5.25	5.25	.....	.....	5.25	5.13
Mexican	3.60	3.80	3.85	.....	3.70	3.85
Mono.	1.15	1.20	1.25	.....	.....	1.55
Mt Diablo	.....	.....	.....	.....	.....	.....
Navajo	1.60	1.50	1.55	.....	1.50	1.55
Nev. Queen	2.90	2.90	.....	.....	3.15	.....
N. Belle I.	2.50	2.45	2.50	.....	2.60	.....
Ophir.	5.75	6.00	6.13	.....	5.75	5.88
Potosi.	2.65	2.80	3 20	.....	2.80	2.75
Savage	2.95	3.15	3.20	.....	3.00	3.10
Scorpion	.....	.....	.....	.....	.....	.....
Sierra Nev	3.30	3 50	3.50	.....	3.30	3.30
Sutro Tun.	.....	.....	.....	.....	.....	.....
Tip Top	.....	.....	.....	.....	.....	.....
Union Con.	3.00	3.05	3.10	.....	3.00	3.05
Utah	1 45	1.50	1.50	.....	1.35	1.35
Yellow Jkt.	4.95	5.00	5.13	.....	5.00	4.85

Meetings.

Carbon Iron Company, Mills Building, 15 Broad street, New York City, January 24th, at eleven o'clock A.M. William Brandreth, Secretary.

Central American Syndicate Company, No. 160 Broadway, New York City, February 12th, at two o'clock P.M. George F. Bingham, Secretary.

Chartiers Valley Gas Company, Garrison Building, Wood street corner Third avenue, Pittsburg, Pa., January 24th, at two o'clock P.M. This is the regular annual meeting. As announced in the ENGINEERING AND MINING JOURNAL last week, a special meeting will be held on March 6th. F. J. Tener, Secretary.

Edison Electric Illuminating Company, of New York, 13–16 Broad street, January 15th, at twelve o'clock noon.

El Cristo Gold and Silver Mining Company, No. 45 Broadway, New York City, January 30th, at eleven o'clock A.M. J. W. Thompson, Secretary.

Martin Process and Chemical Company, No. 43 John street, New York City, January 23d, at three o'clock P.M. Special meeting for the purpose of determining whether the amount of the capital stock of said company shall be diminished to the sum of $450,000.

Navassa Phosphate Company, No. 10 Wall street, New York City, January 23d, at two o'clock P.M.

Santa Lucia Mining and Milling Company, Room 220, No. 1 Broadway, New York City, February 6th, at one o'clock P.M. William R. Little, Secretary.

Stratton Separator Company, No. 32 Cortland street, New York City, January 21st, at two o'clock P.M. H. L. Bogert, Secretary.

Dividends.

The following dividends have been declared:

Aspen Mining and Smelting Company, of Colorado, monthly dividend No. 3, twenty cents per share, or $40,000, payable January 17th, at No. 54 Wall street, N. Y. City.

Atlantic Mining Company, of Michigan, dividend No. 11, two dollars per share, or $80,000, payable February 1st.

Bertha Zinc Works, of Southwest Virginia, 4 per cent, or $120,000.

Calumet & Hecla Mining Company, of Michigan, $5 per share, or $500,000, payable February 5th, in Boston.

Central Mining Company, of Michigan, dividend No, 28, $2 per share, or $40,000, payable February 1st.

Colorado Central Consolidated Mining Company, of Colorado, dividend No. 26, five cents per share, or $13,750, payable February 11th, at the Farmers' Loan and Trust Company, No. 22 William street, New York City.

Consolidation Coal Company, of Maryland, annual dividend, two dollars and a quarter per share, payable January 21st., at No. 71 Broadway, N. Y. City.

Daly Mining Company, of Utah, dividend No. 23, twenty-five cents per share, or $37,500, payable January 31st, at No. 15 Broad street, N. Y. City.

Homestake Mining Company, of Dakota, dividend No. 126, twenty cents per share, or $25,000, payable January 25th, at No. 15 Broad street N. Y. City.

Huntingdon & Broad Top Railway Company, one dollar and a quarter per share, on preferred stock.

Idaho Gold Quartz Mining Company, of Grass Valley, Cal., dividend No. 231, seven dollars and a half per share, or $23,250, payable January 7th.

New York & Honduras Rosario Mining Company, dividend No. 8, ten cents per share, or $15,000, payable January 21st, at No. 345–347 Produce Exchange, New York City.

Quincy Mining Company, of Michigan, dividend No. 41, five dollars per share or $200,000, payable February 15th.

Assessments.

COMPANY.	No.	When levied.	D'l'nq't in office.	Day of Sale.	Amn't per share.
Anchor, Utah	9	Dec. 1	Jan. 3	Jan. 25	.10
Bellevue, Idaho	—	Nov. 10	Dec. 20	Jan. 20	.15
Blue Bird, Dak.	4	Dec. 4	Jan. 30	Feb. 15	.001
Bohama, Dak.	1	Dec. 11	Jan. 15	Feb. 2	.001
Bullion, Dak.	6	Jan. 4	Feb. 8	Feb. 25	.005
Commonw'th, Nev.	7	Nov. 24	Dec. 28	Jan. 21	.50
Concordia, Nev.	2	Nov. 12	*Jan. 24	Feb. 4	.50
Desire, Dak.	4	Jan. 3	Feb. 5	Feb. 23	.001
Hartshorn, Dak.	2	Dec. 4	Jan. 4	Jan. 21	.00½
†Horseshoe Bar, Cal.	2	Dec. 7	Jan. 14	Feb. 4	.10
Imperial, Dak.	1	Jan. 2	Feb. 4	Feb. 21	.001
Jo Craig, Dak.	1	Dec. 11	Jan. 11	Jan. 28	.001
Live Oak Drift, Cal.	11	Nov. 19	Dec. 21	Jan. 16	.05
Lord of Lorn, Nev.	4	Dec. 19	Jan. 21	Feb. 11	.10
Montrose, Colo.	1	Oct. 3	Dec. 26	*Jan. 28	.01½
Nevada Queen, Nev.	4	Dec. 21	Jan. 28	Feb. 25	.50
N. Belle Isle, Nev.	14	Jan. 3	Feb. 6	Feb. 27	.50
N. Gould & Curry, Nev.	10	Dec. 18	Jan. 18	Feb. 4	.20
Occidental Con., Nev	3	Dec. 27	Jan. 31	Feb. 25	.25
Pilgrim, Mich.	....	Dec. 31	Feb. 1	.....	.50
Potosi.	31	Oct. 1	Nov. 6	Nov. 27	.50
Russell R. & Mg., Cal	4	Dec. 17	Jan. 21	Feb. 12	.05
Savage, Nev.	72	Jan. 7	Feb. 11	Mar. 4	.75
Scorpion, Nev.	24	Jan. 3	Feb. 8	Mar. 4	.10
Seg. Belcher, Nev.	2	Dec. 3	Jan. 7	Jan. 28	.25
Sugar Loaf Hill, Dak	3	Dec. 15	Jan. 15	Jan. 21	.002½
Spanish R., Dak.	1	Dec. 6	Jan. 8	Jan. 24	.02
SeaburyCalkins, Dak	11	Jan. 2	Feb. 5	Feb. 28	.005
Union Cons., Nev.	37	Jan. 4	Feb. 8	Mar. 1	.25

*Delinquent day and day of sale postponed to dates given above.

†Assessment No. 1, levied October 9th, 1888, has been rescinded. The money paid on same will be accredited on assessment No. 2, and any excess will be refunded.

FINANCIAL STATEMENTS.

The following are the financial balances of the various mining companies on January 1st so far as collected:

CASH ON HAND.

Alpha Con.	$22,771.35	Julia	$690.93
†Alta	40,906.25	Justus	15,000.00
Andes	17,141.80	Lady Washingt'n.	24,508.00
Belcher	3,996.17	Locomotive	2,559.68
Best & Belcher	8,661.17	Mexican	8,854.89
Benton Con.	96,573.77	Mono	21,056.94
Bodie Con.	47,972.70	**Navajo	24,869.19
Booker Con.	24.32	NorthCom'wealth	1,095.40
Bullion	37,999.09	North Peer	10.86
Bulwer	5,016.16	Occidental	6,622.78
Caledonia	14,226.39	Ophir	24,663.44
Confidence	67,136.13	Overman	6,480.09
*Con. Cal. & Va.	144,195.90	Pondere	9.32
Cons. Imperial	21,490.93	Scorpion	1,093.93
Crocker	2,578.95	Sierra Nevada	10,733.21
Del Monte	1,755.94	Silver Hill	12,542.19
Diana	4,715.85	§Silver King	70,000.00
Dudley	321.60	Standard Con.	1,644.08
Exchequer	13,312.90	Summit	1,859.64
Found Treasure	1,169.73	Syndicate	9,956.46
Gould & Curry	3,104.58	Tioga	105.20
††Hale & Norcross	5,300.58	Utah	12,229.45
Independence	2,845.41	Weldon.	2,304.79

*Cash in bank and unsold bullion on hand valued at $46,880.51, with further shipments to arrive before the close of the fiscal month.

† In cash and a balance of $13,012 due on proceeds of ore concentrates sales.

§ And $14,000 in unsold bullion.

** In cash and unsold bullion.

†† In cash, $9,319 in unsold bullion, with the gold in the bullion and shipments yet to arrive on fiscal month account.

INDEBTEDNESS.

Challenge	$700.75	North Belle Isle	$34,093.74
†Chollar	2,660.59	Peer	6,409.58
Crown Pt.	1,603.84	*Peerless	4,183.30
Con. New York	4,261.51	Potosi	10,269.58
Commonwealth	57,313.82	Savage	49,306.14
Grand Prize	32,597.05	Seg. Belcher & Mides Con.	31,056.09
Holmes	2,799.15	Union Con.	1,900.32
Kentuck	946.25		
Nevada Queen	60,312.64		

* With unsold bullion valued at $5,885.16 as an offset.

† The indebtedness of Chollar is offset by bullion returns from ore not yet received.

Boston Mining Stocks. Jan. 17.

[From our Special Correspondent.]

In the early dealings this week the copper stocks were firm, with an upward tendency in prices. But on Tuesday a drive was made on the market by the shorts who are anxious to cover, in which they were aided by the array of figures published in the ENGINEERING AND MINING JOURNAL, showing an accumulation of copper, and also by the delay in completing the extension of the contracts between the syndicate and the producing companies. This delay has, doubtless, caused some anxiety on the part of timid holders, who rush into the market to sell on the first alarm of danger, and generally are quite as ready to take back their stocks at higher prices. A telegram from the New York agents of the syndicate seemed to reassure the timid ones, and the market recovered in part the decline.

Calumet & Hecla was forced down to $283, a fall of 12 points, but recovered to $290.

Boston & Montana has been quite extensively dealt in, and of course was one of the stocks to feel the effects of the bear rumors, and declined from $62 to $58⅜, recovering to $60. Rights declined from $7⅛ to $6⅛.

Tamarack declined from $156 to $150 with later sales at $151½. Rights sold down to $3¼.

Franklin was very weak and sold down to $14½, but rallied later to $15½.

Atlantic touched $17, and the announcement of the $2 dividend did not effect the market much, the latest sales being at $17¼.

Osceola declined to $19 but was firmer, with sales at $20.

Quincy firm at $85@$84. A $5 dividend is announced, and the report for the year is considered very satisfactory.

Kearsarge declined to $10 for a small lot, with later sales at $10⅝. Butte & Boston steady at $25½@$26.

Allouez declined to $3⅞ on sales of about 1500 shares, nearly all of which were in the early part of the week at $4¼@$4⅛, very little coming out on the decline.

Huron and National were both weak; the former declined from $6 to $4¼, and the latter from $7 to $5⅞.

Santa Fe has been very active this week, and was one of the stocks not affected by the raid, being well sustained. It opened at $2⅛, and advanced to $2⅝, with reaction to $2 1/16. About $23,000 shares were dealt in.

Bonanza dull at $1⅝.

In silver stocks, Catalpa sold at 19c., Dunkin at 95 @97½c.

Quite an active business was transacted in Napa Quicksilver, which advanced from $2½ to $3 1/16, reacting to $3.

LATER PRICES.

(*By Telegraph*).—January 17th, 1 P.M.—Calumet & Hecla, 285; Tamarack offered at 151; Quincy, 83; Boston & Montana, 59½; Osceola, 18 bid, 20 asked; Franklin offered at 16½; Allouez, 4¼; National, 6 bid; Kearsarge, 10 bid; Atlantic, 17 bid; Santa Fe, 2½.

San Francisco Mining Stock Market.

The annual dues for listed stocks are now payable at the exchanges. The dues at the San Francisco Stock and Exchange Board are $100 for each; the mining stocks and the companies will be given until the second Tuesday in February in which to pay them. If not paid on that date the delinquent stocks will be stricken from the list.

Deadwood Mining Stock Market.

[From our Special Correspondent.]

Mining stocks for the past year have been very quiet. The depreciation of Iron Hill from $3.50 to 10 cents seemed to have knocked the bottom out of every thing dealt in on the Deadwood Exchange, consequently the Exchange itself not having any business, closed its doors. Since the public became convinced that the Deadwood Reduction Works Company were really in earnest to build leaching works for the reduction of Bald Mountain and Ruby refractory ore, they have, however, manifested quite an interest in Ruby and Bald Mountain stocks, the principal trading being made in cheap stocks entirely prospective, the buyer holding them for an expected rise in sympathy with mines of merit, and in stocks having real merit, such as Golden Reward, Ruby Bell, Isadorah and several others. Since the collapse of Iron Hill, Carbonate stocks are neglected. Galena stocks have also been neglected because of the unsuccessful efforts of the combined camp to keep a 30-ton smelter at that place supplied with ore. The outlook for the present year is exceedingly bright for Ruby stocks, but rather discouraging for Carbonate and Galena stocks.

The reduction works are on the eve of starting up. The machinery is all in place, fluxing material has been ground by it, and before the 15th of the present month it will be in full blast. If successful Ruby stocks will see much higher prices. The past few days there has been quite a stir and trading in Iron Hill. Rumor has it that a 6-foot vein of ore has been struck. Something has also happened to Isadorah within the past week. Usually dull at 10 cents, an offer for 35,000 shares at 15 cents was refused. The recent unsuccessful attempt to clear the Uncle Sam of water has had the effect of depriving that stock of the little life it had before. Everything at present hinges on the success of the reduction works; if successful, and there is hardly any doubt of it, several dividend mines will be added to the list of Black Hills mines, and a great many hungry "cats" already prepared and waiting will no doubt grow slick and fat on public credulity.

NAME OF COMPANY.	District.	Opening, Jan., 1888.	Highest and lowest during the year.		Closing, Dec. 31, 1888.
Bullion	Carbonate	.03	.03	.....	.....
Blue Bird	Ruby	.01¼	.01	.00¼	.01
Bunker Hill	"	.02	.02	.00½	.02
Bald Mountain	"	.00½	.02	.00¼	.02
Bald Mountain, G. & S.	"	.00½	.02	.00½	.02
Cambrian	"	.00¼	.03	.03	.03
Calumet	"	.10	.25	.10	.20
Centre Shot	Galena	.01½	.....	.....	.....
Cora	"	.02	.05	.....	.....
Double Standard	Ruby	.00½	.08	.01½	.07¾
Eclipse	"	.00¼	.03	.01¼	.03
Equitable	"	.01⅛	.02	.01⅛	.1⅛
Enterprise	Carbonate	.01	.....	.....	.....
Eureka	"	.01½	.....	.....	.....
Florence	Ruby	.00¾	.02½	.01¼	.02
Golden Reward	"	.15	.67	15	.67
Glenwood	"	.01¼	.02	.01¼	.01¼
Harmony	"	.01	.011	.01¼	.11
Horseshoe-Comet	Galena	.05	.....	.....	.....
Hester A	"	.01½	.....	.....	.....
Isadorah	Ruby	.10	.12	.08	.15
Iron Hill	Carbonate	.80	.80	.07	.12
Jefferson	"	.03	.....	.....	.....
Liberty	"	.00¾	.....	.....	.....
Lew Wallace	Ruby	.00¼	.01	.00¼	.00¾
Lucille	"	.00¾	.02	.00½	.02
Maggie	"	.05	.05	.05	.05
Monarch	Spruce Gulch	.10	.15	.02	.....
Minna	Galena	.00¼	.....	.....	.....
Mutual	Carbonate	.02½	.....	.....	.....
Mugwump	"	.01	.....	.....	.....
New Era	Ruby	.00½	.07	.00½	.05
Pluma, Con.	Whitewood	.50	1.00	.50	1.00
Pocahontas	Carbonate	.00¼	.....	.....	.....
Rattler	"	.07	.07	.00¼	.00¼
Richmond	Galena	1.00	.....	.....	.....
Ruby Bell	Ruby	.00½	.25	.00½	.22
Ruby Wilkes	"	.01	.02½	.00¾	.02
Ruby Canyon	"	.05	.15	.05	.15
Ruby Flat	"	.00¼	.01	.00¼	.01¼
Ruby Wonder	"	.00¼	.01¼	.00¼	.01¼
Retriever	"	.02	.20½	.01½	.20
Steward	"	.08	.12½	.08	.12½
Silver Queen	Galena	.20	.....	.....	.....
Seabury-Calkins	Carbonate	.03	.....	.....	.....
Spanish R	"	.18	.18	.01½	.01½
Seg. Iron Hill	"	.02	.....	.....	.....
Tornado		.08	.32	.08	.19
Troy		.00½	.2½	.00½	.02
Uncle Sam		.09	.....	.....	.....

The above review for 1888 came too late for our annual statistical number, published January 12th, and which contained reviews of all the leading stock markets in this country, London and Paris.